EFFECTS OF McKENZIE AND LUMBAR STABILISATION PROTOCOLS ON SEXUAL DYSFUNCTION IN PATIENTS WITH CHRONIC MECHANICAL LOW BACK PAIN

BY

OLUBAMIKE IFEOLU ADERIBIGBE

(B.sc. (Physiotherapy), M.Sc (Physiotherapy) Ib.

MATRIC NUMBER 61512

A Ph.D THESIS IN THE DEPARTMENT OF PHYSIOTHERAPY

FACULTY OF CLINICAL SCIENCES, COLLEGE OF MEDICINE

UNIVERSITY OF IBADAN

Supervisor | External Examiner | Head of Department

EFFECTS OF McKENZIE AND LUMBAR STABILISATION PROTOCOLS ON SEXUAL DYSFUNCTION IN PATIENTS WITH CHRONIC MECHANICAL LOW BACK PAIN

BY

OLUBAMIKE IFEOLU ADERIBIGBE

(B.sc. (Physiotherapy), M.Sc (Physiotherapy) Ib.

MATRIC NUMBER 61512

A Ph.D THESIS IN THE DEPARTMENT OF PHYSIOTHERAPY

FACULTY OF CLINICAL SCIENCES, COLLEGE OF MEDICINE

UNIVERSITY OF IBADAN

Supervisor

External Examiner

Head of Department

EFFECTS OF McKENZIE AND LUMBAR STABILISATION PROTOCOLS ON SEXUAL DYSFUNCTION IN PATIENTS WITH CHRONIC MECHANICAL LOW BACK PAIN

BY

OLUBAMIKE IFEOLU ADERIBIGBE

(B.sc. (Physiotherapy), M.Sc (Physiotherapy) Ib.

MATRIC NUMBER 61512

A Thesis in the Department of PHYSIOTHERAPY

Submitted to the Faculty of Clinical Sciences, College of Medicine in partial fulfilment for the Degree of DOCTOR OF PHILOSOPHY

(Orthopaedic Physiotherapy)

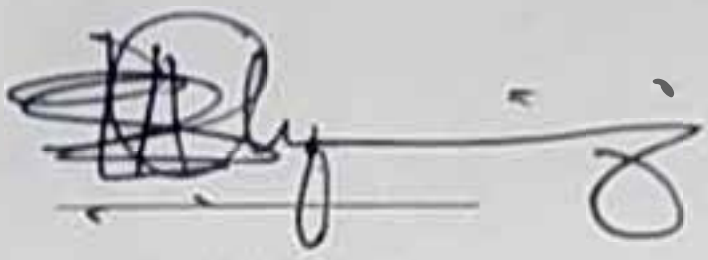
of the

UNIVERSITY OF IBADAN

August, 2017.

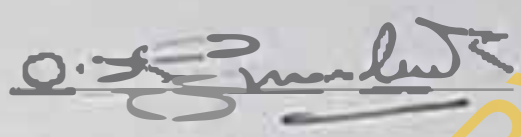
CERTIFICATION

We, Dr O. Ayanniyi and Prof. S.O Ogunlade hereby certify that this research work was carried out by Mrs Olubamike I. Aderibigbe in the Department of Physiotherapy, College of Medicine, University of Ibadan under our supervision.



MAIN SUPERVISOR
O. Ayanniyi, PhD
Reader,

Department of Physiotherapy,
College of Medicine,
University of Ibadan.



CO-SUPERVISOR
S.O Ogunlade
Professor / Consultant,

Department of Surgery,
College of Medicine,
University of Ibadan.

DEDICATION

This project work is dedicated to my LORD and SAVIOUR JESUS CHRIST and to great researchers who have worked tirelessly to bring succour to patients with back pain.

ABSTRACT

Chronic Mechanical Low Back Pain (CMLBP) has been associated with sexual dysfunction (SD). This problem is often not included in the management of individuals with CMLBP. McKenzie and Lumbar stabilisation are well established protocols for managing LBP. However, effects on SD have not been well elucidated. This study was designed to investigate the comparative effects of McKenzie and Lumbar stabilisation protocols on SD in patients with CMLBP.

The quasi-experimental study involved 61(males=23, females=38) individuals with CMLBP and associated SD consecutively recruited from the orthopaedic and general outpatient clinics, University of Ilorin Teaching Hospital. Participants were randomly assigned to either McKenzie Protocol Group (MPG; males=11; females=20) or Lumbar Stabilisation Protocol Group (LSPG; males=12; females=18). The MPG received McKenzie exercises (extension in prone lying, standing and side gliding exercises). The LSPG received lumbar stabilisation exercises (isometric co-contraction in prone lying, crook lying, kneeling, sitting positions, closed and open chain kinetic exercises). Both groups received treatment twice weekly for eight consecutive weeks. Sexual function questionnaire was used to assess sexual variables in females; (Sexual $Desire_{female}$ [SD_f], Lubrication, Orgasm, Sexual Satisfaction [SS_f] and SD $Total_{female}$ [SDT_f]) and males; (Sexual $Desire_{male}$ [SD_m], Erectile Dysfunction [ED], Ejaculation [Ej], Sexual Satisfaction [SS_m] and SD $Total_{male}$ [SDT_m]). Participants were assessed at baseline, 4th and 8th week of the study. Reduction from baseline scores signifies improvement in sexual dysfunction. Data were analysed using descriptive statistics and Student t – test at α 0.05.

The ages of MPG (49.3±12.8 years) and LSPG (52.3±10.5 years) were comparable. At baseline, sexual variables were comparable in MPG and LSPG. In Females SD_f (4.30±0.7 vs 4.5±0.8); SS_f (7.9±1.6 vs 8.12±1.3); Lubrication (9.3±2.2 vs 9.7±2.7); Orgasm (11.6±2.4 vs

11.8±2.1); SDT_f (33.1±5.6 vs 34.1± 5.6); and for Males: SD_m (3.6±1.3 vs 4.08±0.8); SS_m (7.3±1.7 vs 7.46±1.3); ED (7.2±1.2 vs 7.5±2.2); Ej (7.7±2.2 vs 6.7±2.4); SDT_m (25.7±3.9 vs 26.8±6.0) for MPG and LSPG respectively. At week four sexual variables were comparable in MPG and LSPG respectively: for Females SD_f (3.7±0.8 vs 3.3±1.0); SS_f (7.3±1.9 vs 8.4±7.0); Lubrication (8.0±2.2 vs 7.00±2.1); Orgasm (1.4±1.7 vs 10.1±1.8); SDT_f (29.4±5.3 vs 28.8±9.0); for Males: SD_m (2.9±1.1 vs 3.2±1.0); SS_m (6.0±1.6 vs 5.6±1.1); ED (6.1±1.0 vs 5.8±1.7; Ej(7.3±2.2 vs 6.0±1.3) for MPG and LSPG. At week 8, LSPG had significant greater reduction in sexual dysfunction than MPG in SD_f and SS_f in females: SD_f (3.4±0.8 vs 2.3±1.2); SS_f (6.2±1.5 vs 5.1±1.2) respectively. However, MPG and LSPG had comparable effects on Lubrication; Orgasm and SDT_f at week eight: Lubrication (6.7±1.5 vs 6.3±2.0); Orgasm (9.6±1.5 vs 9.0±1.8) and SDT_f (25.9±4.3 vs 22.8±5.8) for females. In Males, LSPG had a significant greater reduction in all the sexual variables than MPG at week 8, SD_m (2.90±1.0 vs 2.2±0.7); SS_m (5.9±1.1 vs 4.3±0.8); ED (6.1±1.2 vs 4.6±1.1); Ej (7.3±1.9 vs 5.0±1.1); and SDT_m (22.2±3.5 vs 15.9±3.5) respectively.

This study observed that Lumbar stabilisation protocol resulted in greater improvement than McKenzie protocol in sexual dysfunction, sexual desire, sexual satisfaction and erectile dysfunction in patients with chronic mechanical low back pain.

Keywords: McKenzie protocol, Lumber Stabilisation protocol, Sexual dysfunction.

Word Count: 491

ACKNOWLEDGEMENTS

My appreciation in the very first place is to Jehovah Shalom, the Almighty, the Omnipotent, Omniscience and Omnipresent, the Creator of heaven and earth and fullness thereof. May HIM alone be praised now and forever more. Amen. Thank you LORD for without YOU there is no me.

I could not have been able to carry out this study without the guidance of my able and thorough supervisor, Dr O. Ayanniyi. His fatherly care and belief in me is highly commendable. Through his advice and guidance, it was possible to carry out this study despite cultural and religious sensitivity of the study. I also appreciate Professor S.O. Ogunlade, my amiable co-supervisor for his support, encouragement, fatherly guidance and readiness to help despite his very busy schedule and professional advice. May the good Lord bless him and keep him and his household..

I am grateful to the Head of Department, Professor T.K Hamzat and all the lecturers in the department for creating the enabling environment and necessary push I need for this post graduate study. I acknowledge the encouragement and the push of Professor T.K Hamzat., thank you sir for without that push the work would not have gotten to this stage. May the good Lord envelop you with manifold blessings. Amen.

I thank Professor B.O.A Adegoke for creating the time despite his work load to attend to me and give professional and academic, support and encouragement; and for helping out in reading this work. I appreciate the kindness and selflessness of Dr Omoyemi O. Ogwuinike, Dr. Olusola C. Odole, and Dr Nse Odunaiya my wonderful lecturers and sisters, thanks for all the care and support, your constructive criticisms and contributions whenever I call on you. I appreciate Professor Arinola O. Sanya you were there both to encourage and push when I got slow with the work thank you ma. A big thank you to Professor Aderonke Akinpelu, Reverend A.O Jaiyesimi, Dr Ayo Fabunmi, Dr Omoyemi O. Ogwuinike, Dr.Olusola C. Odole my wonderful lecturers for being there for me throughout this programme, Dr A. F. Adeniyi, Dr Olubukola A. Olaleye and Dr Ayo Akinremi for their assistance, encouragement, and challenge. I am grateful to all the non-teaching staff of the department for their readiness to assist in various ways whenever necessary. Thank you Mrs Adebanke Adenekan for your love, care and support, may God bless you.

I am grateful to the authority of University of Ilorin Teaching Hospital for granting me the permission to involve their patients in the study. I gratefully acknowledge the contributions of all the consultants in Orthopeadic unit of the University of Ilorin Professor S.B Agaja, Dr M.O Babalola, Dr G.H. Ibraheem, Dr B. Hammed and Dr O.A Olawepo for their support and encouragement and referrals of the participants in this study. I appreciate my colleagues who served as my research assistants Mr Emmanuel Osinaike, Mr Olakunle Omotade.

I want to say a big thank you to my Head of Department, Physiotherapy Department, University of Ilorin Teaching Hospital Mr Alfred Abegunde, for giving me all the support, space , fatherly care throughout this postgraduate programme, I pray that God will help him in all his endeavours. I thank Dr Kamaldeen Oluseye, the Head of Department, Physiotherapy Department University of Ilorin for creating the time to read through my work and giving professional and academic advice. I appreciate the contributions of Mrs Mulikat O. Dosunmu, M.S Abdulkareem, Mr. Saliu Akinwale, Mr Uthman Anjorin, Mrs Gladys O. Alaba, Mrs Adefunke J. Ayanda, Mr Elijah Abolarin and the entire staff of the department, God bless you all.

I must not forget all the participants in this study whose involvement made this study possible and successful. I appreciate your contributions. God will bless all of them abundantly. I appreciate the great effort of my late father for his labour of love to educate me, my dear mothers Mrs Felicia O. Olawale and Mrs Mary A. Aderibigbe for ever being there for me and their constant prayers, may you live long to enjoy the fruits of your labour maximally. I thank God for my siblings- Mr Femi Olawale, Late Mr Akinropo Olawale (of blessed memory), Mr. Olutayo Olawale and Dr Omoniyi Olawale, Mrs Adedayo O. Adedeji, Mr Adetunji Aderibigbe, and Mrs Oluwaseun O. Ogunwale you are all wonderful. Thanks a million times Miss Dickola Banke Amoo and Miss Janet Onigbinde without your support it would have been extremely difficult to finish this programme, may God bless you.

I want to appreciate my pastors: Venerable Dr. And Mrs. A.S. Idowu, Reverend Professor and Dr (Mrs) A.M. Okorie, Reverend Pastor and Mrs. C.O Ogunkunle, Venerable Dr. and Mrs. J.O. Osaji, Reverend Dr. E.O. and Mrs. Malomo. You have been pillars of strength and encouragement unto me throughout this struggle. I pray the good Lord reward you and bless you abundantly. Amen.

I appreciate my wonderful and lovely children, IniOluwa. IfeOluwa and Ayodeji IyinOluwa. Thank you for being there for me all the time, thank you for your understanding and support all the time. The good Lord will make praises to Him all the days of your lives. I say a big thank you to my darling husband Dr A.B. Aderibigbe for being there for me encouraging me despite your busy schedule you supported me all the way through. Sweet heart, you are the best thing that can happen to a woman, am blessed to be that woman. May the Almighty God continue to bless and keep you to the end of your race on this side of eternity. Amen.

TABLE OF CONTENTS

		PAGE
Title page		i
Certification		ii
Dedication		iii
Abstracts		iv
Acknowledgement		vi
Table of contents		ix
List of Tables		xiv
List of Figures		xv
CHAPTER 1: INTRODUCTION		
1.1	Introduction	1
1.2	Statement of the Problem	5
1.3	Aims of study	6
1.4	Hypotheses	6
1.5	Delimitation of study	8
1.6	Limitation	9
1.7	Inclusion Criteria	9
1.8	Exclusion Criteria	10
1.9	Significance of study	10
1.10	Definition of Terms	10
CHAPTER 2: LITERATURE REVIEW		
2.1	Low Back Pain	12
2.2	Burdens of Low Back Pain	12
2.3	Risk Factors for Low Back Pain	13
2.3.1	Risk Factors for the Occurrence of Low Back Pain	13
2.3.2	Risk Factors for the transition of low back pain to Chronic Low Back Pain	14
2.4	Chronic Low Back Pain and Muscular Dysfunction	14

2.4.1	Chronic Mechanical Low Back Pain and Dysfunction of the Local stabiliser's	14
2.4.2	Chronic Low Back Pain and Lumbo-pelvic Stability	15
2.4.3	Causes of Sexual Dysfunction in General Population	17
2.4.4	Management of Sexual Dysfunction	18
2.4.5	Chronic Low Back Pain and Sexual Dysfunction	18
2.4.6	Assessing Sexual Activity of Patients with Chronic Low Back Pain	20
2.5	Muscles of the Low Back and their functional classification	21
2.6	The functional classification of spinal muscle	21
2.6.1	Local stabilisers	24
2.6.2	The Global Stabilisers	24
2.6.3	The Global Mobilisers	24
2.6.4	Pelvic Floor Muscles	25
2.7	Retraining of the Lumbar Spine Segmental Muscles	26
2.8	The Stabilising System of the Spine (The Low Back	27
2.8.1	The Passive Sub-system	27
2.8.2	The Neural Sub-system	27
2.8.3	The Active Sub-system	34
2.9	Management of Chronic Low Back Pain	34
2.9.1	Therapeutic Exercises	34
2.9.2	McKenzie protocol in the management of CMLBP	35
2.9.3	Lumbar Stabilisation Protocol in the Management of CMLBP	35
2.9.4	Principle of Activation and Retraining Deep Stabilisers of the Spine	36

2.10 System Reviews of Lumbar Stabilisation and McKenzie protocols in managing Chronic Mechanical Low Back Pain 37

Chapter 3: Materials and Methods

3.1 Materials 41

3.1.1 Participants 41

3.1.2 Instruments 41

3.1.3 Venue of Research 42

3.2 Methods 42

3.2.1 Methodology 42

3.2.2 Sampling Technique 42

3.2.3 Sample size calculation 44

3.3.1 Procedure 44

3.3.2 Recruitment Procedure 44

3.3.3 Validation of Sexual Function Questionnaire 45

3.3.4 Assignment into Groups 45

3.3.5 Clinical Assessment 46

3.3.6 Measurement of Parameters 46

3.4 Intervention 46

3.4.1 Assessment of Participants in Group One: McKenzie Protocol Group 46

3.4.2 McKenzie Protocol Testing 47

3.4.3 Intervention using McKenzie Protocol 49

3.4.3.1 Treatment of the Postural Syndrome 49

3.5 Group Two: Lumbar Stabilization Protocol Group (LSPG) 52

3.5.1 Patient's education and Baseline Assessment of local Stabilisers 52

3.5.2 Intervention using Lumbar Stabilisation Protocol 53

3.5.3 Prescription of Home Programme 55

3.6 Data Analysis 55

Chapter 4: Results and Discussion

4.1 Results 74

4.1.1 Participants' Profile 74

4.1.2 Comparison of Participants' Baseline Parameters 74

4.1.3 Effect of McKenzie protocol on Sexual Dysfunction Variables (SDV) in CMLBP at baseline, weeks 4 and 8 76

4.1.4 Effect of Lumbar Stabilisation Protocol on Sexual Dysfunction Variables in CMLBP at baseline, weeks 4 and 8 76

4.1.5 Effects of MP on pain, fear avoidance beliefs, sexual interference and sexual satisfaction 76

4.1.6 Effects of LSP on pain, fear avoidance beliefs, sexual interference and sexual satisfaction 77

4.1.7 Comparison of Baseline Sexual Dysfunction Variables (SDV) in Participants in McKenzie and Stabilisation Groups in CMLBP 77

4.2 Hypothesis Testing 92

4.3 DISCUSSION 99

4.3.1 Participants' Social-demographic Profile 99

4.3.2 Drop-out rate among the participants 99

4.3.3 Baseline Comparison of Participants' Sexual Variables 100

Variable in Participants across the eight weeks of study 100

4.3.5 Effects of Stabilisation Protocol on the Sexual Dysfunction Variables of Participants across the eight weeks of study 101

4.3.6 The Comparative Effects of McKenzie and Stabilisation Protocols on the SDV of Participants across the eight weeks of Study 101

4.3.7 Pain during Sexual Activity and Sexual Satisfaction 102

4.3.8 Clinical Implication of Findings 103

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary 104

5.2 Conclusion 106

5.3. Recommendations 106

REFERENCES 107

APPENDICES

A. UI/UCH Ethical Committee approval letter 119

B. UITH Ethical Committee approval letter 120

C. The Pressure Biofeedback 121

D. Chronic Pain Grading Scale 122

E. The McKenzie Institute Lumbar Spine Assessment Chart 124

F. The Oswestry Disability Index (Version 2) 127

G. Sexual Function Questionnaire 129

H. Question 20 WHOOL-Bref 132

I. Informed Consent Form 133

LIST OF TABLES

TABLE TITLE	PAGE
Table 1: Literature Review of Sexual Problems in Patients with Chronic Mechanical Low Back Pain	23
Table 2: Summary table for previous studies that compared in the McKenzie and Stabilisation Exercise in Patients with LBP	39
Table 3: Comparison of the Participants' Baseline Parameters	76
Table 4: The Effects of MP on Sexual Dysfunction Variables in CMLBP at baseline, weeks, 4 and 8.	78
Table 5: Repeated measures of ANOVA and Bonferroni Post Hoc of treatment outcomes in MPG across the 3 time points of the study.	79
Table 6: The Effects of LSP on Sexual Dysfunction Variables in CMLBP at Baseline, weeks 4 and 8	81
Table 7: Repeated measures of ANOVA and Bonferroni Post Hoc of treatment outcomes in LSPG across the 3 time points of the study.	82
Table 8: Comparison on Sexual Dysfunction Variables in the Participants in MP and LSPG at Baseline	84
Table 9: Comparison of the Effects of MP and LSP on Sexual Dysfunction Variables at week 4	85
Table 10: Comparison of the Effects of MP and LSP on Sexual Dysfunction Variables at week 8	86
Table 11: Repeated measures of ANOVA and Bonferroni Post Hoc of treatment outcomes among participants in MPG	

across the 3 time points of the study. 89

Table 12: Repeated measures of ANOVA and Bonferroni Post Hoc of treatment outcomes among participants in MPG across the 3 time points of the study. 90

Table 13: Comparison of Mean Outcomes at Baseline, 4 and 8 weeks of Intervention in both treatment groups. 91

LIST OF FIGURES

FIGURE NUMBER	PAGE
Figure 1: Vicious cycle of Pain, muscle inhibition and Dysfunction of Chronic Mechanical Low Back Pain	22
Figure 2: Diagram showing the Multifidus Muscles	28
Figure 3: Diagram showing the lateral view of the Multifidus Muscles	29
Figure 4: Diagram of the anterior view of the Transversus Abdominis	30
Figure 5: Diagram of the corset-like shape of the Transversus Abdominis	31
Figure 6: The female perineum showing the Pelvic Floor Muscles	32
Figure 7: Male perineum showing the Pelvic Floor Muscles	33
Figure 8: Prone Lying Position for McKenzie Protocol Group	57
Figure 9: Static extension in prone Lying for McKenzie Protocol	58
Figure 10: Active McKenzie extension exercise from prone Lying	59
Figure 11: Active McKenzie back extension exercise	60
Figure 12: McKenzie Trunk Rotation in Standing	61
Figure 13: Trunk Flexion in Sitting for McKenzie	62

Figure 14: McKenzie side bending 63

Figure 15: Retraining the co-contraction of the Transversus Abdominis, Multifidus, Pelvic Floor Muscles 64

Figure 16: Crook Lying position for co-contraction of the Transversus Abdominis, Multifidus and Pelvic Floor Muscles 65

Figure 17: Four point Kneeling Position for co-contraction of the Transversus Abdominis, Multifidus and Pelvic Floor Muscle 66

Figure 18: Retraining co-contraction of the Transversus Abdominis, Multifidus and Pelvic Floor Muscles 67

Figure 19: Open Kinetic Exercises for Lumbar Stabilisation Integrating the limbs 68

Figure 20: Open Kinetic Exercises for Lumbar Stabilisation – Limb Integration in supine lying 69

Figure 21: Open Kinetic Exercise in Stabilisation protocol – Limb Integration in prone lying 70

Figure 22: Starting position for closed chain kinetic exercise 71

Figure 23: Close Kinetic Exercises for Lumbar Stabilisation Protocol 72

Figure 24: Close chain Kinetic Exercises for Lumbar Stabilisation Protocol 73

Figure 25: Comparison of Sexual Dysfunction Total in the Participants in the MPG and LSPG across the three

Point time 87

Figure 26: Comparison of the effects of MP and LSP on Sexual

Dysfunction variables across the three Point time 88

CHAPTER ONE

INTRODUCTION

1.1 Background

Lowback pain (LBP) is the commonest musculoskeletal problem requiring hospital visits (Omokhodion and Sanya, 2003 and Lu and Javier, 2011), and is the third leading cause of disability resulting in significant restrictions of activities of daily living (ADL), activity participation and absenteeism at work (Hong et al, 2012; Chou, Qaseem and Snow et al., 2007). Low back pain (LBP) is pain, muscle tension or stiffness, localized in the back below the costal margin and above the gluteal folds with or without leg pain (Mitchell, 2010). Low back pain can either be described as specific that is caused by specific pathologies or non-specific that is low back pain with no clear cut pathologies and is referred to as mechanical low back pain. This category of low back pain constituted greater than 90% of all low back pain cases (Johnson 2012; El-Gendy et al., 2015). Chronic mechanical low back pain can be described as low back pain that lasts for more than three months (Geisser et al., 2005). Chronic Mechanical Low Back Pain (CMLBP) is a more difficult problem which often has strong psychological overlay; work dissatisfaction and boredom (Ehrlich, 2003).

The incidence and prevalence of low back pain are roughly the same globally (Ehrlich 2003), the lifetime and one year prevalence of low back pain has been put as 60% – 80%, and 34% respectively (Waddell, 2004). Studies reported that 80% to 90% of patients who suffered an acute episode of LBP would have resolution of symptoms enough to go back to work within 12 weeks, regardless of the treatment intervention employed. However, the rate of recurrence of symptoms is very high with men suffering more recurrence than women (Burton, 2005; Mitchell, 2010; Hong et al., 2012). Highest recurrence occurred within the age bracket of 25-54 years (Lu and Javier, 2011). The prevalence of chronic, impairing LBP has risen significantly globally with attendant high levels of disability and health care use (Ferburger et al., 2009).

Low back pain is a significant burden not only to the individual who has it but also to their families, workplace, and society in general. Disability associated with low back pain continued to rise, thereby constituting a substantial economic burden to the patients, caregivers and the society in terms of cost, significant role change, work day

loss and emotional distress resulting in depression (Maniadakis and Gray, 2000; Gray et al., 2011; Janwantanakul et al., 2012). Chronic mechanical low back pain can result in reduction of patients' quality of life due to the suffering and limitations the condition puts on patients' leisure, professional and functional activities as well as sexual life (Franca, Burke, Hanada and Marques 2010). This may in turn adversely affect other important aspect of life of patients such as sexual relationship (Kumar et al., 2009).

Randomized clinical trials revealed that chronic low back pain (CMLBP) was strongly associated with fear of movement that resulted in the patients' activity restriction where patients avoided physical activities because it is believed to either cause pain or increase pain. Subsequently, the pain experienced combined with fear avoidance beliefs can reduce the quality of life of patients with chronic mechanical low back pain (Rosenbaum 2009, Arab et al., 2010 and Antunes et al., 2013).

Sexual Dysfunction refers to a problem occurring during any phase of the sexual response cycle that prevent the individual or couple from experiencing satisfaction from the sexual activity (Chen et al., 2013). Human sexuality is broadly divided into three aspects namely: sexual function, sexual self-concept and sexual relationships and any of these aspects may be affected by chronic mechanical low back pain. (Sparkman-Johnson, 2003). Several clinical trials reported a strong association between chronic low back pain and sexual dysfunction, these comparative studies demonstrated more than one hundred percent increase in sexual dysfunction among the individuals with chronic low back pain compared with matched control of individuals who had no complaints of low back pain (Bergs, Fritzell and Tropp 2009, Bahouq, Fadoua, Hanan et al., 2013, and Nikoobakht, Fraidouni, Yaghoubidoust, et al., 2014).

Frequency of sexual activity and sexual quality of life is reported to be significantly reduced in individuals with chronic mechanical low back pain, the fear that sexual activity will either increase present pain or exacerbate their pain and other symptoms have been implicated in the sexual dysfunction in individuals with low back pain (Ambler, Williams, Hill et al., 2001; Nikoobakht, Fraidouni, Yaghoubidoust et al., 2014). This fear was reported to cause complete cessation of sexual activity in some individuals with chronic mechanical low back pain. Sexual domains in men are sexual desire, sexual satisfaction, erectile dysfunctions and premature ejaculation, but erectile

dysfunction and premature ejaculation are the two main complaints in male sexual dysfunction (Lindau, Schumm, Laumann et al., 2007 and Hatzimouratidis et al., 2010). While the sexual domains in women are sexual desire, sexual satisfaction, orgasm and vaginal lubrication, but orgasm and vaginal lubrication problems were the frequent sexual dysfunction complaints in the studied populations (Karabulutlu, Okanli and Siyrikaya, 2011: Chen et al., 2013)

The prevalence of sexual dysfunctions among individual with low back pain is reported to be between 63% and 81% of the studied populations (Breton, Miller and Fisher 2008; Bergs, Fritzell and Tropp 2009; Bahouq, Fadoua, Hanan et al., 2013; Nikoobakht, Fraidouni, Yaghoubidoust et al., 2014). Similarly studies in Nigeria reflected that sexual dysfunction ranging from 53.3% to 84% among the studied populations (Fajewonyomi, Orji and Adeyemo 2007; Ojomu, Thacher and Obadofin 2007; Oyelade, Jemilohun, and Aderibigbe 2015; and Oyewole, Ogunlana and Gbiri 2017).

Pain and fear avoidance beliefs that were responsible for inhibition of the core muscles (Multifidus, Transversus Abdominis and Pelvic floor muscles), and activity restriction in individuals with low back pain; studies reported muscle inhibition persists even after significant pain relief was achieved (Sapsford 2004, Stuge et al., 2006 and Arab et al., 2010). Sapsford (2004) reported synergy in Transversus Abdominis, Multifidus and Pelvic floor muscles, suggesting that chronic low back pain induces dysfunction in all these muscles.

The McKenzie protocol is a popular classification based system and treatment for low back pain proposed by Robin McKenzie in 1981(McKenzie and May, 2003). It is widely considered to be highly effective for patients with spinal pain (McKenzie and May, 2003). It is a popular classification system and a classification-based treatment programme for LBP, it is also known as Mechanical Diagnosis and Therapy (Clare et al, 2004). This protocol was founded on the principle that mechanical forces are not accepted properly by certain tissues, such as paraspinal muscles, spinal articular joints, intervertebral discs, and neural tissue, leading to tissue damage and subsequent injury during both static and dynamic positions (May, 2007).It is a detailed approach to chronic mechanical LBP that includes both an assessment and an intervention component

(Mckenzie nnd May, 2003; Clare et al., 2004; Ayanniyi et al., 2007) The McKenzie method has good evidence to support its validity, reliability, amongst trained healthcare pmctitioners (Clare et al, 2004; May and Donelson, 2008) The McKenzie method of mechanical diagnosis uses the directional preference system, the principle of centralization and peripheralisation of symptoms (Machado et al, 2006). The McKenzie protocol (lumbar extension) was reported to activate the Multifidus nnd Gluteus maximus and by synergy the Pelvic Floor Muscles in iodividuals with chronic low back pain (Dabholknr and Raphy 2012).

The Lumbnr Stabilization Protocol for the management of chronic low back pain was first proposed by Panjabi (1992). This protocol stnnds on the premise that three systems; the nrticular, the muscular and neural systems work together to provide spinal stabilisation by controlling intervertebral movement, Panjabi proposed there is an alteration in the normal pattem of muscle recruitment changes after an episode of low back pain. It is based on the principle of local spinal stabilisers' inactivation following first episode of low back pain which mny not likely resolve automatically. It advocates the retraining and re-activation of the core stabilizers Transversus Abdominis (TrA), Multifidus (MF) and Pelvic Floor Muscles (PFM) using low-loading strategy. The Lumbar Stabilisation protocol was developed for retraining control of the stabilizing muscles around the spine, the main focus of this protocol was to reactivate the inhibited segmental muscles, retrain the functions of these muscles: the feedforward and motor control functions (Comerford and Mottram 2001, Sapsford 2004). The Lumbar Stabilisation protocol function to activate Transversus Abdominis (TrA) Multifidus (MF) and pelvic floor muscles (Sapsford 2004 and Hosseinifar 2013).

Chronic low back pain has been implicated to induce dysfunction in the pelvic floor muscles with consequent development of sexual dysfunction in the affected individuals (Newmann and Gill 2002, Sapsford 2004, Rosenbaum 2007). However, McKenzie protocol (Machado et al., 2006, Garcia et al., 2011 and Dabholkar and Raphy 2012) and Lumbar Stabilisation protocol (Arnora et al., 2012, Hosseinifar et nl., 2013 and You, Kin, Ho and Chon 2014) have been reported to be beneficial in the management of chronic low back pain, and also in activating the inhibited muscles: multifidus, ghiteus maximus, transversus abdominis and pelvic floor muscles, which may consequently

amcliorate the sexual dysfunction usually associated with chronic mechanical low back pain (Comerford and Mottram 2001, Dabholkar and Raphy 2012, and Hosseinifar et al 2013).

The objective of this study was to compare the effects of McKenzie and Lumbar Stabilisation protocols in ameliorating sexual dysfunction problem in participants with chronic mechanical low back pain.

1.2 STATEMENT OF THE PROBLEM

Chronic mechanical low back pain (CLBP) is one of the serious major public health problems that have high economic and social costs, loss of job and disability in many of the populations (Chou, Qaseem and Snow et al., 2007). Studies have shown sexual dysfunction as a consequence of LBP is common but not routinely assessed by Physiotherapists (Bahouq, Fadoua and Hanan et al., 2013; Nikoobakht, Fraidouni and Yaghoubidoust et al., 2014). There are numerous conservative management approaches to treating low back pain that choice at times poses a challenge to Physiotherapists and also assessing sexual dysfunction is not routinely carried out in patients with chronic low back pain because of its sensitive nature, the most targeted outcome measures are pain and functional disability scores. McKenzie (MP) and Lumbar Stabilisation (LSP) are well established protocols for effective management of chronic mechanical low back pain, reducing pain, activating inhibited muscles secondary to onset of low back pain and improving functional abilities (Clare, Adams and Maher 2004, Miller, Schenk, Karnes and Rousselle 2005, May 2007, Dabholkar and Raphy, 2012 and Hosseinifar, Behtash, Amin and Sarrafzadeh 2012).

However, there is dearth of published studies on direct therapeutic effects of McKenzie and Lumbar stabilisation protocols on sexual dysfunction accompanying CMLBP outside the western world. The question was will there be any effect of these protocols on sexual dysfunction associated with chronic mechanical low back pain (CMLBP)? This study was therefore designed to investigate the comparative effects of McKenzie and Lumbar Stabilisation protocols on sexual dysfunction in patients with chronic mechanical low back pain.

Research Questions:

i. What will be the effect of an eight week McKenzie and Lumbar Stabilisation protocols on the sexual dysfunction in CMLBP?

ii. Will McKenzie and Stabilisation protocols have comparable effect on sexual dysfunction in CMLBP?

1.3 Aims of the study

The aims of this study were to:

1. Investigate the effects of McKenzie protocol on the sexual dysfunction variables at 4th and 8th week in patients with chronic mechanical low back pain (CMLBP).
2. Investigate the effects of Lumbar Stabilisation protocol on sexual dysfunction variables at 4th and 8th week in patients with CMLBP.
3. Compare the effects of McKenzie and Lumbar Stabilisation exercise protocols at 4th and 8th week on sexual dysfunction variables in patients with CMLBP.

1.4 Hypotheses

1.4.1 Major Hypothesis

There will be no significant difference in the effects of McKenzie protocol and Stabilisation protocol on sexual dysfunction variables at 4th and 8th week of the study.

1.4.2 Sub- hypotheses

1. There will be no significant difference in the sexual dysfunction total scores of participants in McKenzie protocol group (MPG) at the baseline, 4th and 8th weeks of the study.
2. There will be no significant difference in the sexual desire of participants in McKenzie protocol group (MPG) group at baseline, weeks 4 and 8 of the study.
3. There will be no significant difference in the lubrication of female participants in MPG at baseline, weeks 4 and 8 of the study.
4. There will be no significant difference in the orgasm of female participants in at baseline, weeks 4 and 8 of the study.

5. There will be no significant difference in the sexual satisfaction of participants in MPG at baseline, weeks 4 and 8 of the study.
6. There will be no significant difference in the erectile dysfunction of male participants in MPG at baseline, weeks 4 and 8 of the study.
7. There will be no significant difference in the ejaculation of male participants in MPG across baseline, weeks 4 and 8 of the study.
8. There will be no significant difference in the sexual dysfunction total scores of participants in Lumbar Stabilization group (LSPG) at baseline, 4th and 8th weeks of the study.
9. There will be no significant difference in the sexual desire of participants in LSPG across baseline weeks 0, 4 and 8 of the study.
10. There will be no significant difference in the Lubrication of female participants in LSPG across baseline, weeks 4 and 8 of the study.
11. There will be no significant difference in the Orgasm of female participants in LSPG across baseline, weeks 4 and 8 of the study.
12. There will be no significant difference in the sexual satisfaction of participants in LSPG across baseline, weeks 4 and 8 of the study.
13. There will be no significant difference in the erectile dysfunction of male participants in LSPG across baseline, weeks 4 and 8 of the study.
14. There will be no significant difference in the ejaculation of male participants in LSPG at baseline, weeks 4 and 8 of the study.
15. There will be no significant difference in the effects of the two treatment protocols (MP and LSP) on the Sexual Desire of participants at week 4 of the study.
16. There will be no significant difference between the effects of the MP and LSP on Lubrication scores of participants at week 4 of the study.
17. There will be no significant difference between the effects of the two treatment protocols on the Orgasm scores of participants in MPG and LSPG at week 4 of the study.
18. There will be no significant difference between the effects of MP and LSP on the Sexual Satisfaction of participants in MPG and LSPG at week 4 of the study.

5. There will be no significant difference in the sexual satisfaction of participants in MPG at baseline, weeks 4 and 8 of the study.
6. There will be no significant difference in the erectile dysfunction of male participants in MPG at baseline, weeks 4 and 8 of the study.
7. There will be no significant difference in the ejaculation of male participants in MPG across baseline, weeks 4 and 8 of the study.
8. There will be no significant difference in the sexual dysfunction total scores of participants in Lumbar Stabilization group (LSPG) at baseline, 4th and 8th weeks of the study.
9. There will be no significant difference in the sexual desire of participants in LSPG across baseline weeks 0, 4 and 8 of the study.
10. There will be no significant difference in the Lubrication of female participants in LSPG across baseline, weeks 4 and 8 of the study.
11. There will be no significant difference in the Orgasm of female participants in LSPG across baseline, weeks 4 and 8 of the study.
12. There will be no significant difference in the sexual satisfaction of participants in LSPG across baseline, weeks 4 and 8 of the study.
13. There will be no significant difference in the erectile dysfunction of male participants in LSPG across baseline, weeks 4 and 8 of the study.
14. There will be no significant difference in the ejaculation of male participants in LSPG at baseline, weeks 4 and 8 of the study.
15. There will be no significant difference in the effects of the two treatment protocols (MP and LSP) on the Sexual Desire of participants at week 4 of the study.
16. There will be no significant difference between the effects of the MP and LSP on Lubrication scores of participants at week 4 of the study.
17. There will be no significant difference between the effects of the two treatment protocols on the Orgasm scores of participants in MPG and LSPG at week 4 of the study.
18. There will be no significant difference between the effects of MP and LSP on the Sexual Satisfaction of participants in MPG and LSPG at week 4 of the study.

19. There will be no significant difference in the effects of the McKenzie and Lumbar Stabilisation protocols (MP and LSP) on the Erectile Dysfunction in the participants at week 4 of the study.
20. There will be no significant difference in the effects of the two treatment protocols MP and LSP on the Ejaculation in the participants at week 4 of the study.
21. There will be no significant difference in the effects of the two treatment protocols MP and LSP on the Sexual Dysfunction Total scores in the participants at week 4 of the study.
22. There will be no significant difference in the effects of the two treatment protocols on the Sexual Desire of participants at week 8 of the study.
23. There will be no significant difference between the effects of MP and LSP on Lubrication of participants at week 8 of the study.
24. There will be no significant difference between the effects of MP and LSP on the Orgasm of participants in MPG and LSPG at week 8 of the study.
25. There will be no significant difference between the effects of MP and LSP on the Sexual Satisfaction of participants in MPG and LSPG at week 8 of the study.
26. There will be no significant difference in the effects of the two treatment protocols MP and LSP on the Erectile Dysfunction in the participants at week 8 of the study.
27. There will be no significant difference in the effects of the two treatment protocols MP and LSP on the Ejaculation in the participants at week 8 of the study.
28. There will be no significant difference in the effects of MP and LSP on the Sexual dysfunction total scores in the participants at week 8 of the study.

1.5 Delimitation of Study:

This study was delimited to the following:

1. Participants: Individuals diagnosed as having symptoms of mechanical low back pain that lasted for more than twelve weeks with associated sexual dysfunction.
2. Individuals with scores above 19 on the sexual function questionnaire

3. Aged of between 18 to 65 years.

4. Instruments:

i. McKenzie Assessment Forms for the Lumbar Spine (McKenzie, 2005) was used to assess the categories of chronic mechanical low back pain.

ii. Sexual Function Questionnaire: This was used to measure the sexual dysfunction scores in patients with chronic mechanical low back pain.

iii. The Pressure biofeedback unit: Manufactured by Chattanooga Company Vista CA 92081 USA. This was used to retrain the Transversus Abdominis, Multifidus and Pelvic Floor Muscles for participants in the Stabilization group.

iv. The Chronic Pain Grading Scale: This was used to assess the pain and effects of pain on function (Von Korff et al., 1992).

v. The Oswestry Disability Questionnaire – version 2: This was used to assess the interference of pain in the sexual life of the participants (Fairbank, Couper and Davies 2000).

vi. Stop watch (Quartz, USA): The stop watch was used in muscle re-training co-contraction of Transversus Abdominis, Multifidus and pelvic floor muscles.

vii. WHO- BREF Quality of Life Questionnaire: This abbreviated version assessed quality of life in four dimensions—physical, psychological, social, and environmental health.

1.6 Limitation of the Study

The compliance of participants to their home programme could not be ascertained, but they were asked to repeat the home programme exercise during next clinic before the day's treatment in order to ascertain their knowledge of the home programme and the ability to carry it out unsupervised.

1.7 Inclusion Criteria

1.7.1 Participants

The participants recruited into this study were:

1. Individuals with mechanical low back pain.
2. Individuals with history of mechanical low back pain of 3 or more months.

3. Participants with scores above 19 on the sexual function questionnaire.
4. Aged of between 18 to 65 years.

1.8 Exclusion Criteria

Individuals with the following conditions were excluded from the study:

i. Specific spine pathology (examples tuberculosis of the spine and tumors).
ii. Diabetes mellitus and Hypertension.
iii. Co-morbidity that influenced overall wellness of the patients, examples are sickle cell anemia, painful disabling upper or lower extremity arthritis, referred pain to the low back from other organs, example kidney disorders and metastasis to the spine (Wadell 2004).
iv. Pregnancy
v. Age younger than 18 year.

1.9 Significance of the Study

The outcome of this study:

1. Provided clinical evidence of the appropriateness and effect of McKenzie and Stabilization exercise protocols on the sexual dysfunction in patients with chronic mechanical low back pain.
2. Served as a scientific basis for further researches on the effect of McKenzie and Stabilization on pain- related sexual dysfunction in other musculoskeletal disorders.

1.10 Definition of Terms:

1. **Sexual Dysfunction:** Sexual dysfunction refers to difficulties that occur during the sexual response cycle that prevent the individual from experiencing satisfaction from sexual activity (Chen et al., 2013).
2. McKenzie Protocol: This is a simple non-invasive mechanical approach or method of managing back pain that utilizes a disciplined system of clinical interviews and physical examinations (McKenzie and May, 2003).
3. Lumbar Stabiliznion exercise protocol: This is an exercise protocol that is based on the principle of local spinal stabilizers' inactivation following first

episode of low back pain which likely does not resolve automatically. It advocates re-activation and retraining and control of the inhibited muscles (Richardson and Jull, 2002).

4. **Mechanical Low Back Pain:** This is described as low back pain of musculoskeletal origin in which symptoms vary with physical activity, posture and movement (Waddell, 1996)
5. **Chronic Mechanical Low Back Pain:** This is mechanical low back pain that has persisted for three months or more (Paul et al., 2008).

CHAPTER TWO

LITERATURE REVIEW

2.1 Low Back Pain

LBP has been described as pain, muscle tension, or stiffness localized below the costal margin and above the inferior gluteal folds, with or without leg pain (Mitchell et al., 2010; Froud, Eldridge, Kovacs et al., 2011). Low back pain can be classified according to the cause as specific or non-specific (Manek and MacGregor, 2005). The specific low back pain have known pathology whereas the non-specific are the low back pain with no clear cut pathology, they have musculoskeletal and respond to movements with the pain getting better or worse with change in physical activities (Waddell, 1996). Low back pain has been declared as a very common and costly musculoskeletal disorder (Woolf and Pfleger, 2003), most common musculoskeletal problem that brings patients to the hospital and number one cause of disability that affects people of less than 45years of age (Omokhodion and Sanya, 2003; Odole, Akinpelu, Adekanla and Obisanya 2011).

Pain has been described as a normal protective mechanism and physiological symptom of patients with low back pain, pain is the most reported symptom, other symptoms reported by patients include numbness, pins and needles, muscle weakness, stiffness and instability in the affected areas. Chronic pain, especially of the moderate-to-severe type, diminishes a person's quality of life, causes loss of work productivity, and may be associated with anxiety or depressive disorder (Lu and Javier, 2011).

Low Back Pain can be classified by duration classified LBP by duration as acute (0- 6 weeks), sub-acute (6 – 12 weeks) and chronic above 12 weeks (Liddle, Baxter and Gracey 2004). It is a global phenomenon with significant socio-economic consequences and results in significant activity restriction (Gray, Adefolarin and Howe 2011), a complex disorder with numerous contributing factors including physical (Mitchell, 2010), biological (Moseley, 2007), and psychosocial factors (Campbell and Edwards, 2009).

2.2. Burdens of Chronic Low Back Pain

The economic burden of chronic low back pain is described as the sum all cost associated with that condition which would not otherwise be incurred if that condition or disease did not exist (Odole, Akinpelu, Adekanla and Obisanya 2011). Low

back pain is a significant burden not only to the individual who has it but also to their families, workplace, and society in general. In Europe, the yearly burden of LBP to society amounts to #211 per person in Sweden and #260 per person in the United Kingdom. Although LBP remains the most common musculoskeletal complaint presenting to physicians and other therapists, controversy remains surrounding the precise cause of the pain in many patients, and appropriate therapies (Peterson, Bolton and Humphreys 2012). Low back pain is a major source of morbidity throughout the world (Ricci, Stewart and Chee et al., 2006).

This condition is one of the most common causes of disability, lost work-days and visits to primary care practitioners in high-income countries (Van Tulder et al., 2002). Not only does low back pain have physical, psychological, social and economic consequences on the individual, its impact upon families, communities, industries and governments is enormous (Weiner et al., 2006). The use of health care services for chronic LBP has increased substantially over the past 2 decades. Multiple studies using national and insurance claims data have identified greater use of spinal injections, surgery and Opioids (Luo et al., 2004), treatments most likely to be used by individuals with chronic LBP. Studies have also documented increase in medication prescription and visits to physicians, physical therapists, and chiropractors (Martin et al., 2008) because individuals with chronic LBP are more likely to seek care (Mortimer and Ahlberg, 2003; Izelenberg and Burdorf, 2004,), and to use more health care services (Von Korff et al., 2007), relative to individuals with acute LBP, increases in health care use are likely driven more by chronic than acute cases. Chronic low back pain is back pain that persisted for twelve weeks and beyond (Wadell, 2004). Chronic low back pain is a condition where biological, psychological and social factors interact and mutually influence each other, both as causal factors and in maintaining the complaints (Hagen et al., 2006; Dersh et al., 2006; Reme, Tangen, Moe and Eriksen, 2011).

2.3 Risk Factors for Low Back Pain

2.3.1 Risk factors for the occurrence of LBP

The risk factors in the development of mechanical low back pain are divided into: Individual, Psychosocial and Occupational factors. The individual factors are age, gender,

general health, high birth weights (males); psychosocial factors are stress, pain behaviour, cognitive functioning and depressive moods. The occupational factors are exposure to prolonged sitting, awkward postures/Provocative spinal postures, monotonous tasks, control of work, manual handling of materials, social support and job dissatisfaction (Scanell, 2003; Lis et al., 2007, Yilmas and Dedeli 2012, Kent and Kjaer, 2012), exposure to vibration (O' Sullivan, 2012) Dysfunction of local muscles namely transversus Abdominis and the multifidus has been implicated in the transition of acute low back pain to chronic low back pain (Comerford and Mottram, 2001).

2.3.2 Risk factors for transition of low back pain to chronic low back pain

The risk factors implicated in the transition of acute low back pain to chronic low back pain are categorized into individual, psychosocial and occupational factors. The individual factors include obesity, educational level, high levels of pain and disability, healthcare provider attitudes, and unemployment. The psychological factors are distress, depressive mood, somatisation, baseline long duration of pain, fear avoidance behaviour and job dissatisfaction, while the occupational factors include unavailability of light duties, lifting for more than three quarter of the day (Yilmas and Dedeli 2012).

2.4 Chronic Low Back Pain and Muscular Dysfunction

2.4.1 Chronic Mechanical Low Back Pain and Dysfunction of the Local Stabilisers

Comerford and Mottram (2001) in their research findings showed that there is local stability system dysfunction that develops only after the onset of pain and pathology. This dysfunction presents as dysfunction of the recruitments and motor control of the deep segmental stability system resulting in poor control of the neutral joint position. Although pain and dysfunction are thus related in back pain, when pain resolves with drugs and or therapy session or sessions, the muscle dysfunction may persists resulting in increased predisposition for recurrence, early progression into degenerative change and maintenance of global imbalance (Richardson, Jull, Hodges and Hides, 1999). Movement dysfunction can present as a local and or global problem, though both frequently occur concurrently, poor movement habits, poor postural alignment, and abnormal neuro-dynamic sensitization can contribute to the development of imbalance

between the local stability and global mobility muscles. This imbalance presents in terms of alterations in the functional length and recruitment of these muscles and results in abnormal force contribution by the muscles around a motion segment (Arab, Behabalani, and Lorestani et al., 2010).

The local muscles Transversus Abdominis (TrA), Multifidus function to control segmental stiffness of the spine, they are mono-segmental in origin and insertion therefore they stabilise the spine when they co-contract isometrically (Richardson and Jull 1995). Inhibition of these muscles following low back pain tends to activate the global muscles of the trunk to go into muscular stiffness in order to make up for the deficiency of the TrA, MF and PFM; this will lead to muscle spasm that exacerbates pain in individuals with low back pain (Comerford and Mottram 2001, Sapsford 2004)

The dysfunction following muscle inhibition places direction specific mechanical stress and strain on various structures in which, if overloaded beyond tissue tolerance resulting in pain and related pathology (Sapsford, 2004). Several researchers have conducted studies on the contribution of local and global muscles dysfunction to the development and transition of acute low back pain to chronic low back pain and attending consequences that result from chronic low back pain and ways of correcting this dysfunction (Comerford and Mottram, 2001; Rasmussen-Bar, Nilson-Wikmar and Arvidson, 2003; Sapsford, 2004; Crow, Pizzari and Buttifant, 2011; Hodges 2011). It is believed that altered function of deep stabilizing muscles of the trunk affects spinal stability. There is substantial evidence indicating that primary muscular impairment in patients with pain in lumbo-pelvic region is dysfunction and loss of motor control characteristics of deep local muscles (Richardson, Jull, Hodges and Hides, 1999; Jull and Richardson, 2000).

2.4.2 Chronic Low Back Pain and Lumbo-pelvic Stability

Vleeming et al., (2008) defined stability as the effective accommodation of the joints to each specific load demand through an adequately tailored joint compression, as a function of gravity, coordinated muscle and ligament forces under changing conditions. Lumbo-pelvic stability was defined by Perrott, Pizzari, Opar and Cook, (2012) as the ability of an individual to attain and then maintain optimal body segment alignment of the

spine (lumbar and thoracic), the pelvis, and the thigh in both static position and during dynamic activity. Optimal function of the passive, active and neuromotor joint control systems (optimal muscle recruitment patterns without substitution strategies), is required for effective load transfer and stability of the pelvis, (Arumugam, 2012; Perrott, Pizzari, Opar and Cook, 2012). Optimal lumbo-pelvic stability is a function of form closure (joint anatomy), force closure (additional compressive forces acting across the joints and neuromotor control. Impairment of these mechanisms may result in pain, instability, altered lumbo-pelvic kinematics and changes in muscle strength and muscle control (Arumugam, 2012).

Several studies have strongly associated occurrence of injury and pain with inhibition of these local stabilizers and that though pain may resolve the dysfunction persists (Sapsford, 2004; Macedo et al., 2008; Arab, Behabadani, Lorestani and Azari, 2012), the associated dysfunction may then lead to over activity of the global muscles of the spine which tends to take over spine stabilization. This process encourages unfavourable neuroplastic changes (loss of motor control, delayed feedforward action and delayed timing of activation) that are known to occur in association with pain (Rasmussen-Barr, 2003; Boudreau et al., 2010; Wand, Chiffelle, O'Connell et al., 2010).

Beales, O'Sullivan and Briffa (2009) proposed that alteration to the functioning of the deep stabilizing muscles may be a reason for ongoing pain and is believed to affect Lumbo-pelvic stability. Several studies have found a strong association between chronic low back pain and dysfunction of the deep segmental muscles and the pelvic floor muscles that are responsible for the stability of the spine. Studies have shown that though pain from low back pain may resolve, the associated dysfunction does not resolve (Rasmussen-Barr et al., 2003, Stuge, Sactre and Braekken, 2011 and Wand , Chiffelle and O'Connell et al., 2010).

The muscle activity that occurs 100ms before continuing to 50ms after the onset of the movement (referred to as anticipatory feedforward activity) in TrA, MF and PFM is a protective mechanism to provide stability at the spinal and pelvic region in any activity(Falla, Jull and Hodges, 2004). Verbunt, Seelen and Vlaeyen et al., 2003 suggested in their revealed CMLBP was closely related to increase in pain, psychological distress, and reduction in the activity of these muscles. Several studies have indicated a

compromise in the feedforward activity and isometric muscle fatigue in TrA, MF, PFM after the onset of low back pain (Comerford and Mottram, 2001; Falla, Jull and Hodges 2003).

This may explain why 43% of patients with acute low back pain seen in primary health care settings develop chronicity and nearly one third do not recover in one year (Henschke et al., 2008). Changes in the timing of activation of Transversus Abdominis muscle have been correlated to the quality of training and are associated with improvement in self-reported pain and function (Tsao, Galea and Hodges, 2010). This pain and its relationship with muscle inhibition, dysfunction in muscles, and consequent dysfunction are represented in fig. 1.

2.4.3 Causes of Sexual Dysfunction in the General Papulation

1. Aging process: Morphologic and Physiologic mechanism of aging also impact negatively of sexual function in the absence of a medical condition (Tirado, Ferrer and Herrera 2016).

2. Disease conditions: There are some medical conditions like diabetes mellitus, hypertension that through their pathologic process induce sexual dysfunction.

3. Side effects of drugs:

Some drugs that are prescribed in the management of some medical, orthopeadic and psychological problems induced sexual dysfunction in the affected patients. These drugs tend to through their various side effects induce sexual dysfunction (Connlgen and Conalgen 2013).

Some Drugs and their side effects on various sexual variables:

1. Anti-androgens – Reduces sexual desire in both male and female, arousal and orgasm in females.
2. The Anti- epileptics – Reduces orgasm and libido
3. The Anti-psychotics – Erectile dysfunction, reduce orgasm, ejaculation disorder and reduced sexual desire.
4. The Anti-depressants – Reduced sexual desire, erectile dysfunction and reduced vaginal lubrication.

5. Anti – hypertensive – Erectile dysfunction, gynecomatia, reduced sexual desire and arousal in women.

6. Recreational drugs – Reduced sexual desire, orgasm and premature ejaculation.

(Conalgen and Conalgen 2013).

3. Musculoskeletal Disorders – Chronic mechanical low back pain – Induces sexual dysfunction in all the variables or domains: sexual desire, sexual satisfaction, vaginal lubrication, erectile dysfunction, ejaculation (Bahouq, Fadoua and Hanan et al. 2013 and Nikoobakht, Fraidouni and Yaghoubidoust et al., 2014).

2.4.4 Management of Sexual Dysfunction

1. Non Drug Approaches

   Therapy with Psychologist who is a specialist in sexual dysfunction.

2. Reversal of Drugs that induced sexual dysfunction
   a. Drug switch
   b. Dose reduction
   c. Drug holidays
3. Drug therapy: The following drugs are used to treat sexual dysfunction
   a. Phosphodiesterate type 5 inhibitors
   b. Sildenafil for reversing the inadequate lubrication and delayed orgasm induced by selective serotonin reuptake inhibitors
   c. For individuals on anti hypertensive Alpha blockers, ACE inhibitors and calcium channel blockers are not considered to cause erectile dystxn.
   d. Angiotensin II receptors antagonists

(Conalgen and Conalgen 2013).

2.4.5 Chronic Low Back Pain and Sexual Dysfunction

Sexual dysfunction has been identified as one of the various consequences that results from chronic low back pain, the prevalence is as high as between 60%-81% among the studied populations (Bergs, Fritzell and Tropp 2009, Bahouq, Fadoua, Hanan et al., 2013, and Nikoobakht, Fraidouni, Yaghoubidoust., 2014). Sexual Dysfunction refers to a problem occurring during any phase of the sexual response cycle that prevent

the individual or couple from experiencing satisfaction from the sexual activity (Chen et al., 2013). Sexual Dysfunction generally are classified into four categories namely: Desire disorders, arousal disorders, orgasm disorders and pain disorders Human sexuality is broadly divided into three (3) aspects namely: sexual function, sexual self-concept and sexual relationships and any of these aspects may be affected by chronic low back pain Sparkman-Johnson (2003). Sexual dysfunction in patients with chronic low back pain may be multi-factorial because of the various factors that may cause sexual dysfunction, these factors are namely: physical/neurological factors, Drug factors and psychological factors (Kuru et al., 1995). People with low back pain are typically told how to lift, sit, bend, and exercise, but rarely are they advised on how to make love (Kumar et al., 2009)

Because sex can be as important as other activities but sometimes difficult to talk about, decreased sexual activity is not uncommon in people with low back pain (Breton et al., 2008; Bergs et al., 2009; Bahouq et al., 2013; Nikoobakht et al., 2014). Pain can quickly kill arousal, anticipation of the pain can be equally as effective in limiting the mood, and patients sometime think it seems better not to start something which might not be possible for them to finish (Rosenbaum, 2009; Kumar et al., 2009). Physical changes that limit positioning can curtail the use of position that you have previously enjoyed (Kumar et al., 2009). In general, the anxiety that results from a low back problem can also decrease sexual desire (Sparkman-Johnson, 2003). Ambler (2001) in a study of sexual difficulties in CMLBP 73% of respondents reported various difficulties with sexual activity related to chronic pain in the areas of arousal, positions, fear of exacerbating pain, lowered confidence, concerns surrounding sexual performance and decreased frequency sexual activity. Being out of work can change patient's financial status, sometimes drastically and that can decrease feelings of self-worth which can affect the patient's libido. This altered life style can also demand role changes and cause personal relations to be strained, when this happens the patient's desire for his or her partner can drop considerably (Kumar et al., 2009).

Sexual activity requires a functional level of physical well-being, the ability to feel, touch and move comfortably is essential in engaging in satisfying and enjoyable sexual activity (Kumar et al., 2009; Rosenbaum, 2009). Decreased mobility, back pain,

fear of movement, reduced muscle activity or altered muscle recruitment and altered Lumbo-pelvic stability may affect sexual functions (Kumar et al., 2009). Some studies were carried out by researchers comparing the prevalence of sexual dysfunctions or difficulties in populations with back pain with population who do not have back pain; the result is as presented in table 1. Complete cessation of sexual activity was been reported in 36% - 40% of patients with chronic pain in a study by Arab et al., (2010).

2.4.6 Assessing Sexual Activity of Patients with Chronic Low Back Pain

Sexual life has an important role in preserving the good quality of life in humans (Bahouq, Fadoua, Hanan et al., 2013). It is therefore very important that clinicians treating CMLBP pay a close attention to this aspect of individuals with CMLBP. Many clinicians do not routinely assess or address sexual concerns routinely in clinical settings; this may be due to the perceived or actual religious and cultural restrictions placed on this aspect of such individual patients and clinicians. A study on orthopedic surgeons revealed 80% of these specialists reported they rarely or never discuss sexual activity with their patients who had hip replacement surgery despite the danger of dislocation that can occur with hip flexion above 90% and internal rotation (Rosenbaum, 2009). Pynor et al. (2005) in this study also that found Physical therapists rarely discuss sex with their patients, they cited embarrassment, and lack of proper training to address this problem as major challenges. Identifying comfortable position that will not trigger or increase pain during sexual activity has been fingered as major challenges by patients with chronic low back pain (Zelman, Rosenberg and Diller, 2006; Rosenbaum, 2009). Sexual positions like man-on-top, side lying face-to-face and rear entry has been found to be very discomforting to female patients with back pain (especially with preference for flexion preference classification) because these positions involved a significant amount of lumbar extension (Bahouq, Fadoua, Hanan et al., 2013).

The causes of back pain are numerous that approximately 85% of this condition has been classified non-specific, therefore recent studies have suggested that the treatment of back pain and resulting sexual difficulties should be individualized. The good news is that love making can be therapeutic for low back pain patients. In this study, Dynamic Muscular Stabilisation Technique improved pain, physical strength (back pressure changes and abdominal pressure changes), sexual frequency and quality of life

in patients with lower back pain. The authors hypothesized that the key for success with Dynamic Muscular Stabilisation Technique exercises is targeting the correct muscle for the required function (Anil Kumar, Pai and Rao, 2009).

2.5 Muscles of the Low Back and their functional classification

Dysfunctions in chronic low back pain (CLBP) may result from impairment of the recruitment and motor control of the deep segmental stability system resulting in poor control of the neutral joint position. Though pain and dysfunctions are related, the pain may resolve but the dysfunctions in Transversus Abdominis (TrA), Multifidus (MF) and Pelvic floor muscles (PFM) may persist (Arab, Behabadani, Lorestani and Azari, 2010).

This dysfunction may lead to increased predisposition to recurrence, early progression into degenerative change and maintenance of global imbalance of both the local and global systems concurrently (Comerford and Mottram, 2001). Dysfunction of these muscles TrA, MF and PFM have been implicated in persistent pain, recurrence of pain, pain catastrophizing, increase in disability, sexual dysfunction, depression and decrease in quality of life in patients with chronic low back pain (Crow Pizzari and Buttifant, 2011; D'hooge, Cagnie, Crombez et al., 2012).

The spinal segmental and the pelvic floor muscle systems have been identified to maintain spinal and lumbo-pelvic stability in static and dynamic activities (Hodges et al., 2002; Sapfords, 2004). The spinal local muscles TrA and MF, and PFM play an important role in generating, maintaining and increasing intra-abdominal pressure through co-contraction and feedforward activation of these muscles in response to trunk perturbation and change in muscles forces during load transfer in functional activities (Hodges et al., 2002; Neumann and Gill, 2002; Vlaeyen, de Jong, Geilen and Heuts, 2002; Sapfords, 2004; Hodges et al., 2005; Arumugan, Milosarljevic, Woodley and Sole, 2012).

2.6 The Functional Classification of Spinal Muscles

The muscles of the lumbar and pelvic region serve mainly two purposes namely: movement and support of the lumbo – pelvic. The muscle systems in its function as stabilizers provide protection to articular structures; thereby help in minimizing the

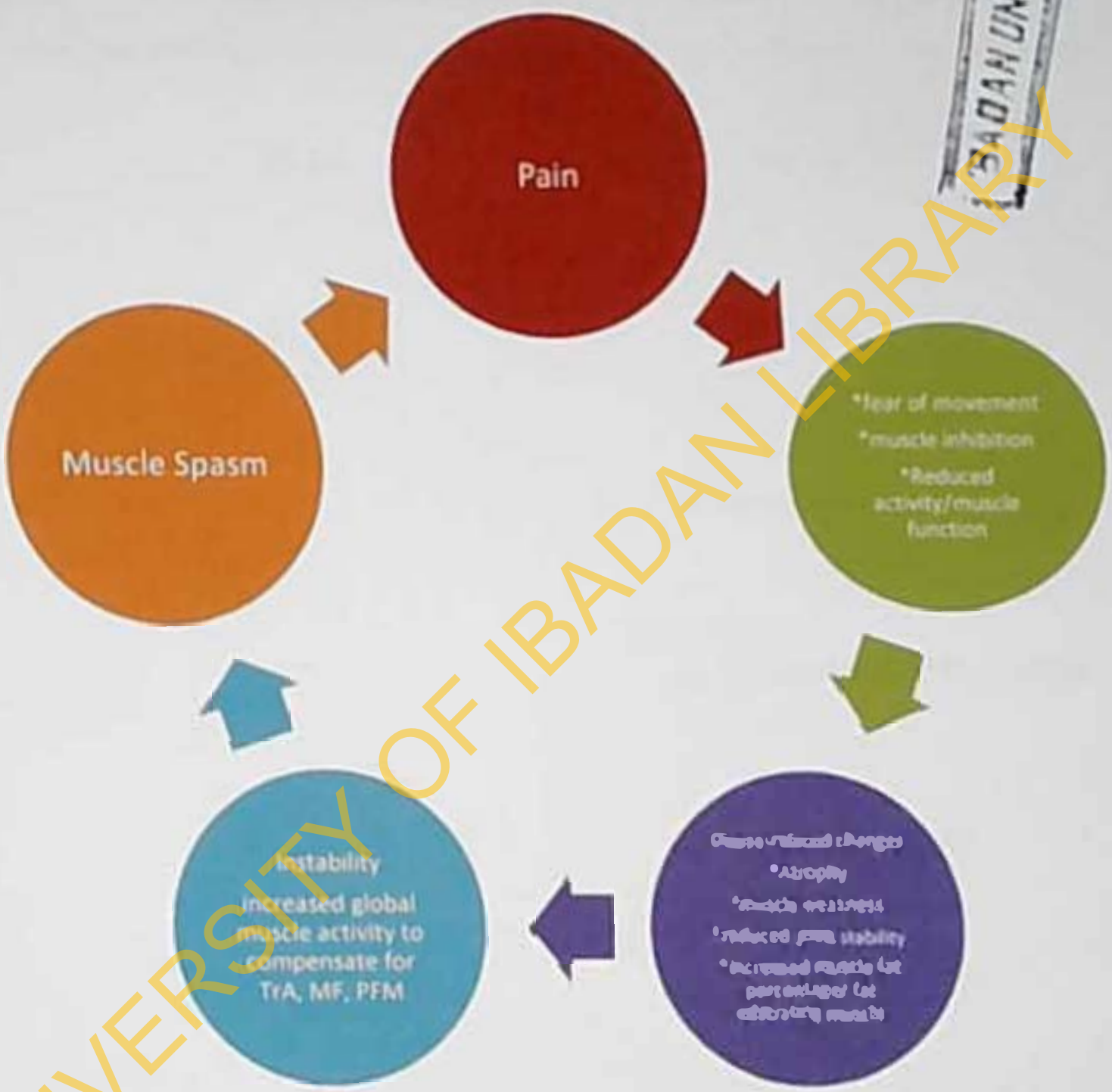


Fig. 1: The vicious cycle of Pain, muscle inhibition and Dysfunction of the Chronic Mechanical Low Back Pain.

Table 1: Literature Review of Sexual Problems in Patients with CMLBP

Sexual Problems	Patients with CMLBP	Patients without CMLBP
ED	59.5%	24.5%
SP (females)	71.1%	36.8%
		(Nikoobakht et al., 2014)
PI	73%	43 % (females) 31% (males)
		(Zelman et al., 2006)
SP	81%	
LD	14.8%	
PI	97.5	
		(Bahouq et al., 2013)

Key:

ED – Erectile Dysfunction SP – Sexual Pain (pain during sex)

SI – Sexual Interference (Pain interfering sex) LD – Reduced libido

unwanted joint displacement, stress absorption and pain. Comerford and Mottram (2001) proposed a classification system for the spinal muscles according to individual muscle unique role in the carrying out normal movements of the spine the musculature of the spine; the muscles are classified into three (3) groups namely: 1. The global movers, 2. The global stabilisers and 3. The Local Segmental Muscles

2.6.1 Local stabiliser:

The functional stability role is to maintain low force continuous activity in all positions of joint range and in all directions of joint motion. This activity increases local muscle stiffness at a segmental level to control excessive physiological and translational motion, especially in the neutral joint position where passive support from the ligaments and capsule is minimal. Their activity often increases in an anticipatory action prior to load or movement, thus providing joint protection and support.

2.6.2 The Global Stabillsers

The functional stability role of these muscles is to generate torque and provide eccentric control of inner and outer range of spinal joint motion. They need to be able to 1. Concentrically shorten into the full physiological inner range position, 2. Isometrically hold position and 3. Eccentrically control or decelerate functional load against gravity. They should contribute significantly to rotation control in all spinal functional movements.

2.6.3 The Global Mobilisers

The global mobilizing muscles are muscles which primarily have a mobilizing role, they are required to have adequate length to allow full physiological and accessory (translational) range of movement without causing compensatory overstrain elsewhere in the spinal movement system. Their functional stability role is to augment stability under high load or during a strain, leverage disadvantage, lifting, pushing, and pulling or ballistic shock absorption. These muscles are particularly efficient in the sagittal plane; though they can generate high forces they do not contribute significantly to rotation

control and cannot provide segmental control of physiological and translational movements in the spine.

2.6.4 Pelvic Floor Muscles

The Pelvic floor muscles (PFM) are the only transverse load bearing muscle group in the body. Biopsy samples taken from PC in asymptomatic females showed between 67% and 76% slow twitch fibers, Continuous tonic PFM activity has been demonstrated at rest in lying, sitting and standing Sapfords (2004). Pelvic floor muscle (PFM) dysfunction has been recently related to the development of lumbopelvic pain Sapfords (2001, 2004); Whittaker (2004). The PFM are the only transverse load bearing muscle group in the body and support the Abdomino-pelvic organs. Dual function of providing stability in the lumbo-pelvic region and controlling bladder continence has been considered for PFM (Richardson, Jull, Hodges and Hides, 1999; Sapsford, 2004).

The Pelvic floor muscles (PFM) are divided into three layers: Superficial, intermediate and deep layers.

1. Superficial— consists of bulbospongiosus, ischio-cavernosus and superficial transverse perinci muscles and the external anal sphincter.
2. Intermediate—intrinsic urethral sphincter, deep transverse perinci, and in females, compressor urethrae and the urethrovaginal sphincter.
3. Deep--levator ani comprising puborectalis (PR), pubococcygeus (PC) and iliococcygeus, and ischiococcygeus, also known as coccygeus. Fibres between PC and the vagina have also been described. (Sapsford, 2004).

The PFM play an important role in generating, maintaining and increasing intra-abdominal pressure in functional tasks such as lifting, laughing, coughing and valsalva (Neumann and Gill, 2002; Sapsford, 2004). Evidence of co-activation between pelvic floor and deep abdominal muscles for development of intra-abdominal pressure and load transfer exists in the literature (Sapsford, 2004). Accordingly, PFM are generally accepted as a part of the trunk stability mechanism. The contribution of PFM to intra-abdominal pressure and trunk stability has been explained by feedforward activation of these muscles in response to trunk perturbation similar to the other components of the

deep stabilizing muscle system of the trunk including deep abdominal muscles and lumbar Multifidus (Richardson and Jull 1995).

It is also hypothesized that PFM dysfunction causes deficit in force closure mechanism, resulting in impaired load transfer and pain in the lumbo-pelvic area (Pool-Goudzwaard et al., 2005). While PFM activity has been assessed during cognitive and functional activation using a range of modalities it has been shown that automatic functional responses do not necessarily mirror voluntary activation (Sapsford, 2004). Functional tasks such Lifting, Nose blowing, coughing, sneezing and laughing recruit the same PFM, diaphragmatic and Abdominal muscle patterns, but with variations in strength and power. Therefore, it is recommended that functionally oriented exercise for TrA, MF and PFM be incorporated as early as possible in the management, rather than after many repetitions of component parts of movements. In this way, the necessary feedforward and feedback mechanisms can be integrated with the appropriate motor programme (Sapsford, 2004).

2.7 Retraining of the Lumbar Spine Segmental Muscles

The retraining of these muscles was in three stages namely:

i. Stage One – The purpose of this stage is to reactivate the local stabilizers- TrA, MF, and PFM.

ii. Stage Two - The purpose is to maintain local muscle synergy contraction, while gradually increasing load through the body using weight-bearing closed chain exercises. Weight-bearing load was added very slowly, ensuring any weight-bearing muscle at any kinetic chain segment is activated in order to give effective antigravity support and provide efficient and safe load transfer through the segments of the body. The focus is especially to ensure activation of the local and weight-bearing muscles of the lumbar spine and pelvis, and the ability to maintain static lumbo-pelvic posture for weight-bearing.

iii. Stage Three - Exercises in this stage are open chain, high velocity and high load in intensity exercises. The aim is to continue to maintain local segmental control while load is added through open kinetic chain movement of adjacent segments.

iv. This final step is to direct progression so that all muscles are integrated into functional movement tasks in a formal way. This third stage allows any loss of local segmental control during high loaded open chain tasks to be detected, as well as ensuring that there is no compensation by the more active (i.e. non-weight-bearing) muscles. In addition, the loss of range of asymmetry of joints adjacent to the lumbo-pelvic region needs to be addressed to ensure that loss of movement range does not interfere with the ability of the individual to maintain lumbo-pelvic stability during movement (Comerford and Mottram, 2001).

2.8 The Stabilising System of the Spine (The Low Back)

Panjabi in 1992 conceptualised the stabilizing system of the low back of the spine as consisting three (3) systems namely: 1. The Passive System, 2. The Neural control and 3 The Active System.

2.8.1 The Passive Sub-system:

This consists of mainly the vertebral bodies, zygapophyseal joints, joint capsules, spinal ligaments, and passive tension from the musculotendinous units. This system is most active at the near end-range of movement described as the elastic zone of the spinal range of movement. The function of these structures is to stabilise the spine at the end range of movement e.g trunk flexion.

2.8.2 The Neural Sub-system

The neural system acts as force transducers sensing changes in position and providing feedback to the neural control subsystem. The functions of the subsystem are seen in the activity of the afferent nerve fibers in the carrying of proprioceptive information in the structures involved in the passive subsystem: the intervertebral discs, the zygapophyseal joint capsules, the inter-spinous and supraspinous ligaments. The primary function of this subsystem is to maintain spinal stability in the neutral zone where passive resistance to movement is minimal specifically in the mid-range of the lumbar spine movements. Most activities of daily living are performed within the mid-range of movements.

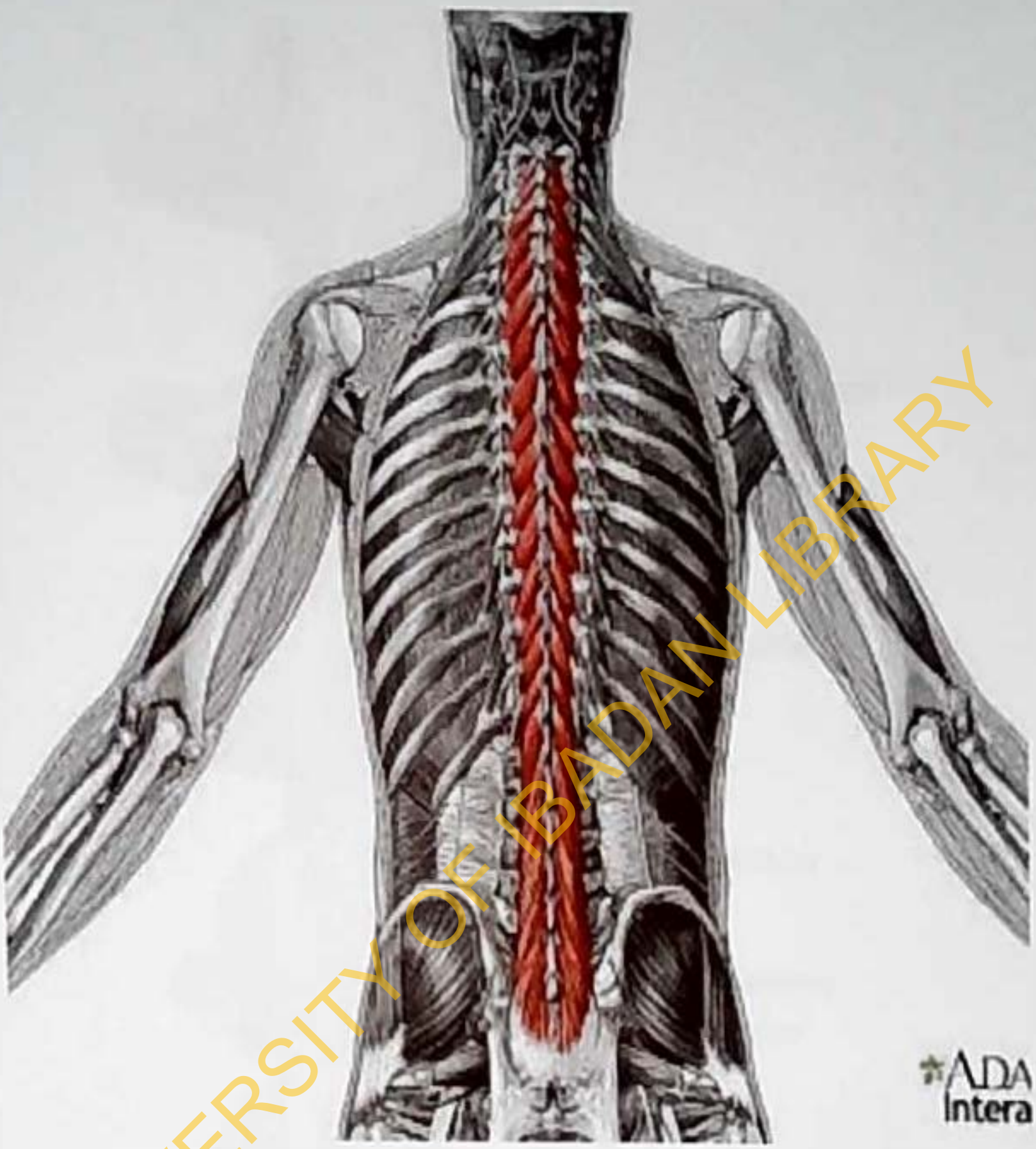


Fig. 2: Diagram showing the Multifidus Muscles

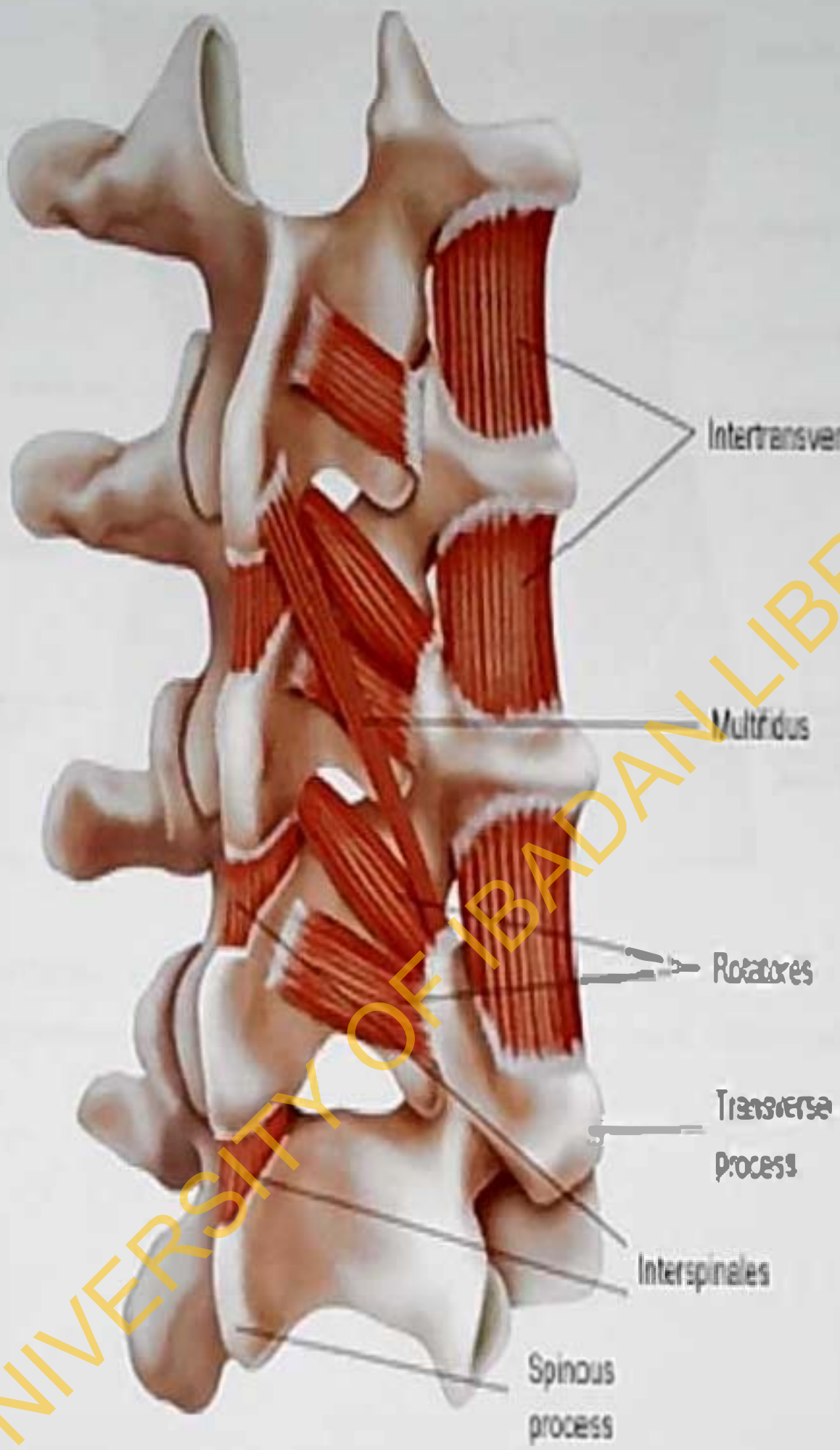
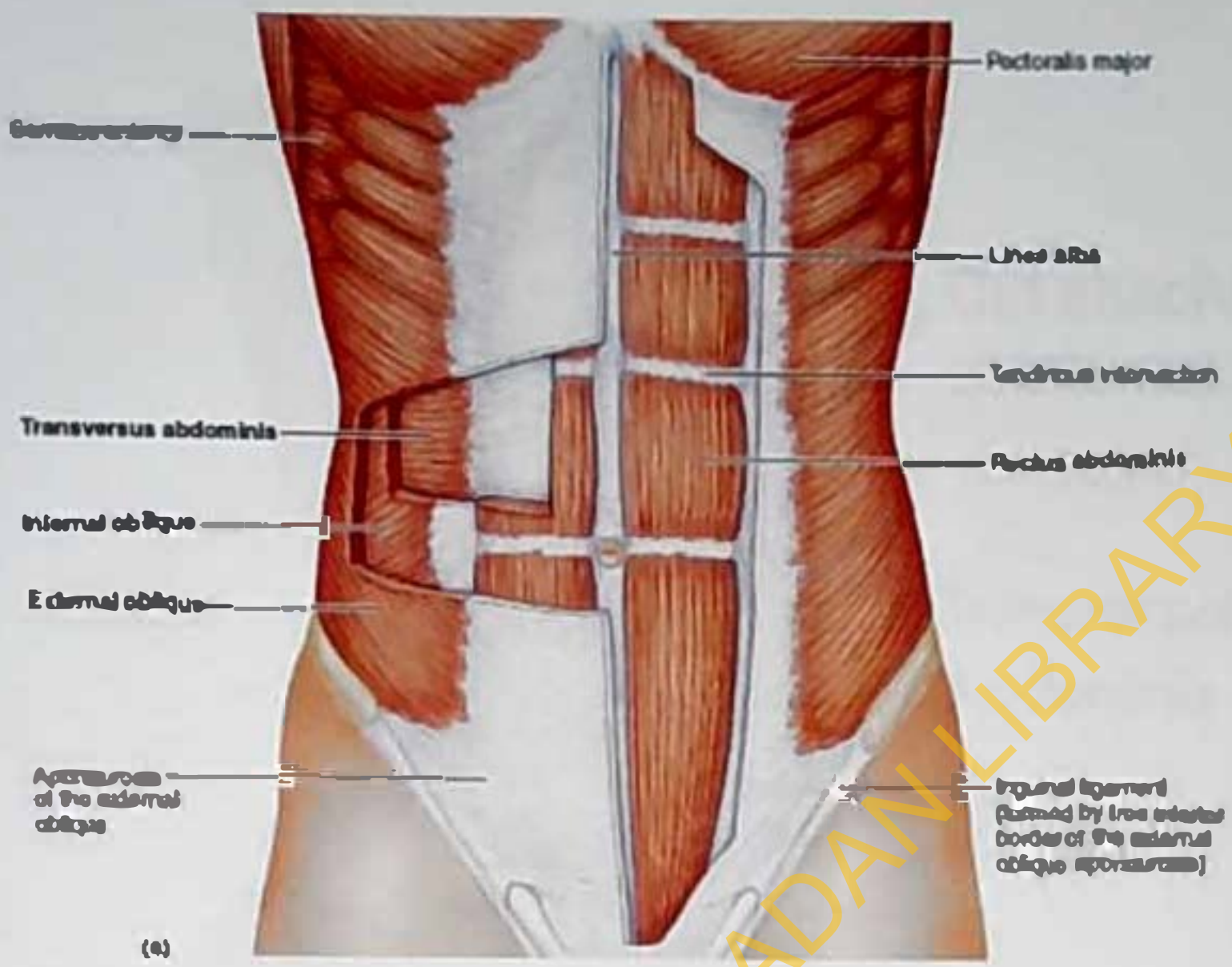
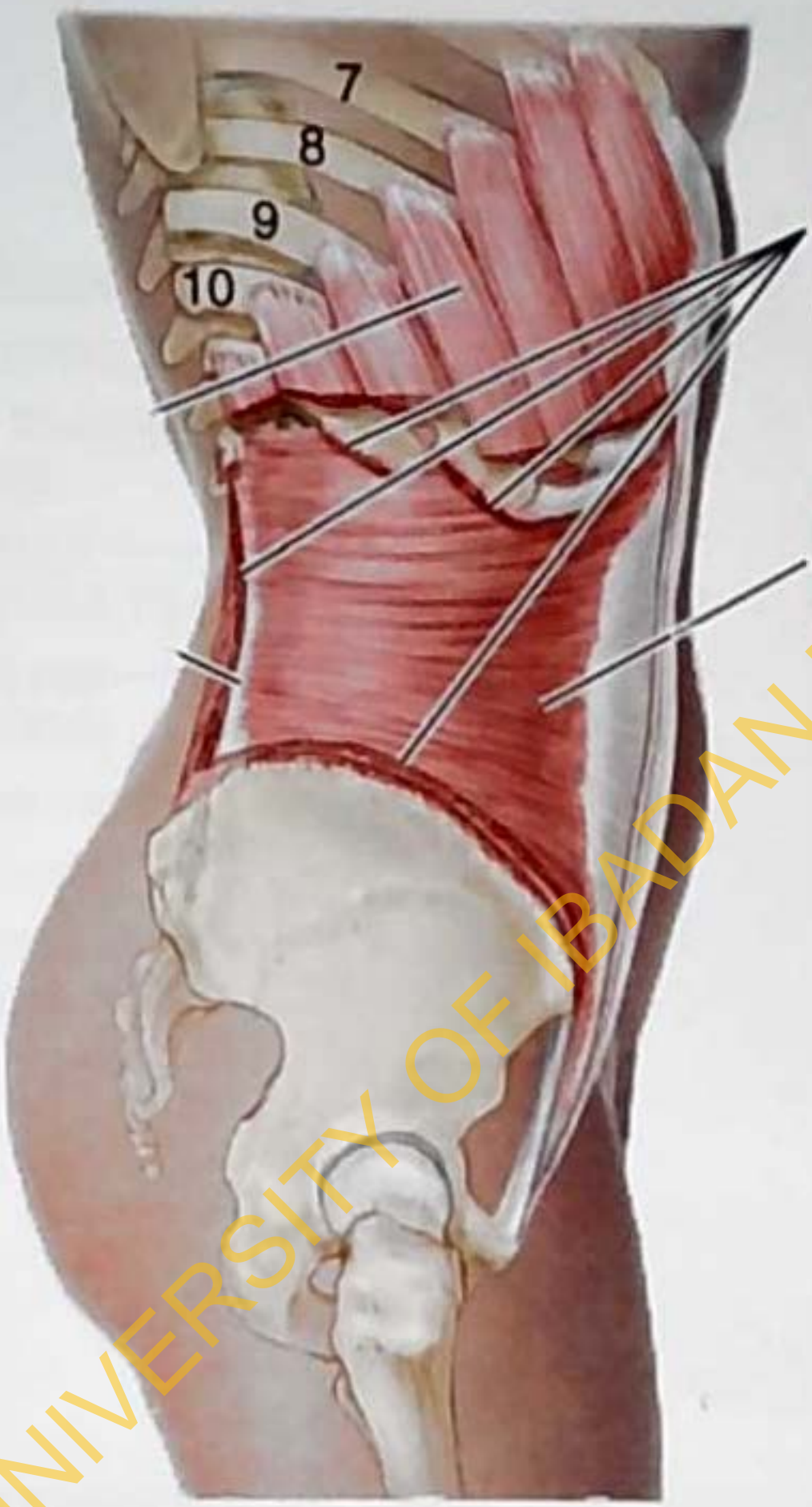


Fig. 3: Diagram showing the lateral view of the Multifidus.



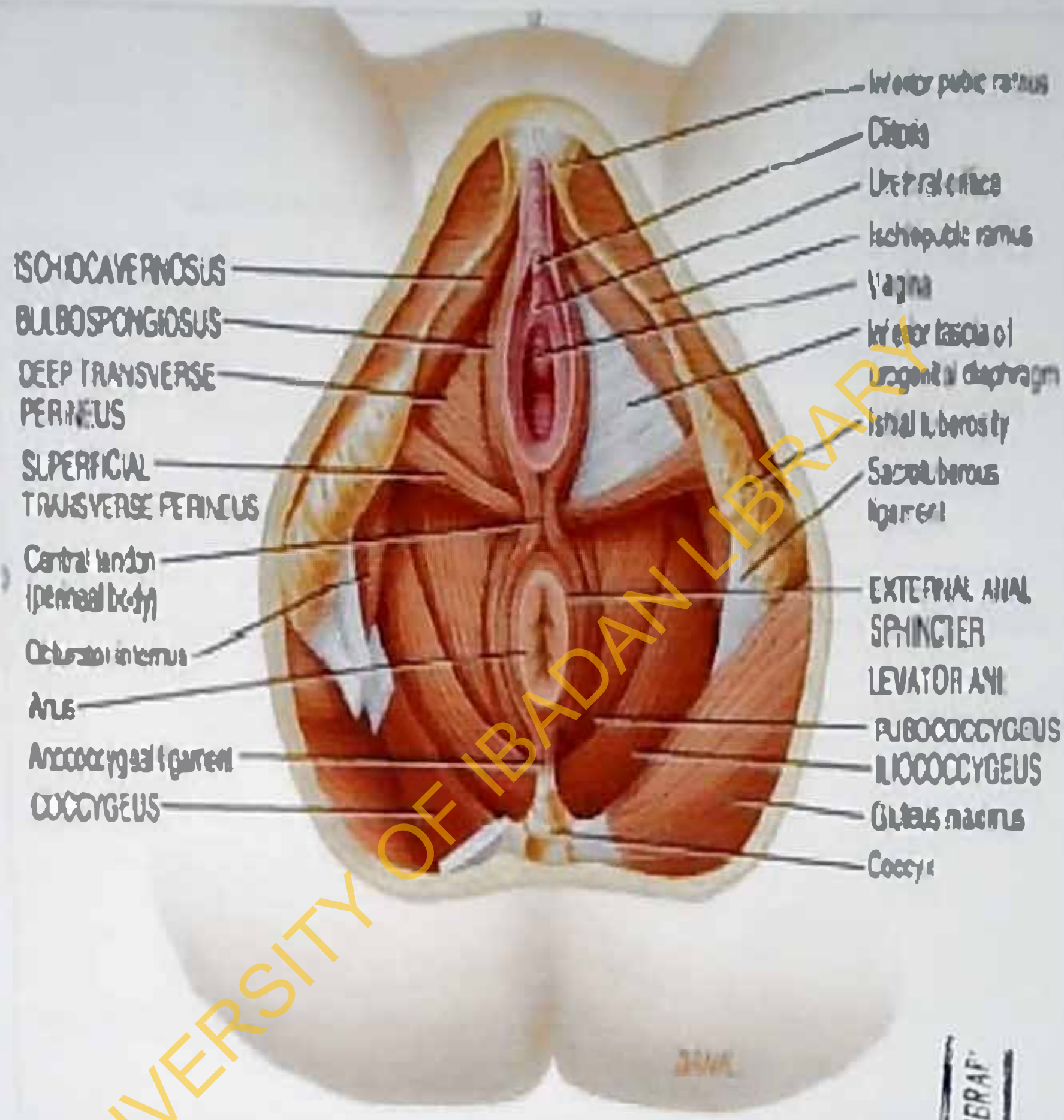
Agur and Dalley 2009; Grant's Atlas Anatomy

Fig. 4: Diagram of the anterior view of the Transversus Abdominis.



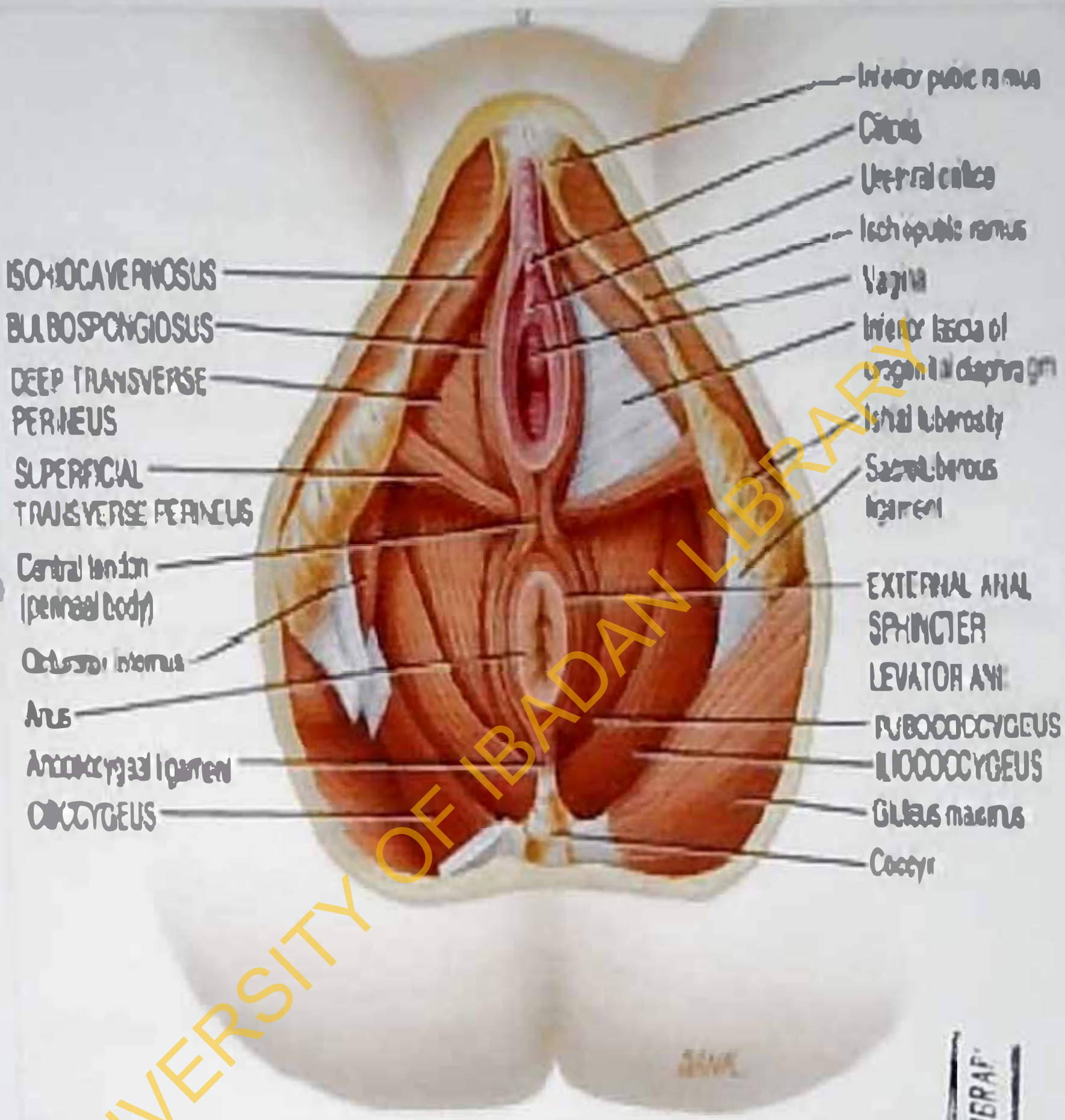
Agur and Dalley 2009: Grant's Atlas Anatomy

Fig. 5: Diagram of the corset-like shape of the Transversus Abdominis



Agur and Dalley 2009; Grant's Atlas Anatomy

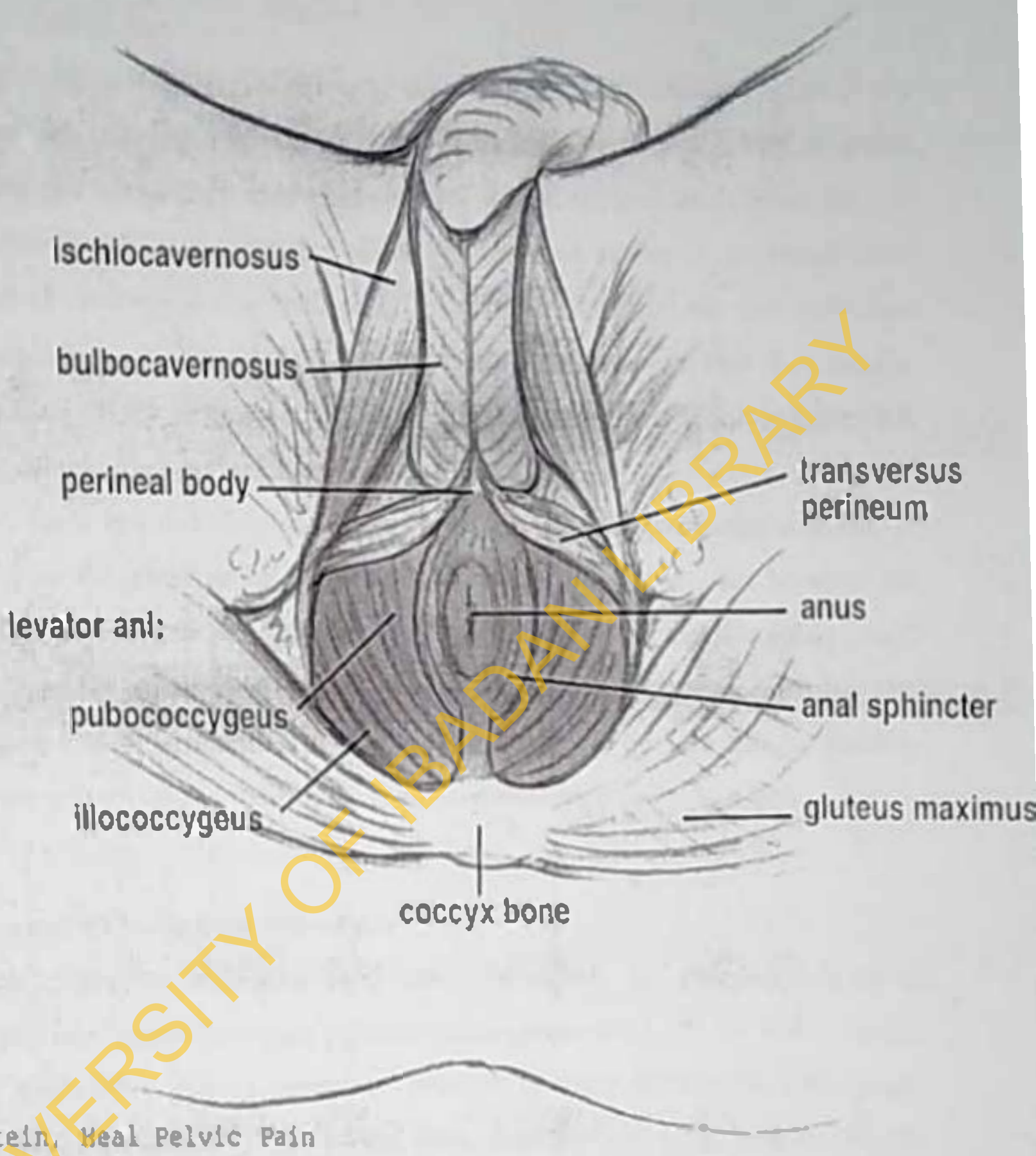
Fig. 6: The female perineum showing the Pelvic Floor Muscles.



Agur and Dalley 2009; Grant's Atlas Anatomy

Fig. 6: The female perineum showing the Pelvic Floor Muscles.

Illustration #4 Male Pelvic Floor Anatomy



©Amy Stein, Heal Pelvic Pain

Fig. 7: Male perineum showing the Pelvic Floor Muscles.

2.8.3 The Active Subsystem

This consist mainly the musculature of the spine the segmental muscles of the spine namely, the Transversus Abdominis, Multifidus and the Pelvic Floor Muscles (PFM). The lumbar spine become highly unstable at very low applied loads when there is inhibition or deactivation of these muscles which studies have shown to get deactivated front first episode of mechanical low back pain. In a normal situation the co-contraction of TrA and MF that prepares the spine in anticipation of a movement, this is called the feedforward function of the segmental muscles. This feedforward action conferred a protection on the spine during activities of daily living.

Whenever there is a deactivation of the segmental muscles the global muscles of the spine takes over the stabilisation in attempt to protect the spine , but because the global muscles are multi-segmented muscles are primary movers of the spine they could not perform the function adequately thereby putting more burden on the remaining two subsystems to provide spine stability. These subsystems soon go into fatigue thereby eliciting back pain and creating a vicious cycle of persistent pain in the low back.

2.9 Management of Chronic Low Back Pain

Different treatment strategies have been developed by Physiotherapists in managing chronic mechanical low back pain and consequences of CMLBP which consist of: the use of modalities, Patient education, Manual Therapy techniques, Therapeutic exercises for chronic mechanical low back pain, Ergonomics, Cognitive behavioral Intervention, McKenzie protocol and Joint Stabilisation protocol (Rasmussen-Barr, Nilsson-Wikmar, Arvidson, 2003).

2.9.1 Therapeutic Exercises

Therapeutic exercise has been defined as the systematic performance or execution of planned physical movements, postures, or activities intended to enable the patient or client to remediate or prevent impairments, enhance function, reduce risk, optimize overall health and enhance fitness (Brody, 2012). Therapeutic exercises is effective in the management of chronic and sub-acute low back pain and prevent recurrences of low back

pain, but there is no evidence for significant difference in effects between types of exercise (Petersen et al 2002 and Rainville 2004). Individually designed exercises programs are recommended but the question remains as to which types of exercises are effective for which sub-groups of patients.

Therapeutic performance variables include strategies such as changing the muscle contraction type, sequence, exercise speed, exercise mode, base of support or cognitive control (Brody, 2012). Therapeutic exercise programs can be progressed in a multitude of ways and must balance the daily factors with the potential barriers and must balance the therapeutic load this is the amount of stress and strain placed on the tissue) with daily activity load (Brody, 2012).

2.9.2 McKenzie protocol in the management of CMLBP

The McKenzie protocol (May, 2006) of management consists of a system of classification and classification based treatment that is commonly used to treat low back pain in many countries (Long, 2004). Classification in the McKenzie protocol is a detailed clinical examination process and it include examination of posture, range of motion assessment, response of patient's presenting symptoms to different loading strategies applied to the spine (May, 2007). The principle of centralization and peripheralisation is strictly observed in classifying low back pain patient according to this protocol of management.

The overall objective of the treatment phase is an individual functional treatment protocol which includes these three phases:

1. Demonstrating and educating the patients about the beneficial effects of correct positions and end range movements on their symptoms and the harmful effects bad or wrong positions on their symptoms.
2. Patient's education on how to maintain the correction (reduction or abolition of symptoms) achieved during treatment.
3. Training the patient on how to restore full range and function to the spine without symptom reoccurrence (McKenzie and May, 2003).

The core components of McKenzie protocol training in self-management are; exercises that consists of sustained postures, repeated exercises similar to the loading strategies used in the assessment (Clare et al., 2004) and patient's education on good postures to maintain in lying, sitting and standing. Patients are trained to maintain, encourage positions and postures that centralizes their symptoms (May, 2007). The McKenzie protocol is promotes rapid symptom improvement in patients with low back pain this makes this protocol a common choice of management approach among Physiotherapists (Clare, Adams and Mehar, 2004; May and Aina, 2012).

2.9.3 Lumbar Stabilisation Protocol in the Management of CNLBP

The efficacy of stabilisation protocol in the management has been reported by several studies (Richardson and Jull, 1995; Rasmussen-Barr et al., 2003; Stuge et al., 2006; Byrne et al., 2006; Crow et al., 2012) in the management of LBP. The aim is to attain adequate dynamic control of lumbar spine forces, thus eliminating repetitive injury to the structures of the spinal segments and related structures (RasmussenBarr., 2003). Richardson and Jull (1995, 1999) have described specific lumbar stabilisation exercises with co-contraction of the deep abdominal (Transversus Abdominis, and the lumbar Multifidus muscles). In some clinical trials, these exercises have proved effective in the management of LBP in the short term as well as in the long term (Hides, Richardson and Jull, 1996; Sapsford, 2004).

2.9.4 Principles of Activation and Retraining Deep Stabilisers of the Spine

Reactivation of inhibited Muscles include: Palpating for the correct activation, observing for correct contraction pattern; tonic (slow motor unit) recruitment of muscles (no fatigue under low load); no substitution and there should be no pain; participants are advised to breathe normally with a consistent, sustained contraction of the muscles and there should be no co-contraction rigidity. Low force sustained hold with normal breathing (10 seconds and repeat 10 times). Perform in a variety of different functional postures. Ensure correct contraction pattern, tonic (slow motor unit) recruitment, no fatigue under low-load (Comerford and Mottram 2001).

Retraining and strengthening the muscle action of the global movers include: - retraining motor control function, rehabilitating global stabilisers control through range of motion, active lengthening or inhibition of global mobilisers.

2.10 Systematic Reviews of Lumbar Stabilisation and McKenzie protocols in managing Chronic Mechanical Low Back Pain

A systematic review by Ferreira et al., 2006, thirteen clinical trials judged to be of moderate to high quality were included in the review, the commonly measured outcomes are pain intensity, disability scores and quality of life measured over a range of period of twelve months post intervention. The trials consisted mainly of comparative studies of the efficacy of specific spinal exercises with spinal manipulative therapy, patient education and general medical practitioner, there was no clinical trial comparing stabilisation with McKenzie technique in this review. The results of this review provided some evidence that specific stabilisation exercises was generally superior to no treatment or to treatment such as usual patient care and education of spinal, but the effects of specific exercises did not appear to be significantly greater than the effects of spinal manipulative therapy or conventional physiotherapy programs in the management of chronic low back pain.

May and Johnson (2008) in their systematic reviews included 18 randomized control trials (RCTs) comparing different treatment modalities in the management of low back pain. The 18 trials was made up of 14 studies on chronic low back pain and four studies on acute and sub-acute low back pain. Only one study by Miller, Schenk, Kames, Rous,elle, (2005) compared Stabilisation exercises with McKenzie technique in managing chronic low back pain this study showed both interventions where improved pain and function in patients with chronic low back pain though the outcome favoured stabilization exercises the difference was not significant. This outcome was supported by one RCT by Arora et al. (2012) titled a single (investigator) blind randomized controlled trial comparing McKenzie and lumbar stabilization protocols in chronic low back pain found that the two approaches were very effective in managing chronic low back pain but lumbar stabilization exercises proved to be slightly more beneficial the patients in the

stabilisation protocol group displayed more improvement in Visual Analogue Scale than the McKenzie protocol group. The reviews recommended more clinical trials to confirm the efficacy of the specific lumbar stabilisation exercises but none of the reviews assess the effect of these treatment methods on the sexual dysfunction in patients with chronic low back pain.

Table 2: Summary table for previous studies that compared the effectiveness of McKenzie and Stabilisation exercise in patients with low-back pain.

NO	Author/Yr Of article	Sample size/ Duration	Outcome measures	Physiological Measures	Methodology/ Duration of study	Purpose of Study	Conclusion
1	Miller et al 2005	30/ CLBP	FSQ, McGill pain questionnaire, SLR.	Pain,	1.McKenzie, 2.Stabilisation, 6 WKSof treatment	Comparative study	Comparative effects
2	Arora et al 2012	30 / CLBP >3 Months	ODI, VAS	Pain, Disability	1.McKenzie 2.Stabilisation 4 WKS of treatment	Comparative study	Stabilisation demonstrated more effects
3	Ali et al 2012	30/ CLBP	VAS, ODI, Biofeedback unit	Pain, Disability and Stability.	1.Stabilisation 2.McKenzie/ 6 WKS	Comparative study	Stabilisation exercises demonstrated more effects.
4	Hosseinifar et al 2013	30/ CLBP	VAS, ODI and Biofeedback unit	Pain, Disability and Stabilisation	1. Stabilisation protocol. 2.McKenzie protocol	Comparative study	Stabilisation demonstrated more effects on pain and disability but comparative effects on biofeedback stability.

5.	Chira 2014	40 patients/CLBP	NPRS, ODI	Pain, Disability	Back extension exercises. Stabilisation exercises. 5 times/week for 3 weeks.	Comparative study	Results showed that stabilisation protocol effected greater reduction in pain and disability scores in CLBP.
6	Novakova et al 2014	62 patients/CLBP	NPRS, RMDQ, GPE	Pain, Disability	1. Directional Preference exercises 2. Stabilisation Exercises.	Comparative study	No significant difference in effects

A&E – accident and emergency, RMDQ-Roland-Morris Disability questionnaire, ROM-range of motion, VAS – Visual Analogue Scale, GPE – Global Perceived Effect, FSQ- functional status questionnaire, SLR-straight leg raise, QoL- quality of life, LBP- low back pain, CLBP- chronic low back pain, ODI- Oswestry Disability Index, ADL- activities of daily living, a/a- as in initial trial above, SIJ-Sacro-iliac joint, FABQ-fear of avoidance beliefs.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Materials

3.1.1 Participants

One hundred and fifteen (115) Patients who were referred by the Physicians or Orthopeadic surgeons diagnosed as having chronic mechanical low back pain and referred for Outpatient Physiotherapy at the Physiotherapy department of the University of Ilorin Teaching Hospital, Ilorin, Kwara State were invited for the study. Ten (10) participants refused to give their consent because of the perceived sensitivity of the study. Thirty-three (33) were excluded from the study; twenty individuals (20) scored less than nineteen on the sexual function questionnaire, ten (10) individuals had low back pain less than twelve weeks in duration and 3 were being managed for diabetes in addition to chronic mechanical low back pain. Seventy-two patients (30 Males (M), 42 Females (F) = 72) aged between 18 and 65 years met the inclusion criteria and were allocated into the McKenzie (M 14, F 22 = 36) and Stabilisation (M 16, F 20 = 36) groups using the Fish bowl method. Sixty-one (M 23, F 38, Total = 61) participants completed the 8 week study. Thirty-one (M 11, F 20 = 31) participants in McKenzie group and thirty (M 12, F 18, Total = 30) participants in the Stabilisation group completed the study. There was a dropout rate of 15.3 % (11 participants M = 7, F = 4) recorded in this study. The flow diagram showing the progression of patients through the study is presented in Fig. 7.

3.1.2 Instruments

The following materials and instruments were used to collect data during the course of this study.

1. The Oswestry Disability Questionnaire: This was used to assess the patient's interference of pain in the sexual function of the participants (Rasmussen-Barr et al., 2003).

   Sexual Function Questionnaire (healthnet.umassmed.edu/mhealth/sexual function): This was used to measure the sexual dysfunction in the participants in this study. The higher the scores the more the sexual dysfunction. The highest score is forty two (42) and the lower range score is fourteen to

seventeen (14-17). The lowest score represent the highest possible level of sexual function; increase in the scores of this instrument signifies increasing sexual dysfunction.

2. WHO-Bref Quality of life Questionnaire: This was used to measure the sexual satisfaction in the participants.
3. McKenzie Assessment Forms: This form was used to assess particular category of low back pain by McKenzie (2005).
4. Treat your own Back by McKenzie (2005): McKenzie Back care educational instruction manual. This was used as an instructional guide for care of the back for patients on McKenzie protocol of exercise.
5. The Pressure biofeedback unit: This was used to retrain co-contraction of the participants' Transversus Abdominis, Multifidus and Pelvic Floor Muscles.
6. Stop watch (Quartz, USA): The stop watch was used to assess and retrain the holding time and the functional activities (the muscular functions) of the deep segmental (TrA and MF) and pelvic floor muscles.
7. Exercise couch: This was used by the participants for exercises performed on the floor.

3.1.3 Venue of Research

The study was carried out in the department of Physiotherapy, University of Ilorin Teaching Hospital, Ilorin.

3.2 Methods

3.2.1 Methodology

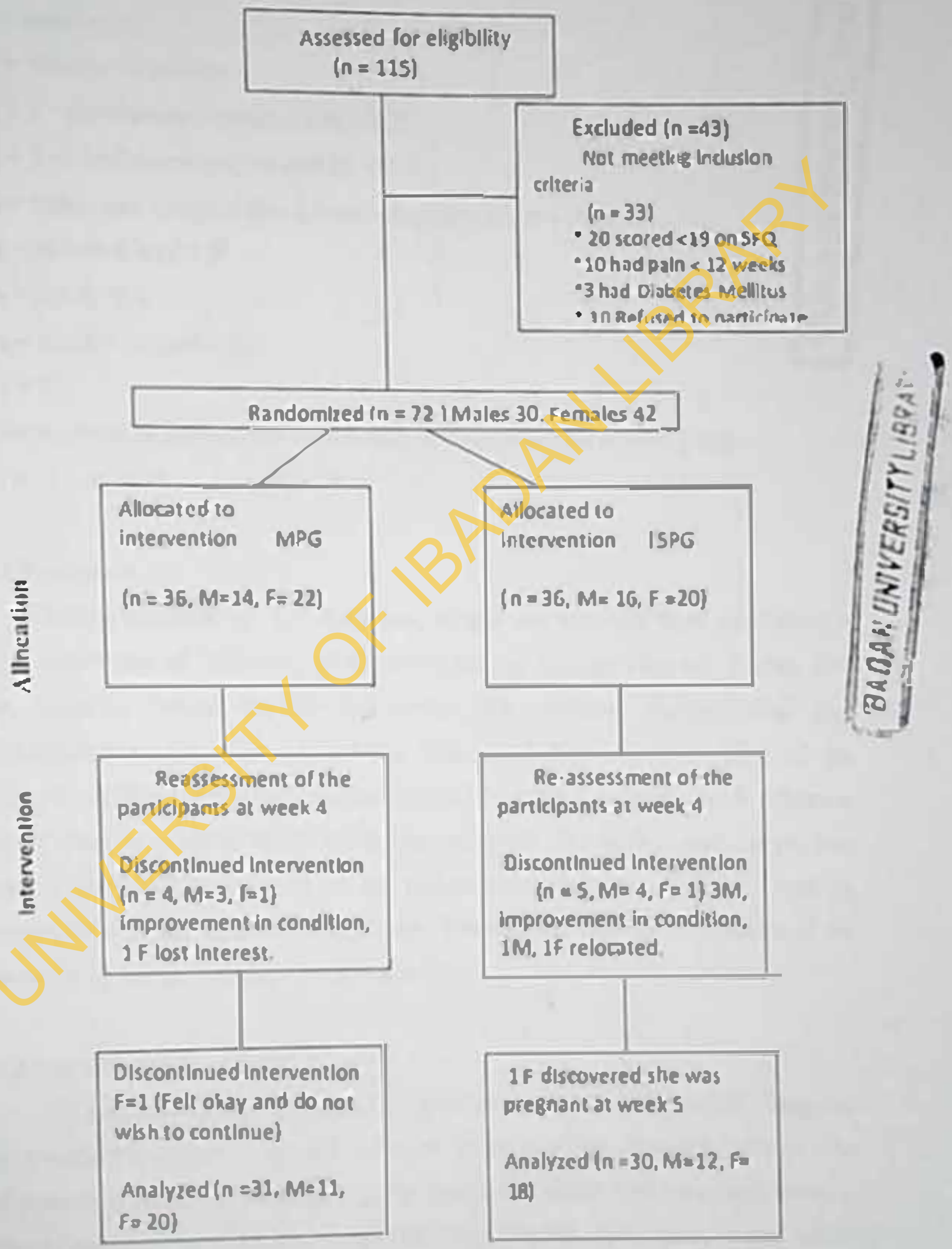
The study was a quasi-experimental study. The participants in Stabilisation group took part in eight-week Stabilisation protocol, while the participants in the McKenzie group went through the McKenzie protocol for eight weeks.

3.2.2 Sampling Technique

Participants for this study were recruited through referrals from the orthopeadic surgeons and family physicians of the University of Ilorin Teaching Hospital. The subjects were screened in order to determine whether they meet the inclusion criteria for the study. The subjects for the study were randomly assigned into two groups- The Stabilisation group and the McKenzie group as they became available.

Figure 7: CONSORT diagram of subjects' progression throughout the study

CONSORT diagram showing the flow of participants the beginning of the study through each stage of the study.



3.2.3 Sample size calculation

Sample size Calculation:

$n = N (Z_1+Z_2)^2/ES^2$

n = sample size

N = Number of groups

Z_1 = α – Confidence interval at 0.05 = 1.96

Z_2 = β – Confidence interval at 0.20 = 0.84

ES = Effect size – large effect 0.8 was adopted (Cohen's 1988).

$n = 2(1.96+0.84)^2/0.8^2$

$n = 2(2.8)^2/0.8^2$

$n = 15.68 = 16/0.64 = 26$

$n = 52$

For Attrition 20 participants were added for equal samples in each group

$n = 52 + 20 = 72$. (Goglay, 2010)

3.3.1 Procedure

Ethical approval for this study was sought and obtained from the Research Ethics Committee of University of Ibadan/University College Hospital, Ibadan. The joint UI/UCH Ethical Review Committee with reference number (Ref no.: UI/EC/13/0135) (Appendix A) and the Ethics and Research Committee of the University of Ilorin Teaching Hospital Ethical Research Committee with reference number (Ref no.: UITH/189/19^{A}/146) (Appendix B). Permission was sought and obtained from the Department of Physiothempy, University of Ilorin Teaching Hospital with a letter from the Physiotherapy Department, College of Medicine of the University of Ibadan introducing the researcher.

3.3.2 Recruitment Procedure

72 participants were recruited through referrals from the Orthopeadic Surgeons and Family Physicians of the University of Ilorin Teaching Hospital. Patients who indicated their interest in participating after due consultations with them were asked to answer questions to determine eligibility. The eligible participants were guided through informed consent process after which oral and signed written consents were obtained. The researcher went ahead to explain in detail the nature, purpose and

procedure of the research to the participants, questionnaires were administered to the participants. The researcher then scheduled appointments for the patients. Each group had at least 36 participants. Participants were assigned into two treatment groups using the fish bowl draw method until they have all completed the 8-week treatment programme. In order to introduce blinding and reduce bias, a research assistant recorded the number of patients who were invited to participate, the number who declined to participate, and the number of screened patients who were ineligible and their reasons for declining participation or ineligibility.

3.3.3 Validation of Sexual Function Questionnaire:

The Sexual Function Questionnaire (SFQ) was downloaded from university of Massachusetts website. The university library was consulted for the permission to use, permission was granted. Face validation of the questionnaire was done by a Consultant Urologist and a Consultant Psychiatrist, a pilot study was carried out with twenty (20) individuals who were not part of the main study, data collected was analyzed; the Cronbach's Alpha was 0.78 for male section, while Cronbach's Alpha for female section was 0.90.

3.3.4 Assignment into Groups

Participants who met the inclusion criteria were assigned to one of two groups. Assignment was by fish bowl draw method where blank pieces of papers were numbered from 1 to 72, each piece of paper was carefully folded with the numbers turned inside was placed in a bowl. Participants were instructed to pick a piece of rolled paper from the bowl; participants who picked the odd numbers were assigned into the McKenzie group, while participants who picked the even numbers were assigned into the Stabilisation group. To introduce blinding and reduce bias, a research assistant was assigned to record the number of patients who are referred from the surgeons to participate, the number who decline to participate, and the number of screened patients who are ineligible and their reasons for declining participation or ineligibility. Participants who volunteer to participate and satisfy the eligibility criteria were then allocated to the different study treatment groups (MPG or LSPG) by the same assistant who was not involved in the assessment and treatment of the participants.

3.3.5 Clinical Assessment

All consenting participants were assessed during their first appearance by the researcher to:

1. Assess the patients to rule out any red flags (Moffet and Frost, 2000).
2. Participants were then reassured that they had no serious disease or condition that their problem was chronic mechanical low back pain.
3. Check the preparedness and suitability of patients for the treatment programme.
4. Carry out a detailed patient's education on the causes, risk factors in the development of chronic low back pain, complications of chronic mechanical low back pain and assess them for pain, disability, quality of life and their sexual activities.
5. Collect the demographic and baseline data of subjects who volunteered to participate in the study, assess them to place each patient in either McKenzie or Stabilisation protocol group.

3.3.6 Measurement of Parameters

1. Assessment of the activities of the Lumbar Segmental Local Muscles Control: The pressure biofeedback unit was used to assess the local muscle activities.

3.4 Intervention

3.4.1 Assessment of Participants in Group One: McKenzie Protocol Group (MPG)

All the participants in this group were assessed individually for their suitability to take part in the study by the researcher using the McKenzie Institute's Lumbar Spine Assessment Form (MILSAF). Physical demonstrations of various movement testing protocols were given to enhance subjects understanding prior to individual assessment. Participants were placed into classifications or syndromes based on the type of low back pain they are diagnosed with using the MILSAF. Information such as age, gender, educational level, occupation, marital status, onset of back pain, recurrence, duration of present episode, previous episode/episodes were recorded for each participant accordingly. The questionnaires were given and completed by the participants before treatment session commenced.

The participant's baseline data obtained and recorded at recruitment. The subjects also completed the questionnaires at the end of the 4th and 8th week of

each participant accordingly. The questionnaires were given and completed by the participants before treatment session commenced.

The participant's baseline data obtained and recorded at recruitment. The subjects also completed the questionnaires at the end of the 4th and 8th week of exercise. All the participants were placed on appropriate McKenzie treatment regime after assessment and were instructed to practice the movements every three hours at home during the day. Measurements of the selected parameters (Pain, disability, fear of avoidance, quality of life) were taken at the baseline, fourth and eight week which marked the end of the study. They were also taught and advised to observe good postural habits during their normal activities of daily living (ADL).The participants were advised to stop any exercise or positions that make their pain worse when carrying out their home treatment regimen until they were able to see their physiotherapist for further instruction.

The detailed description is as follows:

The McKenzie protocol is a classification-treatment based method. Directional preference for extension was first assessed among the participants. This involved a course of specific lumbo-sacral repeated movements in extension that cause the symptoms to centralize, decrease or abolish. The determination of the direction preference for extension was followed by the main MPG activities including:

3.4.2 McKenzie Protocol Testing

Appropriate test movements used in the physical examination of each participant were determined by pain location. Participants were examined following the McKenzie format (May, 2007) as outlined in the assessment forms and as described in the classification algorithm.

1. Postural Examination: Participant's standing and sitting postures were constantly monitored during examination and treatment to detect any faulty postural habits such as rounded shoulder in standing due to thoracic kyphosis or slouch sitting that promote rounded back in sitting. The degree of participant's hyper-lordosis in standing as well as the presence of thoracic or lumbar scoliosis was closely monitored in order to identify any subject with these presentations. The presence of a lateral shift at the trunk was monitored to identify any subject with a lateral shift of the trunk (McKenzie and May, 2003).

2. **Examination of Movement:** In this system, single and repeated movement testing were utilized to examine the participants' range of movements and symptoms (pain behavior), participants were examined in standing and sitting positions. To examine the range of lumbar spine movement (flexion, extension and side gliding) the participants were instructed to stand up with their feet about thirty centimeters apart. In this position single and repeated movements were performed in each of the directions.
3. **Flexion in Standing:** From standing position the participant was asked to bend forward and run his hands down the front of both legs, moving as far as possible into flexed standing, followed immediately by returning back to the standing position (McKenzie, 2003).
4. **Extension in Standing:** The participant was asked to place her hands in the small of the back and bend backwards as far as possible, followed immediately by returning to standing position (McKenzie, 2003).
5. **Side gliding in Standing:** To examine side-gliding the standing participant was asked to move his shoulders and pelvis simultaneously in opposite directions while keeping the shoulders parallel to the ground (McKenzie and May, 2003). Participants who had difficulty performing this movement were assisted by the examiner to guide their movement with a hand placed on one of the participant shoulders and the other hand on her opposite iliac crest to execute side gliding movement.
6. **Flexion in Sitting:** To carry out flexion movement in sitting, the participant was asked to sit on a moderately high stool and instructed to bend forward running his hand down the front of his legs as far as possible into flexed sining followed immediately by returning into neutral sitting (McKenzie, 2003).
7. **Flexion in Lying:** The participant was asked to lie supine with the knees and hips flexed about 45 degrees flat on the plinth. The participant was then instructed to bring their knees up towards their chest, applying overpressure with hands around the knees to achieve maximum possible flexion he can, knees are then released and the feet are placed back on the plinth in the starting position. The exercise was repeated about 10 times.
8. **Extension in Lying:** The participant started with prone lying position with hands palm down, under the shoulders. The participant was asked to raise only the top half of the body by straightening the arms while the pelvis and thighs

remain relaxed and are allowed to sag with gravity. The top half of the body was then repeatedly extended about 10 to 15 times.

9. Static/Sustained Positioning: This test involved maintenance of an end range position for an extended period of time to assess how participants' symptoms (pain) behave. (McKenzie and May, 2003). The sustained/static posture that was used in this study was sustained extension in sitting and sustained extension in prone lying. The repeated movements testing and static positioning were used essentially to identify how participants' symptoms behaved.

Prior to each test movement or static positioning the examiner first asked the subjects to describe the nature, location and the intensity of their symptoms (pain, paraesthesia). After the test movement or static positioning the examiner again asked the participants' to describe the location nature and intensity of their symptoms (pain, paraesthesia) (McKenzie and May, 2003). A rest of minimum of about 10 seconds (McKenzie and May, 2003) was provided before the participants were asked to further describe any changes in symptom (pain) that occured during this rest period. These were recorded in their assessment forms.

Based on the overall clinical picture of participants' history and symptoms behavior during and after the test movements/static positioning, participants' were categorized into one of the three sub-groups of the McKenzie Syndromes namely: postural, dysfunction and derangement. The Researcher/examiner used his clinical discretion and judgment to provide a rest period of between 30 to 60 seconds in between test movements to prevent fatigue of the participants. The number of repeated movements also varies between 2 to 5 repetitions just sufficient to expose the participants' underlying mechanical condition. These precautions are supported by (McKenzie and May, 2003).

3.4.3 Intervention using McKenzie Protocol

Participants were treated based on the outcome of their physical examination and assessment as described by (McKenzie and May, 2003). The McKenzie protocol was exclusively utilized as the line of treatment for the participants in the MPG.

3.4.3.1 Treatment of the Postural Syndrome

The main treatment approach for participants with Lumbar spinal mechanical pain of postural origin was postural education. This consisted of proper identification of individual patient source(s) of postural stress. All participants with problem of

postural back pain will be put through postural education regime consisting of the following:

Correction of sitting posture: participants were taught to sit with good lordosis and to avoid slouch sitting always.

Lumbar support: The use of lumbar support to maintain good lordosis and correct faulty design was demonstrated. The use of rolled towel and clothing material as a low-cost or trial option was also be stressed.

Avoidance of prolonged sitting: participants were instructed to avoid prolonged static postures. Participants were taught to interrupt any static posture before onset of discomfort or pain.

Postural awareness training: The need to consciously control and maintain good lordosis when sitting on a seat with back support was stressed.

Furniture Design and Selection: Participants were instructed to avoid any furniture that normally provoked or aggravated their back pain. Participants were also discouraged from using low chairs and stools as much as possible).

Correction of the lying or sleeping posture: Curling up posture in sleeping was discouraged, while side lying posture with flat pillow support in between the legs and the use of flat pillow to support the abdomen when sleeping was promoted. The regular use of night rolls made up of rolled towel or cloth (to offer firm support to side and back and thus prevent sagging) and tied around the waist line was prescribed for subjects who experienced back pain always when sleeping or lying down. The use of sagging bed was discouraged.

Treatment of the Dysfunction Syndrome: Subjects with dysfunction syndrome was treated by appropriate end range movements or positioning that usually provokes their pain. The treatment was aimed at stretching the offending shortened peri-articular structures responsible for restricted end range movements (McKenzie and May, 2003). Subjects were asked to carry out the identified end range movements for their particular condition regularly until their complaint was resolved. Subjects with flexion dysfunction were instructed not to carry out their treatment in the morning in order not to precipitate back pain of derangement origin, but were reserved for later in the day. The treatment of flexion dysfunction was preceded by extension exercises and ended with extension exercises (Figs.8, 9 and 10).

Treatment of the Derangement Syndrome: Subjects with derangement syndrome of the Lumbar Spine were treated using repeated movement(s) which was believed lead

to decrease in the intensity of subjects symptoms of pain or discomfort (McKenzie and May, 2003). Subjects with posterior derangement of the lumbar spine were treated with extension principles consisting of sustained extension in prone lying, active extension from prone lying position and extension in standing, flexion in long sitting, side gliding and trunk rotation. Participants were taught how to use the lumbar roll at work, in the car while driving and at home using various sizes of lumbar rolls (figs.11, 12 13 and 14). Subjects with suspected relevant lateral compartment contribution whose pain were not affected by extension principles were treated with side gliding movements and later treated with extension principles again (McKenzie and May, 2003).

Subjects were taught to perform extension movement in standing and sitting as used for lumbar spine posterior derangement, as their first line of treatment. Therapist technique of extension mobilization in side lying for lumbar spine (McKenzie and May, 2003) was utilized by the researcher to progress the treatment of some of the subjects. Only the flexion in sitting exercise was used in the recovery of function for subjects with lumbar posterior derangement (McKenzie and May, 2003) after the complete resolution of their lumbar spine pain. Each subject was given an individualized home programme consisting of repeated lumbar spine movements in the directions which centralized or abolished symptoms (McKenzie and May, 2003). Subjects were educated to be aware of their symptoms and to use an increase in symptoms as a signal to perform their exercises immediately. Subjects were instructed in postural education with respect to good sitting, standing and sleeping postures. Additional use of night rolls made of rolled towel was encouraged for those subjects with complaint of lumbar pain on sleeping. All forms of forward bending and lifting were to be avoided (McKenzie and May, 2003).

Back Care Education: Participants received instruction on how to take care of the back and avoid a recurrence of low back pain from "Treat your own back" by McKenzie (2005). Posters and pictorial illustrations were also used to give instructions on care of the back.

3.5. Group 2- Lumbar Stabilization Protocol Group (LSPG)

3.5.1 Patient's education and baseline assessment of the local stabilizers

(A) The patient education: - Participants were educated on the brief anatomy of the spine and functional responsibilities of the local and global muscle, non-specific causes on low back pain, how acute low back pain can transform into chronic low back pain. They were also educated on the effects on CMLBP on functional activities, quality of life, fear avoidance beliefs and sexual life of individuals with CMLBP.

(B) The assessment of baseline and retraining control the neutral Joint Position - The aim of this level of retraining is to retain low threshold activation of the local stability system to increase muscle stiffness and train the functional low load integration of the local and global stabilizers to control the neutral joint position (Comerford and Mottram 2001).

The patient was in prone lying position with the biofeedback pressure sensor unit under the lower abdomen, and the lower edge in line with the anterior superior iliac spine. The pressure unit was inflated to 70mmHg pressure. The instruction that was given to patient was 'draw in your lower stomach gently off the pressure unit and hold the position'. When the correct localized contraction is performed, for a functional and typical TrA the pressure decreases by approximately 6-8 mmHg up to a maximum of 10mmHg in the holding position (Richardson and Jull 1995).

The co-contraction time at baseline was assessed using analogue stop watch, the first reading was recorded as the baseline for the patient, and the holding time was recorded. The best readings (pressure change and the holding time) of this procedure were used as the baseline in training the individual participants in the group; this was also given as home program in order for the patients in this group to familiarize them with this retraining. All the subjects were placed on appropriate Stabilization protocol treatment after assessment and were instructed to practice the exercises every three hours at home during the day. Measurements of the selected parameters sexual function variables were taken at the baseline, week four and eight which marked the end of the study.

3.5.2: Intervention using Lumbar Stabilisation Protocol

This intervention was carried out in four stages namely:

Stage 1 – Week 1 and 2: The Isometric Co-contraction Stage (Week 1-2)

This is the first stage of the protocol: this is the first two weeks of the intervention. The Spinal Neutral Position Retraining consists of re-education of the isometric co-contraction of the Tmnsversus Abdominis and Multifidus muscles (local stabilizers) in four different positions. These positions were the positions of minimal external loading for the spine as the spine is put in a neutral position. The re-activation of the Transversus Abdominis and Multifidus was carried out in four (4) positions namely:

(a) Re-education in Prone Position

Re-education of the isometric co-contraction was commenced in the prone position. The major advantage of this position was that it inhibitory for a major global muscle Rectus Abdominis; therefore help to isolate the exercise to the deep local muscles (Richardson and Jull 1999). The patient was asked to be in prone lying and was instructed to take a gentle breath in and out at the third expiration he/she was instructed to pull up and in the abdominals to flatten the lower abdomen against the spine (co-contraction of the MF and TrA) and hold in this position for 10 seconds this was repeated three times. This exercise was progressed by increasing the holding time to 20 and 30 seconds respectively, this was given as the home programme every three (3) hour of the waking period (fig. 15).

(b) Re-education in Four point Kneeling

Learning the action of drawing in the abdominal wall and holding this position was easiest in four-point kneeling because of the facilitatory stretch of the deep abdominal muscles resulting from the forward drift of the abdominal contents. The patient was in four-point kneeling, instructed to draw in the lower abdominal wall and hold, the stop watch was used to monitor the length of time patient was able to hold the co-contraction. The patient was then taught to locate and maintain normal thoracic and lumbar curves for the isometric exercise. The rib cage and pelvic bone remained aligned and the patient continued to breathe normally throughout the abdominal 'drawing and holding contraction' action (fig. 16).

(c) Re-education in Supine Position

The participant in supine position was asked to gently bend the two knee joint until the feet was in full contact with the couch. The participant was instructed to gently draw in and up the lower abdominal to co-contract the transversus abdominis, multifidus and pelvic floor muscles, hold the contraction and resume normal breathing. The patient was asked to stand with arms akimbo facing the researcher, patient was then asked to gradually draw in and up the lower stomach and hold on while he/she continues normal breathing. The stop watch was used to record maximum holding time and recorded. The same procedure was carried out with patient's left side to the researcher side view; the patient can palpate the co-contraction of the MF in this position with his/her left hand. Progression in this stage was by increase in holding time (fig. 17).

(d) Re-education in Sitting Position

This is a position that is vital to postural retraining and later retraining in functional activities. The patient was asked to sit upright in an armless chair with arm akimbo with resting on the pelvic one inch medial the anterior superior iliac spine and one inch inferior to palpate the transversus Abdominis. Participant was instructed to draw in and up the lower stomach, holding the co-contraction while the participants resume normal breathing and count 10 with each counting corresponding to exhalation. Progression was achieved by increasing count to 20 (fig. 18).

Stage 2:- Weeks 3 and 4:- The Limb re-integration Stage (Open Kinetic Chain Activities)

The patient was asked be in supine and prone lying, he/she was then instructed to lift up the lower limb straight without bending the knee, he/she continued to raise the leg until the leg is up to when he/she can see the tip of the big toe (15 degrees off the plinth) and hold for 10 seconds against gravity, and this was then progressed through 20 and 30 seconds for both the right and left leg. The highest holding time was given as the take home activity in 3 sessions 3 hourly of waking hours of the day. The patient was in four point prone kneeling. Patient was instructed to lift up each of the lower limb straight and hold for 10 seconds in 3 sessions with 2-3 minutes rest period in between to prevent fatigue. Progression was instructed to increase the holding time through 20- 30 seconds per count (figs. 19, 20 and 21).

Stage 3:- Weeks 5 and 6: The Functional re-integration stage (Closed Kinetic Chain)

The patient was seated on a chair without arm rest. The patient was then asked to co-contract the TrA and MF isometrically and stand up straight from sitting while making conscious effort not to lose the co-contraction. This was progressed by the number of repetition of the activity. Further progression of this exercise, the patient was asked to sit on an armless chair, co-contract the Multifidus and Transversus Abdominis, and instructed to stand up from sitting with a holding a medicine ball in his/her two hands while trying as much as possible to keep the co-contraction of these local segmental muscles (fig. 22).

Stage 4: Weeks 7 and 8:– The Functional re-integration (Closed Kinetic chain with external resistance loading)

The patient was requested to be in standing, he/she was then asked to co-contract, and then bend down through the knees to lift up a specified weight of 1kg in each of the hands lifting each of the weights and then stand up straight with the weights while trying to keep the co-contraction. This exercise was also given as home programme (figs. 23 and 24).

3.5.3: Prescription of Home Programme

The participants in the two groups were placed on home programme using the exercises in the protocol as take home exercises. Participants were instructed to carry out the home programme exercises 3 hourly using exercise diary and Muslim prayer times to encourage adherence to make five times a day.

3.6 Data Analysis

The following data analyses were carried out:

i. Descriptive Statistics of mean and standard deviation and percentages was used to summarize all data obtained from the participants in the McKenzie and Stabilisation groups respectively.

ii. T-Test was used to compare the effects of the two treatment protocols on Sexual dysfunction variables.

iii. Repeated measures ANOVA was used for within group comparison of the effects of the two treatment protocols on Sexual dysfunction variables using the scores at baseline, four and eight weeks. Bonferroni adjustment was used for Post hoc comparison. The level of significance was set at alpha level = 0.05.

Fig. 8: Prone Lying Position for McKenzie Protocol Group

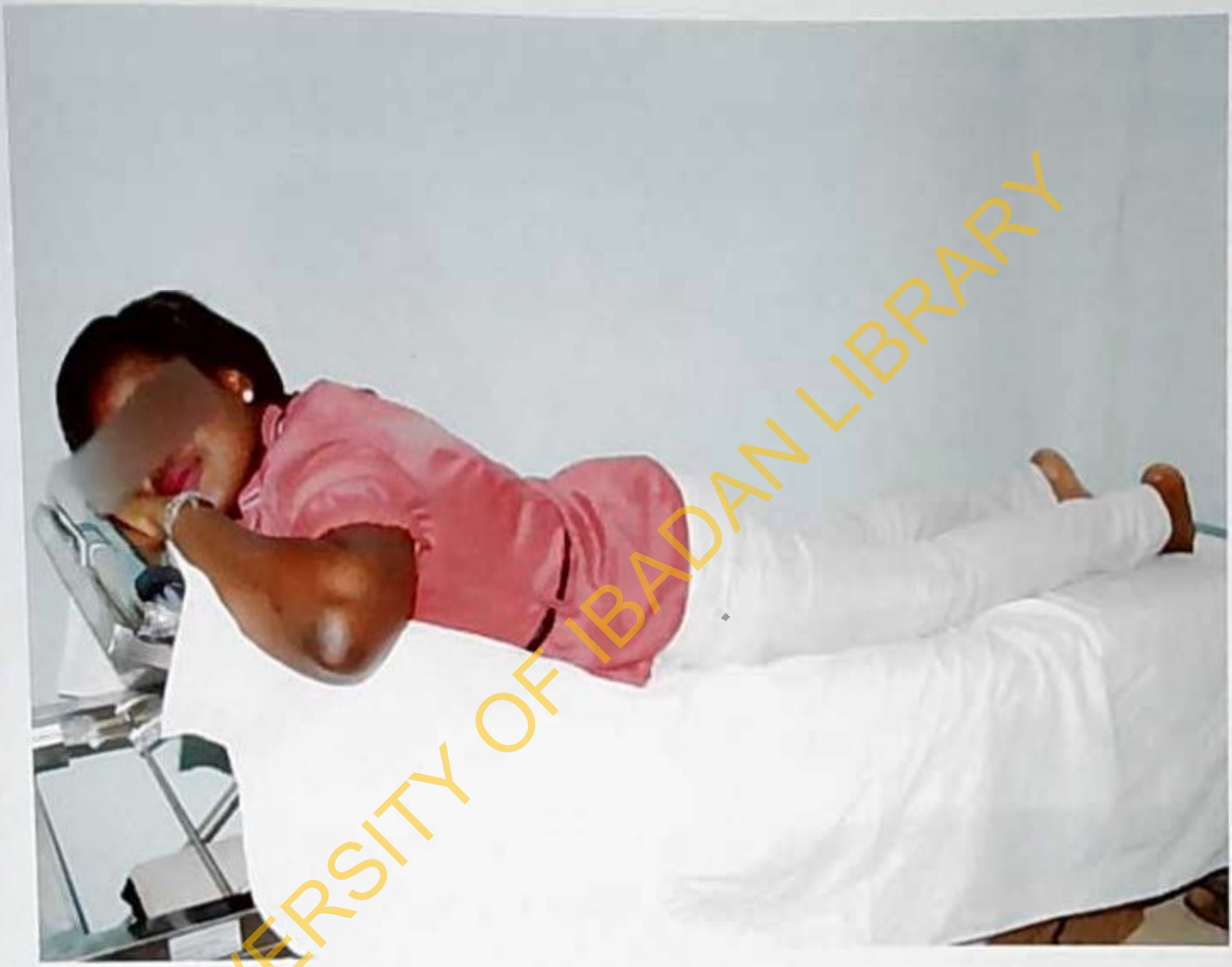


Figure 9: Static McKenzie extension in prone lying.

Figure 10: Active McKenzie extension exercise from prone lying position.

Figure 11: Active McKenzie back extension exercise

Figure 12 McKenzie Trunk Rotation in Standing

Figure 13: Trunk Flexion in Sitting for McKenzie

Figure 13: Trunk Flexion in Sitting for McKenzie

Figure 14: McKenzie side bending exercise

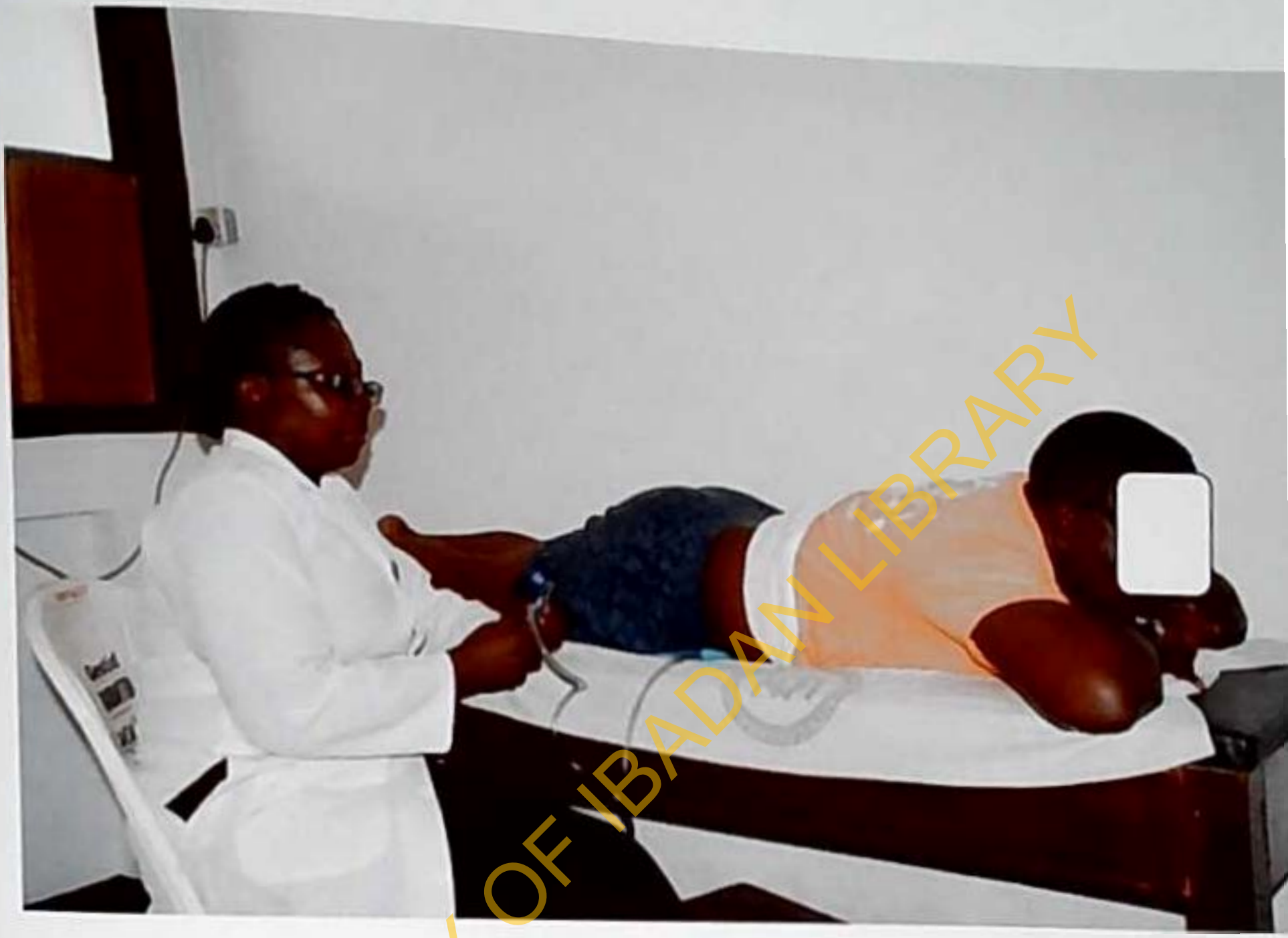


Figure 15: Retraining the co-contraction of the TrA, MF, and PFM in prone lying with pressure biofeedback unit.

Fig. 16: Crook lying position for retraining co-contraction of the Transversus Abdominis, Multifidus and Pelvic Floor Muscle

Figure 17: Four Point Kneeling Position for retraining co-contraction of the Transversus Abdominis, Moltifidus and Pelvic Floor Muscles

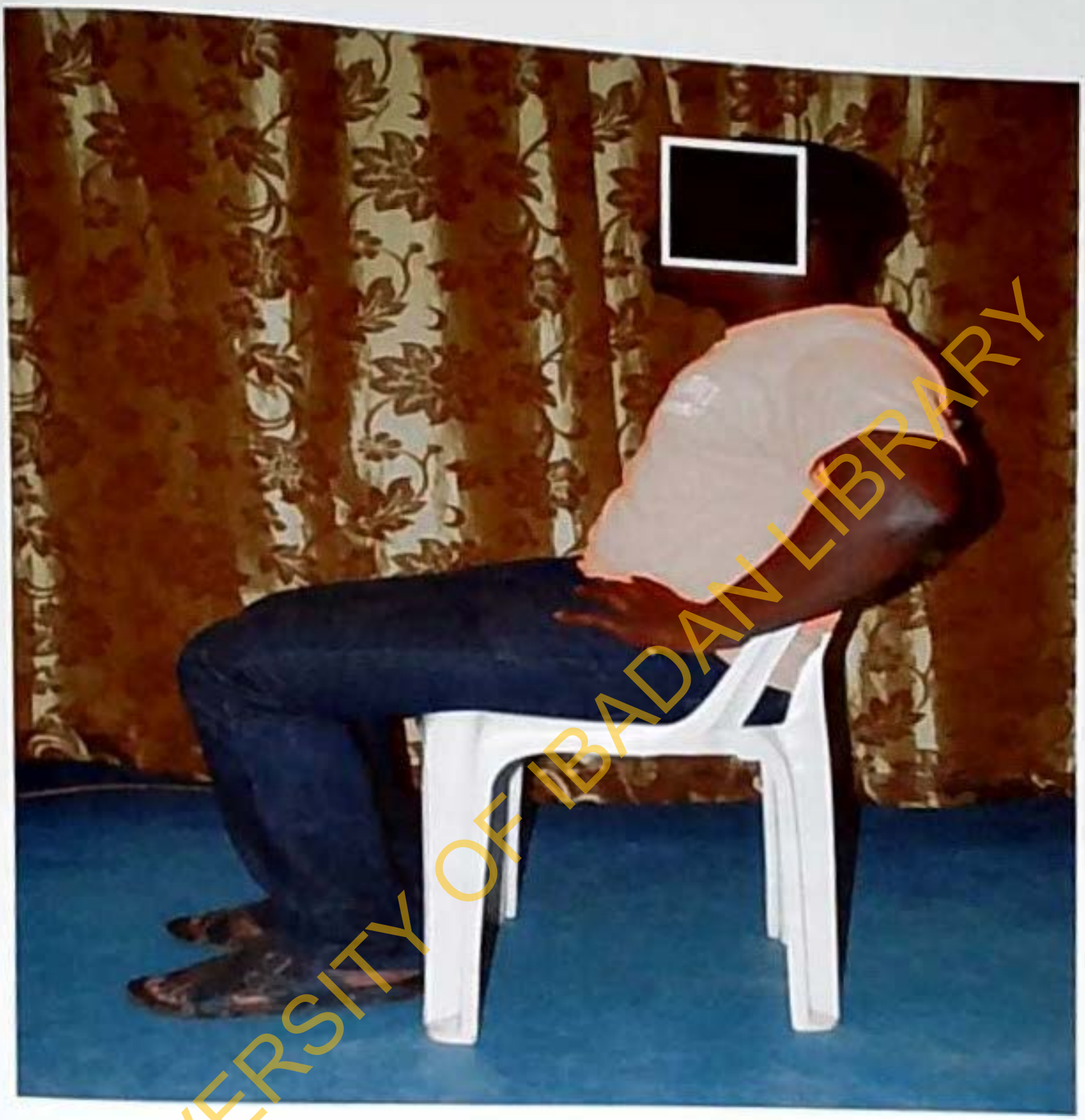


Fig. 18: Retraining co-contraction of the TrA, MF, and PFM in sitting

Fig. 19: Open Kinetic Exercise for Lumbar Stabilisation integrating the limbs

Fig. 20: Open chain kinetic exercise for Stabilisation – Limb integration in supine lying.

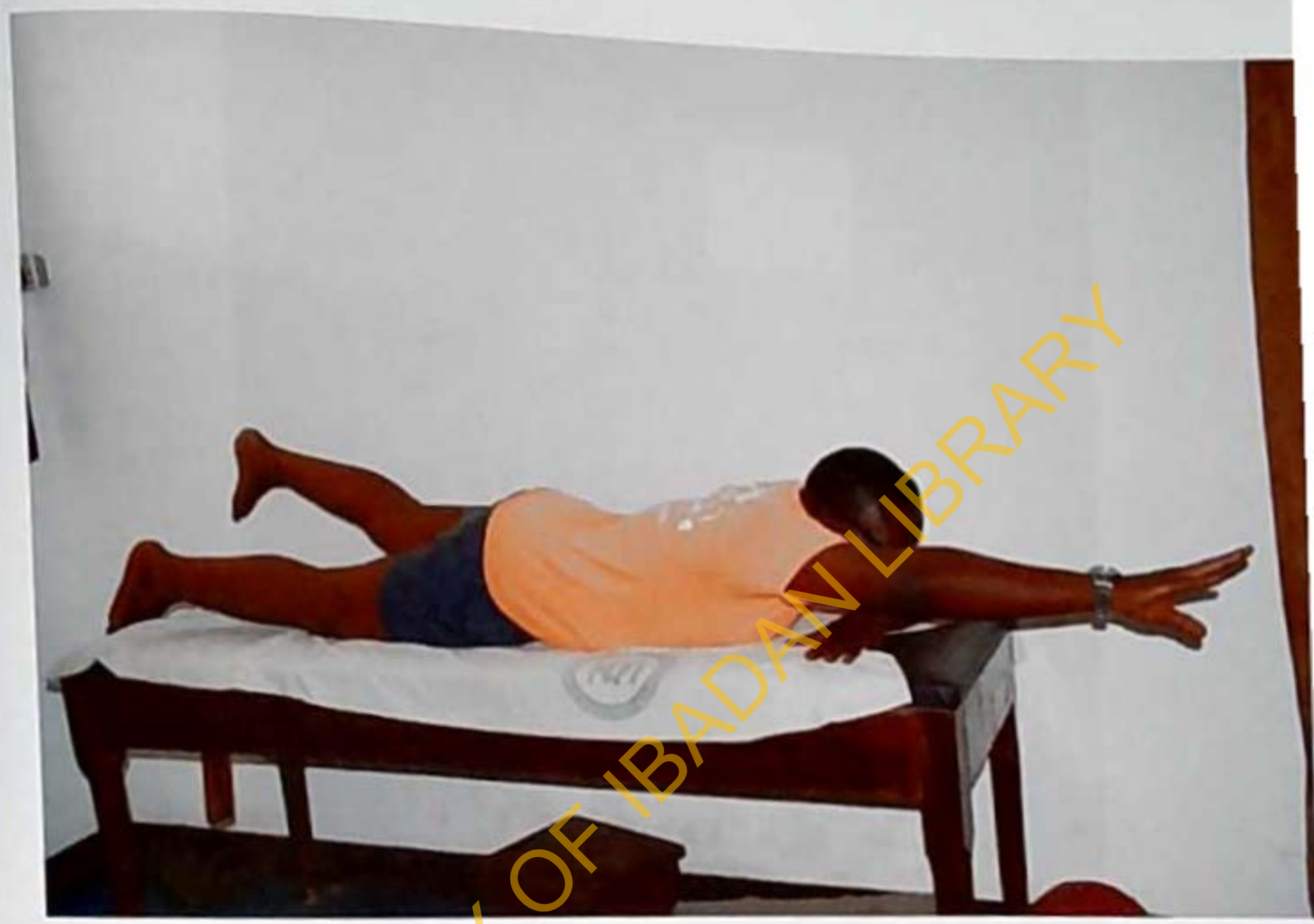


Figure 21: Open chain kinetic exercise in Stabilisation protocol – Limb integration in prone lying

Figure 22: Starting position for closed chain kinetic exercise

Figure 23: Closed kinetic exercise in stabilisation protocol

Figure 23: Closed kinetic exercise in stabilisation protocol

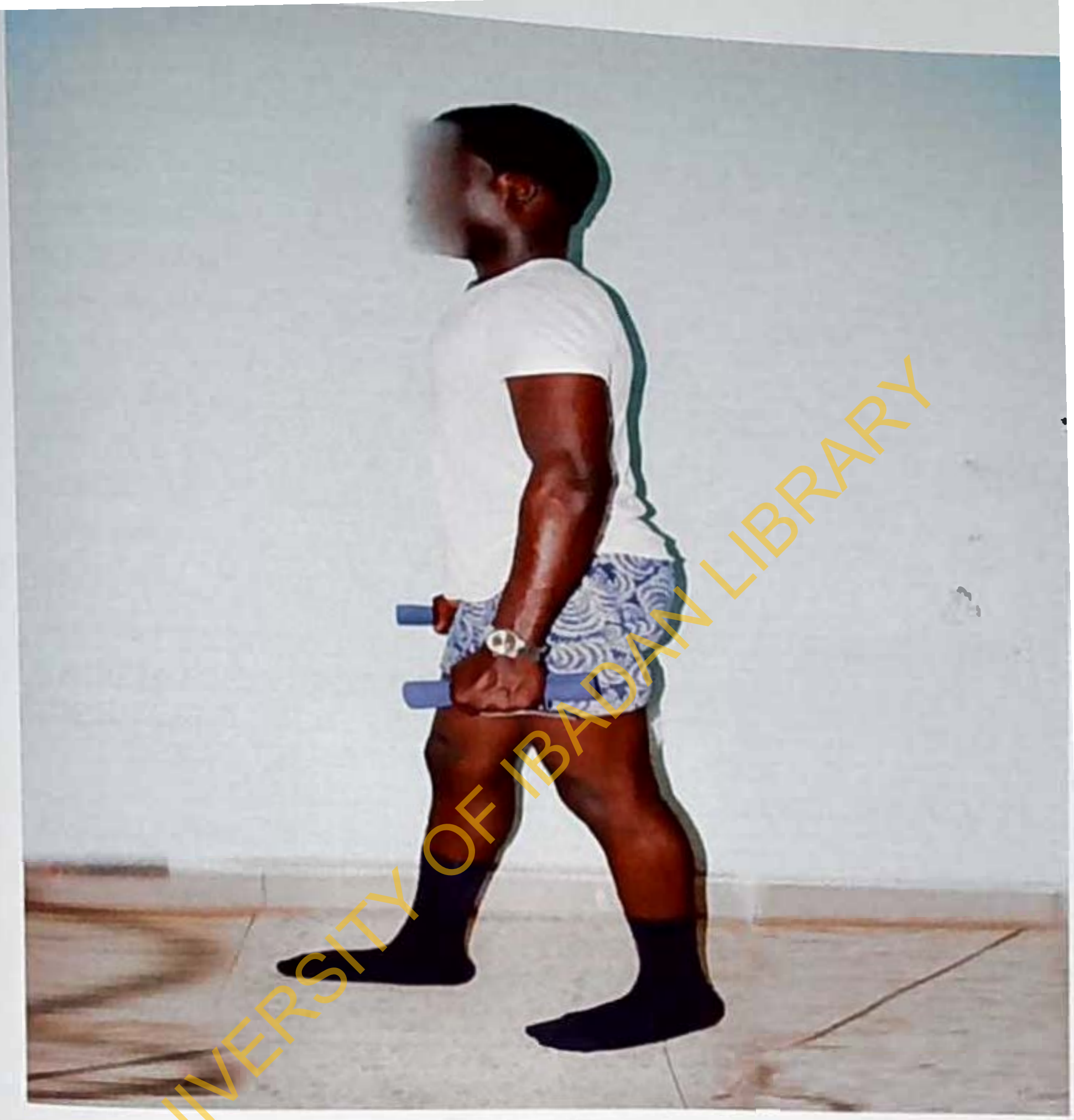


Fig. 24: Close chain kinetic exercises for Lumbar Stabilisation Protocol

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Results

4.1.1 Participants' Profile

Sixty one (61) participants made up of twenty four males and thirty seven females (Male = 23, Female = 38) completed this study. There are thirty one patients in the McKenzie group (MPG) 11 males and 20 females) and thirty participants in the Stabilization group (LSPG) (12 males and 18 females). The mean age of the participants was 49.3 (±12.78) for the McKenzie group and 52.3 (±10.48) for the Lumbar Stabilisation group. The comparison of participants revealed the participants in the two groups were comparable in general characteristics. Sixty-one participants completed the 8-week programme. All the participants in the McKenzie and stabilisation groups were sexually active, and reported low back pain that ranged from three months to seven years (3 months to 7 years). None of the participants reported positively to the specific questions in the algorithm indicative of red flags. Participants in the two groups are comparable in the measured parameters; there was no significant difference in the sexual dysfunction variable and activity interference by pain.

4.1.2 Comparison of Participants' Baseline Parameters

Table 3 shows the participants' baseline parameters were comparable for the two groups at ($p > 0.05$). Table 9 shows the baseline parameters of the sexual dysfunction variables; the sexual desire, lubrication, orgasm, sexual satisfaction, erectile dysfunction and ejaculation disorder were comparable at the baseline. There was no significant difference in these measured parameters in participants in the MPG and LSPG (table3).

Table 3: Comparison of the Participants' Baseline Parameters.

Value	MPG x̄	MPG ±S.D	SPG x̄	SPG ±S.D	Calc. t	p-
Age	49.26	9.66	51.53	8.92	- 0.96	0.96
PI	5.90	1.42	6.77	1.33	-2.45	0.65
SDT_m	25.73	3.93	26.77	6.04	-0.49	0.63
SDT_f	33.10	5.62	34.06	5.61	-0.52	0.61

$p>0.05$

Key:

MPG – McKenzie Protocol Group

SDT_f – Sexual Dysfunction Total male

SDT_m – Sexual Dysfunction Total female

LSPG – Stabilization Protocol Group

PI – Pain Interference

SD – Standard Deviation

4.1.3 Effect of McKenzie protocol on Sexual Dysfunction Varinbles (SDV) in CMLBP across the baseline, weeks 4 and 8 of the study.

Sexual Dysfunction Variables:

The results of this study showed there were significant differences in the mean scores of SD (p=0.0001), L (p=0.0001), O (p=0.0001), SS (p=0.0001), ED (p=0.0001), SDT(p=0.0001) comparison of sexual dysfunction variables across the three-point time (baseline, weeks 4and 8) except in ejaculation disorder throughout the study for participants in the Ej (p = 0.85). The Bonferroni post hoc showed which pairs were significantly different (Tabs. 4 and 5).

4.1.4 Effect of Stabilisntion protocol on Sexual Dysfunction Variables (SDV) in CMLBP across the baseline, weeks 4 and 8 of the study.

Sexual Dysfunction Variables;

Table 6 showed there were significant differences in the mean scores of SD (p=0.0001), L p=0.0001), O (p=0.0001), SS (p=0.0001), ED (p=0.0001) across the time line from baseline to week 8, but Ej showed no significant difference in mean scores (0.17) at $p < 0.05$ (Table 6). The Bonferroni test showed which pairs were significantly different (Table 7) except in ejaculation (p=0.17) that displayed no significant mean score at the end of the study.

4.1.5 Effects of MP on pain, fear avoidance beliefs, sexual interference and sexual satisfaction.

The results of this study across the time line from baseline, fourth and eighth week of intervention showed that there were significant differences in the mean scores of pain (p=0.0001), FABs (p=0.0001), SI (p=0.002), SS (p=0.004) and SDT (p=0.0001). The Bonferroni test showed which time pairs were significantly different (Table 11).

4.1.6 Effects of LSP on pain, fear avoidance beliefs, sexual interference and sexual satisfaction.

Table 12 shows the results of the effect of LSP across the three time line from baseline to eighth week of intervention. A significant difference was shown in pain ($p^{=}0.0001$), FABs (p=0.0001), SI (p=0.0001), SDT (p=0.0001) and SS (p=0.0001). Bonferroni post hoc showed which pairs were significantly different at $p < 0.05$.

4.1.7 Comparison of Baseline Sexual Dysfunction Variables (SDV) in Participants in McKenzie and Stabilisation groups in CMLBP

Sexual Dysfunction Variables;

The comparison of sexual dysfunction variables are shown in tables 8 to 10 and fig. 2. There was no significant difference in the mean scores of the sexual dysfunction variables in the both MPG and LSPG at baseline table 8, the female participants displayed more mean scores than male participants at the baseline ($p > 0.05$). Table 9 showed difference in mean scores were comparable at week 4 ($p < 0.05$). The results in Table 10 showed there were significant difference in mean scores of SD_m (0.05), SD_f (0.002), SS_m (0.001), SS_f (0.02), ED (0.01), Ej (0.01) SDT (0.001)). However, the mean scores of L (0.51), O (0.20) and SDT_f (0.72) were comparable at the end of the study ($p < 0.05$).

Table 4: The effects of MP on Sexual Dysfunction Variables in CMLBP at baseline weeks 4 and 8.

T	SD x̄±SD	L x̄±SD	O x̄±SD	SS x̄±SD	ED x̄±SD	EJ x̄±SD	SDT x̄±SD
BL	4.03±0.99	9.30±2.00	11.60±2.35	7.68±1.67	6.89±1.05	7.56±2.30	30.48±6.20
WK 4	3.47±0.97	8.00±2.18	10.40±1.73	6.93±1.80	6.33±0.71	7.33±2.00	27.10±5.57
WK 8	3.23±0.89	6.65±1.46	9.60±1.54	6.10±1.37	6.10±1.22	7.30±2.00	24.63±4.32
F-value	21.27	22.84	12.95	18.29	5.09	0.17	28.16
P-value	0.00*	0.00*	0.00*	0.00*	0.02*	0.85	0.00*

Key:

SD- Sexual desire

L- Lubrication

O- Orgasm

SS- Sexual satisfaction

ED - Erectile dysfunction

EJ- Ejaculation

SDT- Sexual function total

* - Significant

MP – McKenzie Protocol

CMLBP - Chronic Mechanical Low Back Pain

T – Time

Table 5: Repeated measures ANOVA and Bonferroni Post Hoc test of treatment outcomes among participants in MPG across the 3 time points of the study (n=31)

Outcome		Mean &±SD	Mean Difference &	t-test	p – value
SD	Pr_1	4.03±0.98[a]			
		3.42±0.99[b]	0.61	4.77	0.001*
	Pr_2	4.03±0.98[a]			
		3.23± 0.89[c]	0.80	5.44	0.001*
	Pr_3	3.47±0.97[b]			
		3.23±0.89[b]	0.23	2.25	0.320
L	Pr_1	9.30±2.00[a]			
		8.00±2.18[b]	1.30	4.33	0.001*
	Pr_2	9.30±2.00[a]			
		6.65±1.46[c]	2.65	5.90	0.0001*
	Pr_3	8.00±2.18[b]			
		6.65±1.46[c]	1.35	3.28	0.004*
O	Pr_1	11.60±2.35[a]			
		10.40±1.73[b]	1.20	3.04	0.007*
	Pr_2	11.60±2.35[a]			
		9.60±1.54[c]	2.00	4.07	0.001*
	Pr_3	10.40±1.73[b]			
		9.60±1.54[c]	0.80	2.99	0.008*
SS	Pr_1	7.68± 1.64[a]			
		6.81± 1.90[b]	0.87	3.14	0.004*
	Pr_2	7.68± 1.64[a]			
		6.10± 1.37[c]	1.57	5.40	0.0001*
	Pr_3	6.81± 1.90[b]			
		6.10± 1.37[c]	0.83	3.54	0.001*

Pr_1 – Baseline vs week 4 Pr_2 - Baseline vs week 8 Pr_3 - Week 4 vs week 8

SD – Sexual desire L – Lubrication O – Orgasm

ED – Erection Dysfunction

SS – Sexual Satisfaction

EJ - Ejaculation

SDT – Sexual Dysfunction Total

*Figures that have the same superscript in each domain are not significantly different

Table 5 (contd.): Repeated measures ANOVA and Bonferroni Post Hoc test of treatment outcomes among participants in MPG across the 3 time points of the study (n=31)

Outcome		Mean &SD	Mean Difference &	t-test	p – value
ED	Pr_1	7.10±1.20[a]			
		6.10±0.99[b]	1.00	2.02	0.074
	Pr_2	7.10±1.20[a]			
		6.00± 1.24[c]	0.90	3.25	0.010*
	Pr_3	6.10±0.99[b]			
		6.00±0.89[b]	0.33	1.16	0.282
EJ	Pr_1	7.30±2.30[a]			
		7.30±2.21[a]	0.50	0.59	0.569
	Pr_2	7.80±2.30[b]			
		7.10±2.21[a]	0.70	0.30	0.770
	Pr_3	7.30±2.00[b]			
		7.10±2.21[a]	0.22	0.46	0.695
SDT	Pr_1	30.48±6.16[a]			
		26.87±5.63[b]	3.61	4.75	0.003*
	Pr_2	30.48±6.16[a]			
		24.63±4.32[c]	5.83	6.18	0.001*
	Pr_3	26.87±5.63[b]			
		24.63±4.32[c]	2.47	4.08	0.003*

Pr_1 – Baseline vs week 4 vs week 8

Pr_2 – Baseline vs week 8

Pr_3 – Week 4

SD – Sexual desire

L – Lubrication

O – Orgasm

SS – Sexual Satisfaction

ED – Erection Dysfunction

Ej – Ejaculation

SDT – Sexual Dysfunction Total

*Figures that have the same superscript in each domain are not significantly different

Table 6: The Effects of LSP on Sexual Dysfunction Variables in CMLBP across the baseline, weeks 4 and 8.

T	SD x̄±SD	L x̄±SD	O x̄±SD	SS x̄±SD	ED x̄±SD	EJ x̄±SD	SDT x̄±SD
BL	4.30±0.79	9.78±2.71	12.06±2.26	7.83±1.29	7.36±2.20	6.27±2.10	30.90±6.78
WK4	3.23±0.97	6.89±2.11	10.00±1.78	7.17±5.42	5.82±1.66	6.00±1.34	25.13±8.42
WK8	2.23±1.01	6.28±1.93	8.94±1.76	4.77±1.10	4.73±1.20	5.00±1.10	19.80±5.98
F-value	57.05	22.24	10.65	7.74	18.05	1.97	34.91
P-value	0.00*	0.00*	0.001*	0.001*	0.00*	0.17	0.00*

Key:

SD –Sexual desire

L –Lubrication

O – Orgasm

SS – Sexual satisfaction

ED – Erectile dysfunction

EJ –Ejaculation

SFQ –Sexual function total protocol

* – Significant

LSP – Lumbar Stabillsation

CMLBP – Chronic Mechanical Low Back Pain.

T– Time

BL - Baseline

Table 7: Repeated measures ANOVA and Bonferroni Post Hoc test of treatment outcomes among participants in LSPG across the 3 time points of the study (n=30)

Outcome		Mean x̄±SD	Mean Difference x̄	t-test	p – value
SD	Pr1	4.30±0.79[a]			
		3.23±0.94[b]	1.07	5.76	0.002*
	Pr2	4.30±0.79[a]			
		2.23± 1.01[c]	2.07	11.56	0.0001*
	Pr3	3.23±0.97[b]			
		2.23±1.01[c]	1.00	4.66	0.002*
L	Pr_1	9.78±2.71[a]			
		6.89±2.11[b]	2.89	4.37	0.0001*
	Pr_2	9.78±2.71[a]			
		6.28±1.93[c]	3.50	5.49	0.0001*
	Pr3	6.89±2.11[c]			
		6.28±1.93[c]	0.61	1.94	0.069
O	Pr1	12.06±2.20[a]			
		10.00±1.78[b]	2.06	2.58	0.002*
	Pr2	12.06±2.20[a]			
		8.94±1.76[c]	3.11	4.11	0.001*
	Pr_3	10.00±1.78[b]			
		8.94±1.76[c]	1.06	2.37	0.002*
SS	Pr_1	7.83± 1.29[a]			
		7.17± 5.42[a]	0.68	0.70	0.49
	Pr_2	7.83±1.29[a]			
		4.77±1.10[b]	3.07	10.67	0.0001*
	Pr_3	7.17±5.42[a]			
		4.77±1.10[b]	2.40	2.38	0.024*

Pr_1 – Baseline vs week 4 vs week 8

Pr_2 - Baseline vs week 8

Pr_3 - Week 4

SD – Sexual desire

L – Lubrication

O – Orgasm

SS – Sexual Satisfaction

ED – Erection Dysfunction

*Figures that have the same superscript in each domain are not significantly different

Table 7 (contd.): Repeated measures ANOVA and Bonferroni Post Hoc test of treatment outcomes among participants in LSPG across the 3 time points of the study (n=30)

Outcome		Mean ±SD	Mean Difference x	t-test	p – value
ED	Pr_1	7.36±2.20[a]			
		5.82±1.66[b]	1.55	3.75	0.004*
	Pr_2	7.36±2.20[a]			
		4.73± 1.01[c]	2.64	5.00	0.001*
	Pr_3	5.82±1.60[b]			
		4.73±1.01[c]	1. 09	2.96	0.014*
EJ	Pr_1	6.27±2.10[a]			
		6.00±1.34[b]	0.27	0.36	0.72
	Pr_2	6.27±2.10[a]			
		5.00±2.20[c]	1.27	1.98	0.12
	Pr_3	6.00±1.34[b]			
		5.00±1.10[c]	1.00	1.72	0.12
SDT	Pr_1	30.90±6.77[a]			
		25.13±8.41[b]	5.77	4.09	0.003*
	Pr_2	30.90±6.77[a]			
		19.80±5.98[c]	11.10	8.57	0.0001*
	Pr_3	25.13±8.41[b]			
		19.80±5.99[c]	5.33	4.17	0.003*

Pr_1 – Baseline vs week 4 vs week 8

Pr_2 - Baseline vs week 8

Pr_3 - Week 4

SD – Sexual desire

L – Lubrication

O – Orgasm

SS – Sexual Satisfaction

ED – Erection Dysfunction

SDT – Sexual Dysfunction Total

EJ – Ejaculation

*Figures that have the same superscript in each domain are not significantly different

Table 8: Comparison of Sexual Dysfunction Variables in the Participants in MP and LSPC at Baseline

Outcome	MP (n=31) $\bar{x}\pm SD$	LSP (n=30) $\bar{x}\pm SD$	Calc. t	P-value
SD_m	3.55 ± 1.29	4.08 ± 0.76	-1.25	0.22
SD_f	4.30 ± 0.66	4.47 ± 0.80	-0.71	0.48
L	9.30 ± 2.00	9.65± 2.73	-0.44	0.66
O	11.60 ± 2.35	11.82 ± 2.10	-0.30	0.76
SS_m	7.27 ± 1.74	7.46 ± 1.27	-0.31	0.76
SS_f	7.90 ± 1.59	8.12 ± 1.27	-0.45	0.65
ED	7.18 ± 1.16	7.50 ± 2.15	-0.43	0.67
EJ	7.73 ± 2.20	6.67 ± 2.43	1.10	0.29
SDT_m	25.73 ± 3.93	26.77 ± 6.04	-0.49	0.63
SDT_f	33.10 ± 5.62	34.06 ± 5.61	-0.52	0.61

Alpha level set at $P < 0.05$

SD – Sexual Desire L – Lubrication

O – Orgasm SS_m – Sexual satisfaction for males

SS_f – Sexual satisfaction for females ED – Erectile dysfunction

EJ – Ejaculation SDT_m – Sexual Dysfunction Total for males

SDT_f – Sexual Dysfunction Total for females

Table 9: Comparison of Effects of MP and LSP on Sexual Dysfunction Variables at

Week 4

Outcome value	MCK (n=31) x̄±SD	ST (n=30) x̄±SD	Calc. t	P.
SD_m	2.91 ±1.14	3.15±0.99	0.57	0.58
SD_f	3.70 ±0.80	3.29 ±0.96	1.36	0.18
L	8.00±2.18	7.00 ±2.12	1.41	0.17
O	10.40 ±1.73	10.12 ±1.76	0.49	0.63
SS_m	6.00 ±1.61	5.62 ±1.12	0.69	0.50
SS_f	7.25 ±1.94	8.35 ±6.99	-0.68	0.50
ED	6.10 ±0.99	5.82 ±1.66	0.47	0.65
EJ	7.30 ± 2.21	6.00 ± 1.34	1.65	0.13
SDT_m	22.36 ± 2.69	20.39 ± 4.74	1.23	0.23
SDT_f	29.35 ± 5.28	28.77 ± 8.89	0.25	0.81

Alpha level set at $P < 0.05$

SD– Sexual Desire

L – Lubrication

O – Arousal orgasm

SS_m – Sexual satisfaction

ED – Erectile dysfunction

EJ – Ejaculation

SS_f – Sexual satisfaction (female)

SDT_m – Sexual Dysfunction Total for males

SDT_f – Sexual Dysfunction Total for females

Table 10: Comparison of the Effects of MP and LSP on Sexual Dysfunction Variables at week 8

Outcome	MCK (n=31) x̄±SD	ST (n=30) x̄±SD	Calc. t	P-value
SD_m	2.90 ± 0.99	2.15 ± 0.69	2.13	0.05*
SD_f	3.40 ± 0.82	2.29± 1.21	3.29	0.002*
L	6.65 ± 1.46	6.29 ± 1.99	0.63	0.51
O	9.60 ± 1.54	8.88 ± 1.80	1.31	0.20
SS_m	5.90 ± 1.10	4.31 ± 0.75	4.13	0.00*
SS_f	6.20 ± 1.51	5.12± 1.23	2.37	0.02*
ED	6.10 ±1.20	4.73 ± 1.01	2.85	0.01*
EJ	7.30 ± 1.89	5.00 ± 1.10	3.46	0.01*
SDT_m	22.20 ± 3.46	15.92 ± 3.52	4.27	0.01*
SDT_f	25.85 ± 4.26	22.76 ± 5.84	1.86	0.72

Alpha level set at $P < 0.05$

Key:

SD – Sexual Desire L – Lubrication O – Orgasm

SS – Sexual satisfaction ED – Erectile dysfunction EJ – Ejaculation

SDT – Sexual Dysfunction Total

* – Significant at $p < 0.05$.

Fig. 25: Comparison of Sexual Dysfunction Total in the Participants in the MPG and LSPG across the three-point time.

Key;

SDT – Sexual Dysfunction Total

LSP – Lumbar Stabilisation Protocol

MP1, MP2 MP3 – McKenzie Protocol at baseline, week 4 and week 8 respectively

LSP1, LSP2, and LSP3 – Lumbar Stabilisation Protocol at baseline, week 4 and week 8 respectively

MP – McKenzie Protocol

*** – Significant at p<0.05.**

*** – Significant at p<0.05**

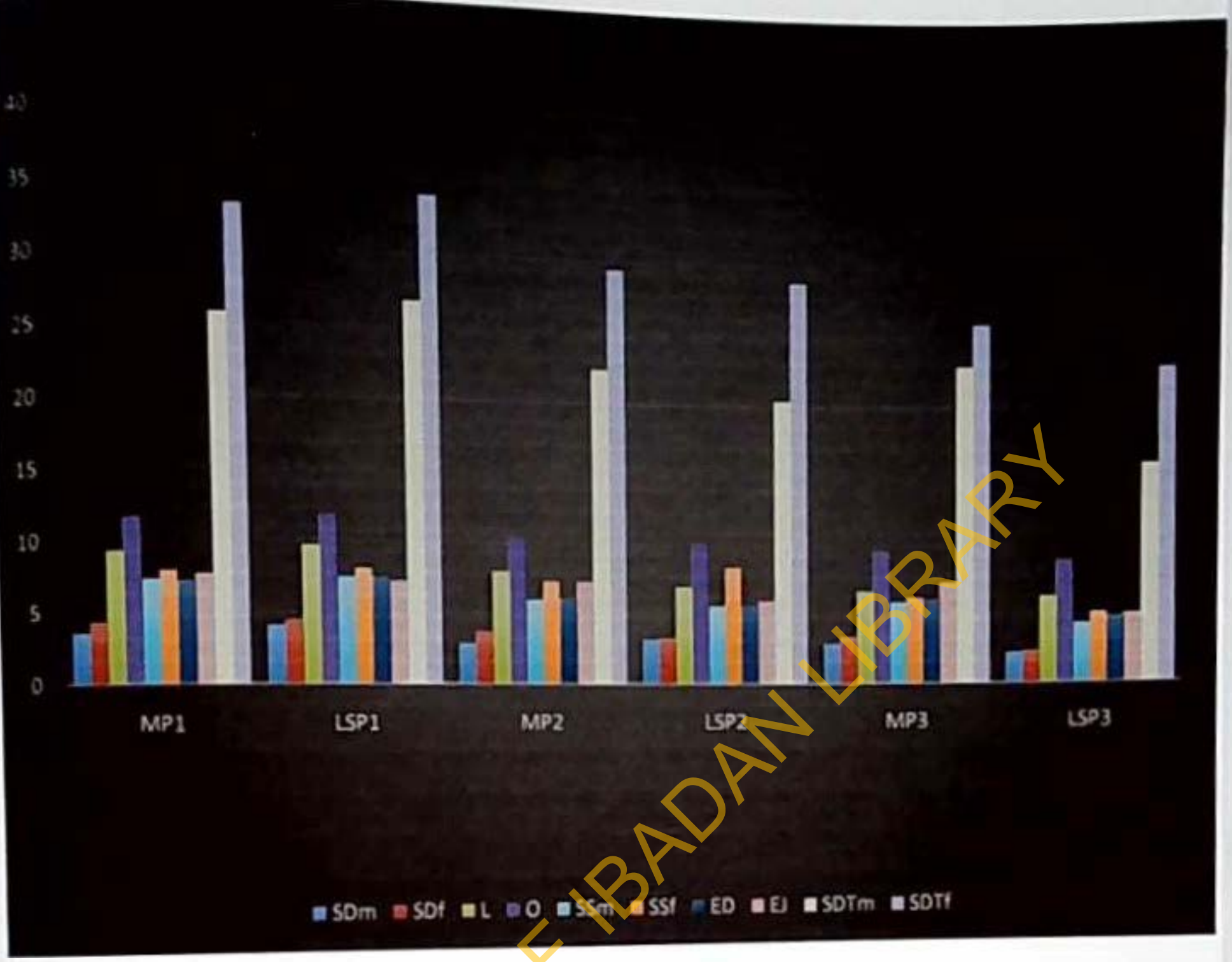


Fig. 26: Comparison of the effects of MP and LSP on sexual dysfunction variables across the three-point time.

Key:

SD – Sexual Desire L – Lubrication O – Orgasm SS – Sexual satisfaction

ED – Erectile dysfunction EJ – Ejaculation SDT – Sexual Dysfunction Total

MP1, MP2 MP3 – McKenzie Protocol at baseline, week 4 and week 8 respectively

LSP1, LSP2, and LSP3 – Lumbar Stabilisation Protocol at baseline, week 4 and week 8 respectively

*** – Significant at $p<0.05$**

Table11: Repeated measures ANOVA and Bonferroni Post Hoc test of treatment outcomes among participants in MPG across the 3 time points of the study (n=31)

Outcome	BL &±SD	WK 4 &±SD	WK 8 &±SD	f-value	p – value
Pain	24.75 ± 6.86[a]	17.93 ± 6.59[b]	13.94 ± 6.82[b]	49.47	0.0001
FABs PA	16.87 ± 5.25[a]	12.71 ± 4.77[b]	10.23 ± 5.02[b]	30.88	0.0001
SI	2.81 ± 1.55[a]	2.36 ± 1.05[b]	2.16 ± 1.09[b]	6.02	0.002
SDT	30.47 ± 6.27[a]	27.10 ± 5.57[b]	24.63 ± 4.32[c]	28.46	0.0001
Q21 (SS)	3.00 ± 1.03[a]	3.25 ± 1.05[b]	3.48 ± 0.85[b]	6.22	0.004

BL– Baseline WK 4 - Week 4 WK 8 - Week 8FABs

PA – Fear avoidance beliefs (Physical Activity)

SI – Sexual Interference from pain (question 8 Oswestry disability questionnaire)

SDT – Sexual Dysfunction Total

Q21 (SS) – Question 21 in WHOQOL-Bref (Sexual Satisfaction)

*Figures that have the same superscript are not significantly different

Table 12: Repeated measures ANOVA and Bonferroni Post Hoc test of treatment outcomes among participants in LSPG across the 3 time points of the study (n=30)

Outcome	BL X±SD	WK 4 X±SD	WK 8 X±SD	f-value	p – value
Pain	29.18 ± 6.32[a]	17.18 ± 5.60[b]	10.91± 4.26[c]	114.58	0.0001
FABs PA	18.15 ± 5.37[a]	11.37 ± 4.10[b]	6.87 ± 3.16[c]	69.14	0.0001
SI	3.77 ±1.63[a]	2.10 ± 0.85[b]	1.63 ± 0.76[c]	49.14	0.0001
SDT	30.90 ± 6.78[a]	25.13 ± 8.4[b]	19.80 ± 5.99[c]	34.91	0.0001
Q21 (SS)	2.23±0.86[a]	3.93±0.83[b]	4.67 ± 0.48[c]	92.92	0.0001

BL – Baseline WK 4 - Week 4 WK 8 - Week 8

FABs PA – Fear avoidance beliefs (Physical Activity)

SI– Sexual Interference from pain (Oswestry Disability Questionnaire)

SDT – Sexual Dysfunction Total

Q21 (SS) – Q21 in WHOQOL-Bref (Sexual Satisfaction)

*Figures that have the same superscript are not significantly different

Table 13: Comparison of Mean outcomes at Baseline, 4 and 8 weeks of Intervention in both treatment groups.

T	RX	SDm	SDf	L	O	SSm	SSf	ED	EJ	SDTm	SDTf
B	MP	3.55	4.30	9.30	11.60	7.27	7.90	7.18	7.73	25.73	33.10
	LSP	4.08	4.47	9.65	11.82	7.46	8.12	7.50	6.67	26.77	34.06
	REM	C	C	C	C	C	C	C	C	C	C
W4	MP	2.91	3.70	8.00	10.40	6.00	7.25	6.10	7.30	22.36	29.35
	LSP	3.15	3.29	7.00	10.12	5.62	8.35	5.82	6.00	20.39	28.77
	REM	C	C	C	C	C	C	C	C	C	C
W8	MP	2.90	3.40	6.65	9.60	5.90	6.20	6.10	7.30	22.20	25.85
	LSP	2.15	2.29	6.25	8.88	4.31	5.12	4.73	5.00	15.92	22.76
	REM	B	B	C	C	B	B	B	B	B	C

MP: McKenzie Protocol Group
LSPG: Lumbar Stabilisation Protocol Group
SDm: Sexual Desire male
SDf : Sexual Desire Female
L: Lubrication
O: Orgasm
SSm: Sexual Satisfaction male
SSf: Sexual Satisfaction female
B – Effect of LSP is better than MP
C – Effect of LSP is comparable to MP
REM - Remark

4.2 HYPOTHESIS TESTING

Sub- hypotheses

Hypothesis 1: Hypothesis 1 stated that there will be no significant difference in the sexual dysfunction total scores of participants in McKenzie (MPG) group across baseline, weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for sexual dysfunction total = 28.46 p = 0.00

Hypothesis 1 is therefore REJECTED.

Hypothesis 2: Hypothesis 2 stated that there will be no significant difference in the sexual desire of participants in McKenzie (MPG) group across baseline, weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for sexual desire = 21.27 p = 0.00

Hypothesis 2 is therefore REJECTED.

Hypothesis 3: Hypothesis 3 stated that there will be no significant difference in the lubrication of female participants in McKenzie (MPG) group across baseline, weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for lubrication = 22.84 p = 0.00

Hypothesis 3 is therefore REJECTED.

Hypothesis 4: Hypothesis 4 stated that there will be no significant difference in the orgasm of female participants in McKenzie (MPG) group across baseline weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for sexual desire = 12.95 p = 0.00

Hypothesis 4 is therefore REJECTED.

Hypothesis 5: Hypothesis 5 stated that there will be no significant difference in the sexual satisfaction of participants in McKenzie (MPG) group across baseline, weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for sexual satisfaction = 18.29 p = 0.00

Hypothesis 5 is therefore REJECTED.

Hypothesis 6: Hypothesis 6 stated that there will be no significant difference in the erectile dysfunction of male participants in MPG across baseline, weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for erectile dysfunction = 5.09 p = 0.02

Hypothesis 6 is therefore REJECTED.

Hypothesis 7: Hypothesis 7 stated that there will be no significant difference in the ejaculation of male participants in MPG across baseline, weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for sexual satisfaction = 0.17 p = 0.85

Hypothesis 7 is therefore ACCEPTED.

8. Hypothesis 8: stated that there will be no significant difference in the sexual dysfunction total scores of participants in Lumbar Stabilization group (LSPG) across baseline, weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for sexual dysfunction total is 34.91 at P = 0.00

Hypothesis 8 is therefore REJECTED.

9. Hypothesis 9: stated that there will be no significant difference in the sexual desire of participants in Lumbar Stabilisation group (LSPG) at baseline and across weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for sexual dysfunction total is 57.05 at P = 0.00

Hypothesis 8 is therefore REJECTED.

10. Hypothesis 10: stated that there will be no significant difference in the Lubrication of female participants in Lumbar Stabilisation group (LSPG) at baseline and across weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for Lubrication is 22.24 at P = 0.00

Hypothesis 10 is therefore REJECTED.

11. Hypothesis 11: stated that there will be no significant difference in the Orgasm of female participants in LSPG at baseline and across weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for Orgasm is 10.65 at P = 0.001

Hypothesis 11 is therefore REJECTED.

12. Hypothesis 12: stated that there will be no significant difference in the sexual satisfaction of participants in LSPG at baseline and across weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for sexual satisfaction is 7.74 at P = 0.001

Hypothesis 12 is therefore REJECTED.

13. Hypothesis 13: stated that there will be no significant difference in the erectile dysfunction of male participants in LSPG at baseline and across weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for erectile dysfunction total is 18.05 at P = 0.00

Hypothesis 13 is therefore REJECTED.

14. Hypothesis 14: stated that there will be no significant difference in the ejaculation of male participants in LSPG at baseline and across weeks 4 and 8 of the study.

Alpha level: 0.05

Test statistics: Repeated ANOVA

Observed F- ratio for ejaculation is 1.97 at $P = 0.17$

Hypothesis 14 is therefore ACCEPTED.

15. Hypothesis 15 stated that there will be no significant difference in the effects of the two treatment (McKenzie and Stabilisation) protocols on the Sexual Dysfunction total of participants at week 4 of the study.

Alpha level: 0.05

Test statistics: t-test

Calculated t for SDTm (male) is 1.23 at $P = 0.23$

Calculated t for SDTf (female) is 0.25 at $P = 0.81$

Hypothesis 15 is therefore ACCEPTED.

16. Hypothesis 16 stated that there will be no significant difference between the effects of the two treatment (MP and LSP) protocols on Lubrication of female participants at week 4 of the study.

Alpha level: 0.05

Test statistics: t-test

Calculated t is 1.41 at $P = 0.17$

Hypothesis 16 is therefore ACCEPTED.

17. Hypothesis 17 stated that there will be no significant difference between the effects of the two treatment protocols on the Orgasm of participants in MPG and LSPG at week 4 of the study.

Alpha level: 0.05

Test statistics: t test

Observed t is 0.49 at $P = 0.63$

Hypothesis 17 is therefore ACCEPTED.

18. Hypothesis 18 stated that there will be no significant difference between the effects of MP and LSP on the Sexual Satisfaction of participants in MPG and LSPG at week 4 of the study.

Alpha level: 0.05

Test statistics: t-test

Observed t for male participants (SS_m) is 0.69 at P = 0.50 and

Calc. t for female participants (SS_f) is -0.68 at P = 0.50

Hypothesis 18 is therefore ACCEPTED.

19. Hypothesis 19 stated that there will be no significant difference in the effects of the two Treatment protocols (MP and LSP) on the Erectile Dysfunction in the participants at week 4 of the study.

Alpha level: 0.05

Test statistics: t - test

Observed t is 0.47 at P = 0.65

Hypothesis 19 is therefore ACCEPTED.

20. Hypothesis 20 stated that there will be no significant difference in the effects of the two treatment protocols MP and LSP on the Ejaculation in the participants at week 4 of the study.

Alpha level: 0.05

Test statistics: t-test

Observed t is 1.65 at P = 0.13

Hypothesis 20 is therefore ACCEPTED.

21. Hypothesis 21 stated that there will be no significant difference in the effects of the two treatment protocols (MP and LSP) on the Sexual Dysfunction Total scores in the participants at week 4 of the study.

For male:

SDTm:

Alpha level: 0.05

Test statistics: t- test

Calc. t is 1.23 at P = 0.23

Hypothesis 21 is therefore ACCEPTED.

For female:

SDTf: Alpha level: 0.05

Test statistics: t – test

Observed t was 0.25 at P = 0.81

Hypothesis 21 is therefore ACCEPTED.

22. Hypothesis 22: There will be no significant difference in the effects of the two treatment protocols (MP and LSP) on the Sexual desire scores in the participants at week 8 of the study.

Alpha level: 0.05

Test statistics: t-test

For male:

SD_m:

Alpha level: 0.05

Test statistics: t- test

Calc. t is 2.13 at P = 0.05

Hypothesis 22 is therefore REJETED.

SD_f: Alpha level: 0.05

Test statistics: t – test

Observed t was 3.29 at P = 0.002*

Hypothesis 22 is therefore REJECTED.

23. Hypothesis 23: There will be no significant difference between the effects of the two treatment (MP and LSP) protocols on Lubrication scores of participants at week 8 of the study.

Alpha level: 0.05

Test statistics: t-test

Calculated t was 0.63 at 0.51

Calc. t is 0.05

Hypothesis 23 is therefore ACCEPTED.

24. Hypothesis 24: There will be no significant difference between the effects of the two treatment protocols on the Orgasm scores of participants in MPG and LSPG at 8 of the study.

Alpha level: 0.05

Test statistics: Independent T Test

Calculated t is 1.31 at 0.20

Hypothesis 24 is therefore ACCEPTED.

25. Hypothesis 25: There will be no significant difference between the effects of MP and LSP protocols on the Sexual Satisfaction of participants in MPG and LSPG at week 8 of the study.

Alpha level: 0.05

Test statistics: t test

For male:

SS_m:

Alpha level: 0.05

Test statistics: t- test

Calc. t is 4.13 at P = 0.00*

Hypothesis 25 is therefore REJETED.

For female:

SSf: Alpha level: 0.05

Test statistics: t – test

Observed t was 2.37 at P = 0.02*

Hypothesis 25 is therefore REJECTED.

26. Hypothesis 26: There will be no significant difference in the effects of the two treatment protocols (MP and LSP) on the Erectile Dysfunction in the participants at week 8 of the study.

Alpha level: 0.05

Test statistics: t-test

Observed t is 2.85 at 0.01*

Hypothesis 26 is therefore REJECTED.

27. Hypothesis 27: There will be no significant difference in the effectsof the two treatment protocols (MP and LSI²) on the Ejaculation in the participants at week 8 of the study.

Alpha level: 0.05

Test statistics: t-test

Observed t is 3.46 at 0.01*

Hypothesis 27 is therefore REJECTED.

28. Hypothesis 28 stated that there will be no significant difference in the effects of the two treatment (McKenzie and Stabilization) protocols on the Sexual Dysfunction Total of participants at week 8 of the study.

Alpha level: 0.05

SDT_m:

Test statistics: t-test

Calculated t was 4.27 at P = 0.01*

Hypothesis 28 for male participants is therefore REJECTED.

SDTf:

Test statistics: t-test

Calculated t was 1.86 at P = 0.72

Hypothesis 28 for female participants is therefore ACCEPTED

4.3.1 Participants' Social-demographic Profile

There was no significant difference in the socio-demographic profile of the participants. The mean age of the participants in this study fell within the bracket that were known to have the highest occurrence of symptoms of low back pain in the general population (Lu and Javier, 2011).

4.3.2: Drop-out rate among the participants

The total drop-out rate observed in this study was 15%. Various studies reported various drop-out rates ranging from 15% to 30.0% (Rittweger et al., 2002; Hurley et al., 2004; Johnson et al., 2010). Johnson et al., (2010) in an 8-week study which compared four physiotherapy regimens in the treatment of long-term

mechanical LBP among Nigerian patients reported 27.4% drop-out rate. The drop-out rate is less than 30% benchmark for defining the acceptable level of drop-out in studies that involve patients with LBP.

4.3.3 Baseline Comparison of Participants' Sexual Variables

The sexual dysfunctions variables namely: sexual desire, lubrication, orgasm, sexual satisfaction, erectile dysfunction, and ejaculation for the participants in the two groups were comparable in their baseline values. There was no significant difference in the mean of these parameters for the two groups. Baseline measures are believed to be predictors of response to treatment in clinical trials (Child et al., 2004). Thus it is important for the baseline measures to be comparable in the groups in clinical trials in order to reduce or erase co-founders and reduce pollution of the results of such studies. This means that any changes noticed post intervention can safely be attributed to the interventions in this study.

4.3.4 Effects of McKenzie Protocol on the Sexual Dysfunction Variables scores of Participants across the Eight Weeks of Study.

The sexual function domains measured in this study were sexual desire (SD), lubrication (L), orgasm (O), sexual satisfaction (SS), erectile dysfunction (ED), ejaculation (EJ), and sexual dysfuaction total (SDT). The analysis of the sexual dysfunction total (SDT), pain interference in sexual activity and sexual satisfaction using repeated measures of ANOVA showed a significant improvement in the various sexual function variables following McKenzie intervention across eight weeks of study. The repeated measures analysis of the sexual function domains showed a very significant improvement in all these variables following eight weeks of McKenzie protocol. This suggests that this protocol has a positive impact on these variables. The post hoc test revealed a significant improvement in sexual desire during the four weeks of the study compared to the remaining four weeks of the study. in the erectile dysfunction the significant improvement was spread across the study though more improvement was observed within the first four weeks of intervention. This was in line with the study by Arora, Arora, Singh and Kaur (2012) a significant reduction of pain and dysfunction was observed in a four week McKenzie intervention. A significant improvement was observed in lubrication, orgasm, sexual satisfaction and sexual

sexual dysfunction total throughout the study. This was similar to the study by Dabholkar and Raphy (2012) that concluded McKenzie intervention resulted in recruitment of Multifidus, improvement in musele endurance and reduction in disability. However, there was no significant improvement in ejaculation of the participants throughout the study.

4.3.5 Effects of Stabilization Protocol on the Sexual Dysfunction Variables Scores of Participants across the Eight Weeks of Study.

The findings of this study showed a significant improvement in the various sexual dysfunction variables following lumbar stabilisation protocol, this suggest that lumbar stabilisation protocol has a positive impact on the sexual dysfunction variables in the participants. The post hoc test revealed significant improvement in sexual desire, lubrication, orgasm, erectile dysfunction and sexual dysfunction total within first four weeks of intervention, the magnitude of improvement slowed down for lubrication but the same pattern of improvement continued to the end of study for sexual desire. orgasm, erectile dysfunction and sexual dysfunction total. There was no significant difference in the effects of McKenzie and Lumbar stabilisation protocols improvement for in sexual satisfaction of participants within the four weeks of intervention, this may suggest that both protocols had a comparable positive however the improvement in the sexual satisfaction became very significant between four and eight weeks of intervention. The results of this study is in line with studies by Franca, Burke, Hanada and Marques 2010, Hosseinifar 2013, You, Kim, Oh and Chon 2014). There was no significant improvement in ejaculation throughout the study.

4.3.6 The Comparative Effects of McKenzie and Stabilisation Protocols on the Sexual Dysfunction Variables Scores of Participants across the Eight Weeks of Study.

The result of this study, no significant difference in the age and baseline outcome parameters in the MP and LSP groups was observed. Baseline parameters are believed to be significant predictors of the response to treatment in clinical trials for LBP (Child et al., 2004). Comparability in baseline measures in clinical trials is reported to reduce the chances co-founders other than the intervention in predicting outcomes. The result of this study revealed that the groups in this study were comparable in their age, gender and baseline parameters; it can be safely implied that

the results obtained at the different times in the course of this study could have been largely due to the effects of the various treatment protocols.

Comparative analysis of the effect of MP and LSP groups showed the two treatment protocols had comparable improvement in all the domains of the sexual function questionnaire at four week. However, there was significant difference in the effect of the two protocols (MP and LSP). LSP had a greater effect on the arousal sensation, sexual satisfaction, erectile dysfunction, ejaculation and the overall sexual function at week 8 which was the end of the study. This is in accordance to several studies (Goldby et al., Franca et al., 2010, Arora et al., 2012 and Hosseinifar et al., 2013) which showed the superiority of lumbar stabilisation protocol on McKenzie protocol in reducing pain intensity and functional disability. The reduction in pain intensity and functional disability, coupled with improvement in the activities of the inhibited muscles (Rasmussen-Barr et al., 2003; Stuge et al., 2006; Byrne et al., 2006; Crow et al., 2012) may be responsible for the significant reduction in sexual dysfunction and subsequent improvement in sexual satisfaction, sexual desire erectile dysfunction, and pain interference in sexual activity in participants in the stabilisation group may be responsible for the significant improvement in sexual activity.

The reactivation of inhibited muscles (MF, TrA and PFM) may also be the reason for the improvement in sexual activity of the participants though McKenzie protocol have positive effects on inhibited muscles (Rasmussen-Barr et al., 2003; Stuge et al., 2006; Byrne et al., 2006; Crow et al., 2012)) stabilisation protocol focused mainly on reactivating and retraining the core muscles; this may be the responsible for the greater reduction in sexual dysfunction level of the participants in the stabilisation.

There was no significant difference in the improvement effected on the orgasm and lubrication of the participants in the two groups by MP and LSP at the 8 week of the study, results showed comparable efficacy of the two protocols on these parameters at week 8, which was the end of the study.

4.3.7 Pain during Sexual Activity and Sexual Satisfaction

The participants experienced less pain during sexual activity and consequently more sexual satisfaction at the end of this study compared to the beginning of the study. The within group change in pain intensity during sexual activity was statistically significant post treatment and also the sexual satisfaction for the two groups of study.

The fear avoidance beliefs, and disability index scores were also significantly less for the participants in the two groups. Studies by Campbell and Edwards 2009; and Meulders et al., (2012) explained that the fear that physical activity will exacerbate pain or promote injury or re-injury leads to avoidance of the activity, increase disability, depression and disuse which then further increase pain.

Studies by Hagg, Fritzell and Nordwall, 2006 and Bergs et al., 2009 revealed that sexual life and sexual function of individuals with CMLBP was affected negatively, and that there was a significant improvement of sexual function strongly associated with surgical intervention (Total disc replacement) in the management of CMLBP. The surgical intervention was said to relief pain by increasing segmental stability at the lumbar vertebra. The improvement in sexual activity and satisfaction recorded may be due to the effectiveness of the McKenzie and Stabilisation protocols in inducing significant reduction in pain felt during sexual activity. This may be due to the fact that both protocols relief pain, increase function, and reactivate inhibited muscles thereby imposing more stability to the spine especially during functional activities.

The participants in the Stabilisation group experienced less sexual restriction and more sexual satisfaction probably because there was greater reduction in pain intensity during sexual activity experienced in this group more than the McKenzie group. This may be explained by the effect of the lumbar stabilisation on segmental muscles that impact segmental stability on the lumbar vertebral of participants that participated in lumbar stabilisation protocol.

4.3.8 Clinical Implication of Findings

McKenzie and Lumbar stabilisation protocols had ameliorating effects on the clinical variables and the sexual dysfunction variables after 8 weeks of treatment. The McKenzie and Stabilisation protocols had comparable effects on pain intensity, fear avoidance beliefs about physical activities, sexual satisfaction, sexual desire, lubrication, orgasm, erectile dysfunction, ejaculation and sexual dysfunction total score of the female participants after four weeks of treatment.

This study thus indicates that the two protocols may be of benefit to participants with sexual dysfunction secondary to chronic mechanical low back pain.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Chronic mechanical low back pain is one of the commonest health conditions worldwide with serious attending disability, absenteeism from work and significant role change. The burden of chronic low back pack pain is enormous and the cost of managing chronic low back pain is significant. Chronic mechanical low back pain is highly associated with sexual dysfunction. Therapeutic exercise is regarded as best treatment approach by different clinical guidelines. McKenzie and Lumbar Stabilisation protocols are recommended in managing pain intensity, fear avoidance beliefs and quality of life. However, both treatment protocols have not been investigated for their effects on sexual dysfunction as a consequent of chronic mechanical low back pain. This study evaluated and compared the effect of McKenzie and Lumbar stabilisation protocols on sexual dysfunction variables for eight weeks of treatment.

The literature review discussed the definition, epidemiology, classification and risk factors for low back pain, and sexual dysfunction from mechanical low back pain, pain, fear avoidance beliefs and how they affect normal sexual activity were also studied Review of the McKenzie and Lumbar Stabilisation defined the protocols and explained the objectives of the two treatment protocols. A pre-test posttest quasi experimental study was carried out. Ethical approval for the study was sought and obtained from the Ethical research committee of the University of Ilorin Teaching Hospital, Kwara State and the Joint University of Ibadan/University College Hospital Institutional Review Committee. Participants were recruited for the study from the orthopeadic and family medicine outpatient clinics. Informed consent of the participants was duly sought and obtained after the objective and procedure of the study was explained. The participants were randomly assigned to one of two groups; The McKenzie protocol group (MPG) and Lumbar stabilisation group (LSPG). Treatment was applied twice weekly in both groups for 8 weeks. The outcomes were measured in terms of clinical variables of pain intensity and functional disability, Fear avoidance beliefs, sexual dysfunction variables at the baseline 4th and 8th week of intervention. The instuments used to measure the outcome were: Chronic Pain Grading scale, Fear Avoidance beliefs questionnaire, Oswestry disability

questionnaire, and sexual function questionnaire. Data obtained was analysed using descriptive statistics of mean and standard deviation, repeated measures, Bonferroni post hoc test. The level of significance was set at 0.05. Results showed that the mean age of the participants was 49.3 ± 12.78 years for McKenzie and 52.3 ± 10.48 for Lumbar Stabilisation protocol group. A dropout rate of 15.3% post intervention was observed in this study. 31 participants and 30 participants in the McKenzie and Lumbar Stabilisation groups respectively completed the study. Both groups were comparable in age and baseline outcomes ($p > 0.05$). Within group comparison across the 3 time points of the intervention phase showed that both treatment protocols had significant effects on sexual variables ($p < 0.05$). There was a significant difference in pain intensity, level of fear avoidance beliefs about physical activities and pain interfering with sexual activity in the McKenzie group. Significant differences in pain intensity, level fear avoidance beliefs about physical activities and pain interfering with sexual activity in participants was noted in the Lumbar Stabilisation group ($p < 0.05$). Both protocols were significant in their median scores on level of Fear avoidance beliefs about physical activities, at 4th and 8th week of the intervention phase ($p > 0.05$). McKenzie and Lumbar stabilisation protocols were comparable in their effects on sexual desire, sexual satisfaction, lubrication, orgasm, erectile dysfunction, ejaculation and sexual dysfunction total at 4th week of intervention ($p < 0.05$). McKenzie and Lumbar Stabilisation protocols had comparable effects on lubrication, orgasm, sexual dysfunction total for females and ejaculation at week 8th of the study ($p < 0.05$). Lumbar stabilisation protocol had greater effect on the mean scores of sexual dysfunction variables in sexual satisfaction, sexual desire, erectile dysfunction and sexual dysfunction total for males at 8th of intervention ($p < 0.05$).

The results were discussed by comparing and contrasting the outcomes of the study with previous related research. Literature was appropriately cited to validate the findings from this study. Likely reasons for the findings of the study were also offered It was concluded that Lumbar stabilisation protocol led to a greater influence on sexual desire, sexual satisfaction and erectile dysfunction at eight week of treatment. McKenzie and Lumbar Stabilisation protocols were comparable in their improvement at the 8th week of treatment.

5.2 Conclusion

From the finding of this study, the following conclusions were drawn:

1. McKenzie and Lumbar Stabilisation protocols had significant and positive impact on all sexual dysfunction variables after 8 weeks of treatment.
2. The McKenzie and Lumbar Stabilisation protocols had comparable effects on sexual satisfaction, sexual desire, lubrication, orgasm, erectile dysfunction, ejaculation and sexual dysfunction total score of the female participants after four weeks of treatment.
3. Lumbar Stabilisation protocol was better in four sexual dysfunction variables than McKenzie protocol at the eight week of treatment, while the both McKenzie and Lumbar Stabilisation protocols had comparable effects on three sexual dysfunction variables at eight week of treatment.
4. Lumbar Stabilisation and McKenzie protocols had comparable but not significant effects on ejaculation throughout the eight weeks of treatment.
5. This study indicated that McKenzie and Lumbar stabilisation protocols brought about significant reduction in sexual dysfunction associated with chronic mechanical low back pain. This indicates that these treatment protocols may be of benefit to patients who experience sexual dysfunction secondary to chronic mechanical low back pain.

5.3 Recommendation

The findings of this study gave rise to the following recommendations:

1. McKenzie and Lumbar Stabilisation protocols are included in the treatment of patients with chronic mechanical low back pain who had associated sexual dysfunction.
2. Lumbar stabilisation protocol is recommended for an earlier and better improvement in sexual desire, sexual satisfaction, erectile dysfunction and sexual dysfunction total.
3. McKenzie protocol is recommended for clinical use where self-management will be of advantage especially in patients feel comfortable with the use of a biofeedback.
4. Adherence to home programme should be emphasised to patients with chronic mechanical low back pain and monitored by Physiotherapists at every treatment session to ensure full complinnce.
5. The effects of McKenzie and Lumbar Stabilisation protocols were not followed up beyond eight weeks. It is recommended that future studies may include short and long time follow-up.

REFERENCES

Airaksinen, O., Brox, J., Cedraschi, C., Hildebrandt, J., Klaber-Moffet, J. and Kovacs, F. 2006. European guidelines for the management of chronic low back pain. *European Spine Journal* 15 (2): S192-S200.

Agur A.M.R. and Dalley, A. F. (Eds). 2009. Grant's Atlas Anatomy. 12th Edition Lippincott, Williams and Wilkins.

Akbari, A, Khorashadizadeh S and Abdi, G. 2008. The effect of motor control exercise versus general exercise on lumbar local stabilizing muscles thickness: randomized controlled trial of patients with chronic low back pain. *Back Musculoskelet Rehabilitation* 2008 21: 105–112.

Al-Obaidi, S.M., Nowail, A.A., Nakhi, H.B. and Al-Mandel, M. 2011. Evaluation of McKenzie intervention for chronic low back pain by using selected physical and bio-behavioural loutcome measures. *Physical Medicine and Rehabilitation 3: 637-646.*

Alemo, S. and Sayadipour A. 2008. Chronic Mechanial Lower Back Pain. *The Journal of Neurological and Orthopedic Medicine and Surgery* 28(1): 5-11.

Ambler, N., Williams, AC., Hill, P., Gunary, R. and Cratchley, G. 2001. Sexual Difficulties of Chronic Pain Patients. *Clinical Journal of Pain* 7: 138-145.

Anil Kumar, MN., Pai, NB. and Rao, S. 2009. Antipsychotics and Sexual Dysfunction. *Online Journal of Health and Allied Sciences* 8 (3): 1-6.

Antunes, S.R, Macedo, S. B.G, Amaral, T.S., Gomez, H.A., Pereira, L.S.M., and Rocha, F.L. 2013. Pain, kinesiophobia and quality of life in chronic low back pain and depression. *Acta Ortopedica Brasileira* 21(1).http://dx.doi.org/10.1590/S1413-78522013000100005.

Arab, A.M., Bebabalani, R.B., Lorestani, L. and Azari, A. 2010. Assessment of pelvic floor muscles control strategies in subjects with sacro-iliac joint pain during the active straight leg raise test. *Spine* 27: 1-8.

Arora, L., Arora, R., Singh, J., and Kaur, H. 2012. A single (investigator) blind randomised controlled trial comparing McKenzie exercises and lumbar stabilisation exercises in chronic low back pain. *European Journal of Experimental Biology* 2(6): 2219-2228. Retrieved 5/2/2016 at 7.03 a.m www.pelagiaresearchlibrary.com.

Arumugan, A., Milosarljevic, S., Woodley, S. and Sole, G. 2012. Effects of external pelvic compression on form closure, and neuromotor control of the lumbo-pelvic spine: A systematic review. *Manual Therapy* 17: 275-284.

Ayanniyi, O., Lasisi, O.T., Adegoke, B.O.A. and Oni-Orisan, M.O. 2007. Management of low back pain. Attitudes and treatment preferences of physiotherapists in Nigeria. *African Journal of Biomedical Research* 10: 41– 49.

Bahrq, H., Fadoua, A., Hanan R., Ihsane, H. and Najia H. 2013. Profile of sexuality in moroccan chronic low back pain patients. *BMC Musculoskeletal Disorders* 14: 63. doi dx.doi.org/10.1186/1471-2474-14-6 3Retrieved 8/4/2014 at 4.03 a.m.

Bergs, S., Fritzell, P. and Tropp, H. 2009. Sex life and sexual function in men and women before and after total disc replacement compared posterior lumbar fusion. *Spine Journal* 9(12): 987-994.

Bo, K. 2012. Pelvic floor muscle training in treatment of female stress urinary iocontinence, pelvic orgnn prolapsed atid sexual dysfiuiction. *World Journal of Urology* 30: 437.

Boudieau, S.A., Farina, D. and Falla. 2010. The role of motor learning and oeuroplasticity in designing approaches for musculoskeletal pain. *Manual Therapy* 15: 410-414.

Breton, A., Miller, C.M. and Fisher, K. 2008. Enhancing the sexual fiuiction of women living with chronic pain: A cognitive-bchavioural treatment group. *Pain Research and Management* 13(3):219-224. Retrieved April 8, 2014 at 4.11a.m. www.pulsus.com/journal/journalHome.

Brady, L.T. 2012. Effective therapeutic exercise prescription; the right exercise at the right dose. *Journal of Hand Therapy* 25 (2): 220-241.

Byrne, K., Doody. and Hurley, D.A. 2006. Exercise therapy for low back pain: A small-scale exploratory survey of current Physiotherapy practice in the republic of Ireland acute hospital setting. *Manual Therapy* 11: 272-278.

Campbell, C.M. and Edwards, R.R. 2009. Mind body interaction in pain: The neurophysiology of anxious and catastrophic pain-related thoughts. *Translational Research* 153 (3): 97-101.

Chen, C., Yen-Chin, L., Yuan-Hsiang, C., Fang-Fu, R., Wa-Min, L. and Rang-Hui, W. 2013.Female sexual dysfunction: definition, classificatioo and debates. *Taiwanese Journal of Obstetrics and Gynecology* 52 (1): 3-7.

Chou, R., Qaseem, A., Snow, V., Casey, D.J. and Cross J. 2007. Diagnosis and treatment of low back pain: joint clinical practice guideline for the American pain society. *Annals of Internal Medicine* 147: 478-491.

Clare, H.A, Adams, R. and Maher, C.G. 2004. Reliability of McKenzie classification of patients with cervical and lumbar pain. *Journal of Manipulative Physiology and Therapy* 28: 122-127.

Cohen, J. 1988. *Statistical power analysis for the behavioural sciences* 2nd Ed pg 55. Lawrence Erlbaum Associates Publishers. Hillsdale. New Jersey Hove, London.

Comerford, M.J. and Mottram, S.L. 2001. Functional stability retrains: principles and strategy for managing mechanical dysfunction. *Manual Therapy* 6 (1): 3-14.

Conalgen, H.M. and Conalgen, J.V. 2013. Drud induced sexual dysfunction in men and women. Australian Prescriber 36: 42-51. Retrieved 29/7/17 at 8.58p.m. doi.australianprescriber,htm

Crow, J., Pizzari, T. and Buttifant, D. 2011. Muscle onset can be improved by Therapeutic Exercise: A systematic review. *Physical Therapy in Sport* 12: 199-209.

Dabholkar, A. and Raphy, L. 2014. The effect of extension based treatment technique in McKenzie derangement syndrome on recruitment of multifidus and endurance of back extensor muscles. *International Journal of Science and Research* 3(8): 450 – 453.

Dagenais, S., Caro, J. and Haldeman, S. 2008. A systematic review of low back pain cost of illness in the United States and internationally. *Spine* 8 (26): E1321-E1322.

Delitto, A., George S.Z, Van Dillen L., Whitman J.M, Shekelle P., Denniger T.R, Godges J.J. 2012. Low Back Pain: Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health from the Orthopeadic Section of the American Physical Therapy Association. *Journal of Orthopeadic Sports Physical Therapy* 42940: A1-A57.

Deish, J., Getchel, R.J., Mayer, T., Polatin, P. and Temple, O.R. 2006. Prevalence of psychiatric disorders in patients with chronic disabling occupational spinal. *Spine* 31(10): 1151-1162.

D'hooge, R., Cagnie, B., Crombez, G., Vanderstraeten, G., Dolphens, M. and Danneels, L. 2012. Increased intramuscular fatty without differences in Lumbar Muscle Cross-sectional area during remission of Unilateral Recurrent Low Back Pain. *Manual Therapy* 17: 584-588.

Ehrlich, G.E. 2003: Low back pain. *Bulletin of the World Health Organization*. 81 (9): 671-676.

El-Geady, S., Gaowgzeb, R.A., Al-Saif, A., Mamdouh, K., Chevidikunnan M.F., Gheith, N., Abou-Alsaud, A. and Karrouf, G. 2015. Impact of Reflexology on mechanical low back pain. *International Journal of Physiotherapy* 2(5): 786-790.

Fajewonyomi, BA., Orji, E.O. and Adeyemo, A.O. 2007. Sexual dysfunction among female patients of reproductive age in a hospital section in Nigeria. *Journal of Health Population and Nutrition* 25 (1): 101 – 106.

Fairbank, J.C.T. and Pynsent, P.B. 2000. Oswestry Disability Index. *Spine* 25 (22): 2940-2953.

Falla. D., Juli, G. and Hodges. P.W. 2004. Feedforward activity of the cervical muscles during voluntary arm movements is delayed in chronic neck pain. *Experimental Brain Research* 157(1): 43-48.

Ferburger, J.K., Holmes, G.M., Agans, R.P., Jackson, A.M., Darter, J.D., Wallace, A.S., Castel L.D., Kalbook, W.D., and Castel L.D. 2009. The rising prevalence of chronic low back pain. *Archives of Internal Medicine* 69: 251-258.

Ferreira, P.H., Ferreira, M.L. and Maher, C.G. 2006. Specific stabilisation exercise for spinal and pelvic pain: a systematic review. *Australian Journal of Physiotherapy* 52: 79-88.

Franca, F.R., Burke, T., Hanada, E.S. and Pasqual, M.A. 2010. Segmental stabilisation and muscular strengthening in chronic low back pain.- a comparative study. *Clinics* 65 (10): 1013-1017.

Fritz, J.M., George, S.A. and Dellito, A. 2001. The role of fear of avoidance beliefs in acute low back pain: Relationship with status. *Pain* 94 (1): 7-15.

Froud, R., Eldridge, S., Kovacs, F., Breen, A. and Bolton, J. 2011. Reporting outcomes of back pain trial: A Modified Delphin Study. *European Journal of Pain* 15(10): 1068-1074.

Garcia, A.N., Gondo, F.L.B., Costa, R.A., Cyrillo, F.F., Silva, T.M., Cost, L.C.M and Costa, L.O.P. 2011. Effectiveness of the back school and McKenzie technique in patients with chronic non-specific low back pain: a protocol of a randomized control trial. BMC *Musculoskeletal Disorder* 12: 179.

Geisser, M.E., Cano, A. and Leonard, M.T. 2005. Factors associated with marital satisfaction and mood among Spouses of persons with chronic back pain. *The Journal of Pain* 6: 518-525.

Gempt, J., Rothoer, RD., Gfams, A., Meyer, B. and Ringel, F. 2010. Effect of lumbar spinal stenosis and surgical decompression on erectile dysfunction. *Spine* 35(22): E1172-1177.

Georgoodis, G., Papathanasios, G., Spiropoulous, P. and Katsoulakis. 2007. Cognitive assessment of musculoskeletal pain with a newly validated Greek version of the FBAQ. *European Journal of Pain* 11(3): 341-351.

Gogtay, N.J. 2010. Principles of sample size calculation. *Indian Journal of Ophthalmology* 59 (6): 517-518. Retrieved October 16, 2010 from http://www.ijo.in

Goldby, L.J., Moore, A.P., Doust, J. and Trew, M.E. 2006. A randomized controlled trial investigating the efficie ncyof musculoskeletal physiotherapy in chronic low back disorder. *Spine* 31(10): 1083-1093.

Gray, H., Adefolarin, A.T. and Howe T.E. 2011. A systematic review of instruments for the assessment of work-related psychosocial factors (blue flags) in individuals with non-specific low back pain. *Manual Therapy* 16: 531-543.

Hagen, K.B., Tambs, K. and Bjerkedul, T. 2006. What mediates the inverse association between education and occupational disability from back pain? – a prospective co-hort study from north-Trondelag health study in Norway. *Social Science and Medicine* 36: 1267-1275.

Hagg, O., Fritzell, P. and Nordwall, A. 2006. Sexual function in men and women after anterior surgery for Chronic low back pain. *European Spine Journal* 15(5): 677-682.

Hatzimouratidis, K., Eardley, I., Giuliano, F., Hatzichristou, D., Moncada, I., Salonia, A., Vardi, Y. and Wespes, E. 2014. Guidelines of male sexual dysfunction: erectile dysfunction and premature ejaculation. *European Association of Urology* 57 (50: 804-814. Retrieved on 15/11/16 at 6.45p.m. https://www.ncbi.nlm.gov/pubmed/20189712.

Heller, M. 2012. Changing inhibition patterns: breaking the pain- inhibition – instability cycle. *Dynamic Chiropratic* 30 (13): 1-4. Retrieved 8/8/17 at 5.15 a.m. https://www.dynamicchiropractic.com.

Henschke, N., Maher, C.G. and McAuley D. 2008. Prognosis in patients with recent onset of low back pain in Australian primary care: inception co-hort study. *British Medical Journal* 337 (7662): 154-157. Retrieved 18/8/17 at 4.19 p.m. doi.www.ncbi.nlm.gov

Hides, J.A., Jull, G.A. and Richardson C.A. 2001. Long-term effects of specific stabilizing exercises for first episode of low back pain. *Spine* 26 (11): 243-248.

Hodges, W.H. and Tucker, K. 2011. Moving differently in pain: A new theory to explain adaptation to pain. *Pain* 15: S90- S98.

Hong, R., Novick, D.and Happich M. 2012. Costs associated with treatment of chronic low back pain. *Spine* 38(1): 75-82.

Hosseinifar, M., Akbari, M., Behtash, H., Amin, M. and Sarrafzadeh . 2013. A Comparison between the effects of Stabilisation and McKenzie exercises on the pain, disability and lumbo-pelvic stability in patients with non-specific chronic low back pain. *Life Science Journal* 10 (10): 298-302.

Hurley, D.A., McDonough, S.M., Dempster, M., Moore, A.P. and Baxter, G.D. 2004: A randomized clinical trial of manipulative therapy and interferential therapy for acute low back pain. *Spine* 2(2):2207- 2216.

Uzelenberg, W. and Burdorf, A. 2004. Patterns of care for low-back pain in a working population. *Spine* 29:1362-8.

Infraca R. 2011. Sexual dysfunction questionnaire: scale development and psychometric validation. *Giornole Italiano Di Psicopatologio* 17: 253 –260.

Janwantanakul, P., Sitthipornvorakul, E. and Paksaichul . 2012. Risk factors for the onset of non-specific low back pain in office workers: a systematic review of prospective co-hort studies. *Journal of Manipulative and Physiologicol Therapeutics* 35(7): 568- 577.

Johnson, O.E., Adegoke, B.O.A., Ogunlade, S.O. 2010. Comparison of four physiotherapy regimens in the treatment of long-term mechanical low back pain. *Japanese Physical Therapy Association* 13: 9-16.

Johnson, O.E. 2010. *Combination Physiotherapy Regimens in Managing Low Back Pain.* VDM Verlag Dr. Mueller E.K. Chapter 2: pg 14-42.

Johnson, O.E. 2012. Therapeutic exercises in the management of non-specific low back pain. Ali Asglow Nomsteh (Ed.) ISBN: 978-953-51-0599-2. In Tech. https://www.intechopen.com/books/low-back-pain-/therapeutic exercises- in-the management - low-back-pain. chapter 10: 225-246.

Karabulutlu, E.Y., Okanli, A. and Siurikaya, S.K. 2011. Sexual dysfunction and depression in Turkish female heamodialysis patients. Pakistan Journal of Medical Science 27(4): 842-846. Retrieved on 15/11/16 at 8.44p.m. https://www.pjms.compk.

Kendall, A.S. and Crowley, D.1999. Development and Initial validation of a questionnaire for measuring fear of avoidance of pain scale. *Journal of Musculoskeletal Pain* 7 (3): 3-9.

Kent, P. and Kjaer, P. 2012. The efficacy of targeted interventions for modifiable psychosocial risk factors of persistent non-specific low back pain: a systematic review. *Manual Therapy* 17 (5): 385-401.

Kovacs, F., Oliver-Fronterei, M., Plana, M.N., Royuela, A., Muriel, A. and Gestaso, M. 2011. Improving school children is knowledge of methods for preventing back pain: a cluster randomized controlled trial. *Spine* 36 (8): E505-512. Retrieved 21/8/17 at 2.25p.m. doi.10.1097/BRS01013e1381.

Kuru, O., Bewyer, D. and Kutu, Y. 1995. Low back pain and sexuality. *O.M.U Tip Dergisi* 12 (1): 83-86.

Kumar, S., Sharma, V.P., Shikla, R., Dev, R. and Negi, M.P.S. 2009. Assessment of back and abdominal pressure, sexual frequence and quality of life. *International Journal. Therapy and Rehabilitation* 16 (11): 615-624.

Liddle, S., Baxter, G. and Gracey, J. 2004. Exercise and Chronic low back pain: what works? *Pain* 107: 176 – 190.

Lindau, S.T., Schumn, L.P., Laumann, E.O., Levinson, W., O'Muichearlaigh C.A. and Waite L.J. 2007 . *New England Journal of Medicine* 357 (8): 762-774.

Lis, A., Black, K., Korn, H. and Nordin, M. 2007. Association between sitting and occupational low back pain. *European Spine Journal* 16: 283-298.

Long, A., Donelson, R. and Fung, T. 2004. Does it matter which exercise? a randomized control trial of exercise for low back pain. *Spine* 29 (23): 2593-2602.

Lu, H. and Javier, F. 2011. Prevalence and treatment of chronic pain in the philipines. *Journal of Internal Medicine* 49 (2): 61-69.

Luo, X., Pietrobon, R. and Hey, L. 2004. Patterns and trends in opioids use among individuals with back pain. Spine 29 (8): 884-890.

Macedo, L.G., Maher, C.G., Latimer, J. and McAuley, J.H. 2009. Motor control exercise for persistent, non-specific low back pain: a systematic review. Retrieved on 12/12/ 2016 at 6.46 a.m. http://ptjournal.apta.org.

Machado, L.A.C., De Souza, M.S., Ferreira, P.H. and Ferreira, M.L. 2006. The McKenzie method for low back pain: a systematic review of the Literature with a Meta-Analysis Approach. *Spine* 31 (9): 254-264.

Maniadakis, N. and Gray, A. 2000. The Economic burden of back pain in the United Kingdom. *Pain* 56: 95-103.

Manek, N.J. and MacGregor, A.J. 2005. Epidemiology of back disorders: prevalence, risk factors and prognosis. *Current Opinion in Rheumatology 17: 134-140*

Martin, B.I., Deyo, R.A., Mirza, S.K., Turner, J.A., Comstock, B.A., Hollingworth, W. and Sullivan, S.D. 2008. Expenditures and health status among adults with back and neck problems. *Journal of American Medical Association* 299 (6): 656-664.

May, S. 2006. Classification by McKenzie's mechanical syndromes: a survey of mckenzie-trained facility. *The Journal of Manipulative and Physiological Therapeutics* 29(8): 637-642.

May, S. 2007. Evidence-informed management of chronic low back pain with the McKenzie method. *The Spine Journal* 6 (5): 56-65.

May, S. and Aina, A. 2012. Centralisation and directional preference: a systematic review. *Manual Therapy* 17: 497-506.

May, S. and Donelson, R. 2008. Evidence-informed management of chronic low back pain with the McKenzie method. *The Spine Journal* (8)1: 134–141.

McKenzie, R. and May, S. 2003. *The lumbar spine: mechanical diagnosis and therapy* New Zealand, spinal publications 5th Ed. 501-513.

Meulder, A. and Vlaeyen J.W. 2012. Reduction of fear movement- related pain and pain-related anxiety: an associative learning approach using a voluntary movement paradigm. *Pain* 153:1504- 1513.

Miller, E.R., Schenk, R.J., Karnes J.L., Rousselle, J.G. 2005. A Comparison of the McKenzie approach to a specific spine Stabilisation programme for chronic low back pain. *Journal of Manual and Manipulative Therapy* 13: 103-112.

Mitchell, T., O'Sullivan, P.B., Burnett, A., Straker, L., Smith, A. and Thornton, J.2010. Identification of modifiable personal factors that predict newonset low back pain: a prospective study of female nursing students. *Clinical Journal of Pain* 26 (4): 275- 283.

Moseley, G.L., 2007. Reconceptualising pain according to modern pain science. *Physical Therapy Reviews* 12 (3): 169-178.

Moffet, J.K. and Frost H. 2000. Back to fitness programme for programme: the manual for Physiotherapists to set up the classes. *Physiotherapy* 86 (6): 295-305.

Mortimer, M. and Ahlberg. 2003. To seek or not to seek? Care seeking behaviour among people with low back pain. *Scandinavian Journal of Public Health* 3 (13):194-203.

Newmann, P., and Gill, V. 2002. Pelvic floor and abdominal interaction: EMG activity and intra-abdominal pressure. *International Urogynecology Journal and Pelvic Floor Dysfunction* 13(2): 125-132.

Nikoobakht M., Fraidouni N., Yaghoubidoust M., Bum A., Pakpour A.H. 2014. Sexual function and associated factors in Iranian patients with chronic low back pain. *Spinal Cord* 52 (4): 307-312. NCBI.htm. Retrieved on 8/9/2014 at 1.07 p.m.

Novakova, E., May, S, Riha and M., and Krai, P. 2012. Direction specific or Stabilisation exercises for chronic low back pain patients: a randomized controlled trial. World Press McKenzie institute international letter 7 (2): 1-7.

Odole, A.C., Akinpelu, A.A., Adekanla, B.A. and Obisanya, O.B. 2011. Economic burden of low back pain on patients seen at the outpatient physiotherapy clinics of secondary and tertiary health institutions in Ibadan. *Journal of the Nigeria Society of Physiotherapy* 18 &19. 43- 48.

Ojomu, F., Thacher, T. and Obadofin, M. 2007. Sexual problems among nigerian women. *International Journal of Impotence Research* 19: 310 – 316. Retrieved on 30/7/17 at 6.11 p.m. doi.10.1038/sj.ijir.3901524.

Omokhodion, F.O., and Sanya, A.O. 2003. Risk factors low back pain among office workers in Ibadan, south-west Nigeria. *Journal of Occupational Medicine* 53: 287-289.

O'Sullivan, P.B., Beales, D.J., Beetham, M.J., Cripps, J., Graf, F. and Lin I.B. 2002. Altered motor control strategies in subjects with sacro-iliac joint pain during the active straight leg raising test. *Spine* 27: 1-8.

O'Sullivan, K., O'Sullivan, P., O'Sullivan, L. and Dankaerts, W. 2012. What do physiotherapists consider to be the best sitting spinal posture? *Manual Therapy* 17: 432-437.

Oyelade, B.O., Jemilohun, A.C. and Aderibigbe, S.A. 2016. Prevalence of erectile dysfunction and possible risk factors among men of south – western Nigeria: a population based study. *Pan African Medical Journal ISSN*: 1937 – 8688: 1-7. Retrieved 30/7/17 at 6.17 p.m. https://www.panafrican-med-journal/content/article.htm

Oyewole, O.O., Ogunlana, M.O., Gbiri, C.A.O. and Orilogun, K.S. 2017. Sexual dysfunction in a Nigerian stroke cohort: a comparative cross-sectional study. *Sexuality and Disability* Retrieved on 30/7/17 at 5.57pm. http://doi.org/10.1007/s11195-017-9488.-6

Paul, B., Leitner, C., Vacariu, G., Wick, F., Zehetmayer, S., Matzner, M., Mitermaier, C., Vanceek, E. and Ebenbichler, G. 2008. Low-back pain assessment based on the brief ICF core sets: diagnostic relevance of motor performance and psychological tests. *American Journal of Physical Medicine and Rehabilitation* 87:452-460.

Perrott, M.A., Pizzari, T., Opar, M. and Cook, J. 2012. Development of clinical rating criteria for tests of lumbo-pelvic stability. *Rehabilitation Research and Practice Retrieved 18/8/17. Doi10.1155/2012/803637.*

Petersen T, Laslett M, Thorsen H, Manniche C, Ekdahl C, Jacobsen S. 2003 Diagnostic classification of non-specific low back pain. A new system integrating patho-anatomical and clinical categories. *Physiotherapy Theory and Practice* 19:213–217.

Petersen, C.K., Bolton, J. and Humphreys, B.K. 2012. Predictors of improvement in patients with acute and chronic low back pain undergoing chiropractic treatment. *Journal of Manipulative Physiology and Therapeutics* 35: 525-533.

Pool-Goudzwaard, A.I., Slieker ten Hove, M.C., Vierhout, M.E., Mulder, P.H., Pool, J.J. and Snijders, C.J. 2005. Relations between pregnancy-related low back pain, pelvic floor activities changes in feedforward, and pelvic floor dysfunction. *International Urogynecology Journal and Pelvic Floor Dysfunction* 10: 468- 474.

Pynor R., Weerakoon, P., Jones M.K. 2005. A preliminary investigation of physiotherapy students attitudes towards issues of sexuality in clinical practice. *Physiotherapy* 91:42–8.

Rainville, J., Hartigan, C., Martinez, E., Limke, J., Jouve, C. and Finno, M. 2004. Exercise as a treatment for chronic low back pain. *The Spine Journal* 4:106-115.

Rasmussen-Bar, E., Nilsson-Wikmar, L. and Arvidson, I. 2003. Stabilisation training compared with manual therapy in sub-acute and chronic low back pain. *Manual Therapy* 8(4): 233-241.

Reme, S.E., Tangen, T., Moe, T. and Eriksen, H.R. 2011. Prevalence of psychiatric disorders in sick listed chronic low back pain patients. *European Journal of Pain* 15 (10):1075-1080

Ricci, J.A., Stewart, W.F., Chee, E., Leotta, C., Foley, K. and Hocbberg, M.C. 2006. Back pain exacerbations and lost productive time costs in united state workers. *Spine* 31: 3052-3060.

Richardson, C.A. and Jull, G.A. 1995.Muscle control: what exercises would you prescribe? *Manual Therapy* 1: 2-10.

Richardson, C., Jull, G., Hodges, P. and Hides, J. 1999. *Therapeutic Exercise for Spinal Segmental Stabilization in Low Back Pain* London: Churchill Livingstone.

Rittweger, J., Just, K., Kautzsch, K., Reeg, P. and Felsenberg, D. 2002. Treatment of chronic lower back pain with lumbar extension and whole-body vibration exercise. *Spine* 27 (17): 1829–1834.

Rosenbaum, T.Y. 2007. Pelvic Floor involvement in the male and female sexual dysfunction and the role of pelvic floor rehabilitation in treatment: a literature review. *Journal of Sexual Medicine* 4(1): 4-13.

Rosenbaum, T.Y. 2009. Musculoskeletal pain and sexual function in women. *Journal of Sexual Medicine* 1743-6109.

Sapsford, R. 2004. Rehabilitation of pelvic floor muscles utilizing trunk stabilisation. *Manual Therapy* 9: 3-12.

Scanell, J.P. and McGill, S.M. 2003. Lumbar posture – should it, and can it be modified? A study of passive tissue stiffness and lumbar position during activities of daily living. *Physical Therapy* 83 (10): 907- 917.

Schmidt, L., Rechter, L., Hansen, V.K., Andreasen, J. and Overvad, K. 2008. Prognosis of sub-acute low back pain patients according to pain response. *European Spine Journal* 17: 57-63.

Sparksman-Johnson. 2003. *Chronic low back pain and how it may affect sexuality*: Patient education. University of Kentucky; Health Information Library.

Stegman, J.K., 2006. Stedman's Medical dictionary. 28th edition. Lippincott Williams and Wilkins. A Wolters Kluwer Health Company. 351 West Camden Street, Baltimore, Maryland 21201-2436 USA.

Stein, A., Glasper, R., La Marina V., Poplanus, S., Silbert, C., Small, D., Stamas, S., Stendahl and Cardenia, T. 2017. Retrieved 12/8/17 at 10.50 p.m. https://www.healpelvicpain.com

Stuge, B., Saetre, K. and Braekken, I.H. 2011. The association between pelvic floor muscle function and pelvic girdle pain- a matched case control 3D ultrasound study. *Manual Therapy* 30:1-7.

Tirado, L.C.E., Ferrer, J.A. and Herrera, A.M. 2016. Aging and erectile dysfunction. *Sexual Medicine Reviews 4(10) 63-73.*

Tsao, H., Galea, M.P. and Hodges, P.W. 2010. Driving plasticity in the motor cortex in recurrent low back pain. *European Journal of Pain* 14 (8): 832-839.

Verbunt, J.A., Seelen H.A., Vlaeyen, J.W., van de Heijden, G.J., Heuts, P.H., Pons, K. and Knottnerus, J.A. 2003. Disuse and deconditioning in chronic low back pain: concepts and hypotheses on contributing mechanisms. *European Journal Pain*. 71:9-21.

Vlaeyen, J.W.S., de Jong, J., Geilen, M., Heuts, P.H.T.G. and van Breukelen, G. 2002. The treatment of fear of movement/ (re)injury in chronic low back pain: further evidence on the effectiveness of exposure in vivo. *Clinical Journal of Pain* 18:251–261.

Vleeming, A., Albert, H., Ostgaard, H., Sturcssoo B. and Stuge B. 2008. European guidelines for the diagnosis and treatment of pelvic girdle pain. *European Spine Journal* 17(6): 794-819

Von Korff, M., Ormel, J., Keefe, F.J. and Dworkin, S.E. 1992. Grading the severity of chronic pain. *Pain 50: 133-149.*

Von Korff, Lin, E., Fenton, J. and Saunders, K. 2007. Frequency and priority of pain patients' health care use. *Clinical Journal of Pain* 23 (5): 400-408.

Waddell, G., Newton, M., Henderson, I., Somerville, D. and Main, C. 1993. A fear avoidance beliefs questionnaire (FABQ) and the role of fear avoidance beliefs in chronic low back pain disability. *Pain* 52: 157-168.

Waddell, G., 2nd ed. *The back pain revolution* Edinburgh: Churchill Livingstone. 2004. Ix.

Wand, B.M., Chiffelle, L.A., O'Connell, N.E., McAuley, J.H. and De Souza, L.H. 2010. Self-reported assessment of disability and Performance-based assessment of disability are influenced by different patient characteristics in acute low back pain. *European Spine Journal 19 (4): 633-640.*

Weiner, D.K., Rudy, T.E., Morrow, L., Slaboda, J. and Lieber, S. 2006. The relationship between pain, neuropsychological performance and physical function in community-dwelling older adults with chronic low back pain. *Pain Medicine* 7(1): 60-70.

Whittaker, .2004. Abdominal ultrasound imaging of pelvic floor muscles function in individuals with low back pain. *The Journal of Manual and Manipulative Therapy* 12: 44-49.

Woolf, A. and Pfleger, B. 2003. *Burden of major musculoskeletal conditions* Bulletin of the World Health Organization. 81(9): 646-656.

European Scientific Journal July 2014 edition vol.10, No.21 ISSN: 1857 – 7881 (Print) e – ISSN 1857- 7431 123.

Ylimax, E. and Dedeli, O. 2012. Effect of Physical and Psychosocial factors on occupational low back pain. *Health Science Journal* 6(4): 598-609.

You, J.H, Kim, S.Y., Oh D.W. and Chon, S.C. 2014. The effect of a novel core stabilisation technique in managing patients with chronic low back pain: a randomized, controlled experimental- blinded study. Clinical Rehabilitation 28(5): 460-469.

Zelman, D., Rosenberg J. and Diller J. 2006. *Addressing sexual Impairment in chronic Pain* Pain Medicine News .painmedicinenews.com.

INSTITUTE FOR ADVANCED MEDICAL RESEARCH AND TRAINING (IAMRAT)
COLLEGE OF MEDICINE, UNIVERSITY OF IBADAN. IBADAN, NIGERIA.
Director: Prof. A. Ogunniyi, [illegible]
Tel: 08023036563, 08036094173
E-mail: aogunniyi@comuiedu.ng

UUUCH EC Registration Number: NHREC/05/01/2008a

Notice of Renewal of Approval

Re: Comparative Efficacy of McKenzie Technique and Stabilization Exercises in the Management of Patients with Chronic Low Back Pain

UIUCH Ethics Committee assigned number: UIUEC/13/0135

Name of Principal Investigator: Olubamike I. Adeniigbe

Address of Principal Investigator: Department of Physiotherapy,
College of Medicine,
University of Ibadan, Ibadan

Date of receipt of valid application for renewal of approval: 04/12/2014

Status: 2nd Approval

This is to inform you that the UIUCH Ethics Committee has received your application for renewal of approval on the above titled research. The report indicates that a total of 40 participants have been recruited into the study so far. It also states that out of the 40 participants who have completed their intervention, 23 were in McKenzie group while 17 were in stabilization group. The report also states that the study is still ongoing until sample size of 72 is achieved.

The Committee notes the contents of the report and having found it satisfactory, hereby approves your request for renewal of approval for One Year of Study Duty.

This renewed approval dates from 22/12/2014 to 21/12/2015. Note that no participant accrued or activity related to this research may be conducted outside of these dates. All informed consent forms to be used in study must carry the UIUCH Ethics Committee assigned number and duration of UIUCH EC approval of the study. It is expected that you submit your annual report as well as annual request for project renewal to the UIUCH EC early in order to obtain renewal of your approval and avoid disruption of your research.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the UIUCH EC. No changes are permitted in the research without prior approval by the UIUCH EC except in circumstances outlined in the Code. The UIUCH EC reserves the right to conduct compliance visit to your research site without previous notification.

UIUCH EC
DEC 2014

Dr. W.O. Ilalogun
Vice-Chairman, UIUCH Ethics Committee
E-mail: uiuchirc@yahoo.com

UNIVERSITY OF ILORIN TEACHING HOSPITAL

Chairman
MRS. OLAJUMOKE ANIFOWOSHE
LL.B. (Hons), ACMA
Chief Medical Director
PROF. A.W.O. OLATINWO
MBBS, FWACS, MBA, CMIOD
Chairman Medical Advisory Committee
DR. B. S. ALABI
MBBS, FWACS, FMCOG
Civil Hospital Mgt.
Director of Administration
DR. (MRS.) Y.C. AYO-BELLO FRAN
B.Sc, MPH (Otago, USA), PhD (Ibadan)

Old Jebba Road, Oke-Oro,
P.M.B. 1459, Ilorin,
Kwara State, Nigeria.

E-mails:
- unithilorin1980@yahoo.com
- info@uith.org

Telephones:
- 08055763942
- 08037301311

UITH/CAT/185/19[illegible]/146

UITH EAC Protocol Number: EAC [illegible]
UITH ERC Approval Number: ERC [illegible]

Date: 14/05/2015

COMPARATIVE EFFICACY OF MCKENZIE TECHNIQUE AND STABILISATION EXERCISES IN THE TREATMENT OF PATIENTS WITH CHRONIC LOW BACK PAIN

UITH Ethical Research Committee (ERC) assigned number: NHREC/08/05/2014
Name of Applicant/Principal Investigator: ADERIBIGBE OLUDAIMIKE ISEOLU
Address of Applicant: Dept. of Rehabilitation, College of Medicine, University of Ibadan.
Date of receipt of application: 11/03/2015
Type of Application: Full Committee Review
Date of Full Committee Decision on the Research: 11/03/2015
Date of full Committee approval: 14/05/2015

Notice of Full Committee Approval

I am pleased to inform you that the research described in the submitted protocol, the consent forms and other participant information materials have been reviewed by the UITH Ethical Review Committee (ERC) and given full Committee approval.

The approval is from 14/05/2015 to 13/05/2016. You are requested to inform the committee at the commencement of the research to enable it appoint its representative who will ensure compliance with the approved protocol. If there is delay in starting the research, please inform the ERC so that the approval can be adjusted accordingly.
Note that no recruitment or activity related to the research may be conducted outside these dates.

The UITH ERC requires you to comply with all the institutional guidelines and regulations and ensure that all adverse events are promptly reported to the ERC.
No changes are allowed in the research without prior approval by the ERC. Please note that the ERC reserves the right to conduct monitoring/oversight visit to your research site without prior notification.

Thank you

PROF. C.T. ADEDOYIN MBBS (C.I), FWACP (Fmed.), FRCP (Edin), ASN/ISN Fellow, Cert. HP&M
Chairman, UITH Ethics Review Committee. (ERC)

UNIVERSITY OF ILORIN TEACHING HOSPITAL

Chairman
MRS. OLAJUMOKE ANIFOWOSHE
LL.B. (HONS) ACIArb
Chief Medical Director
PROF. A.W.O. OLATINWO
MBBS, FWACS, MBA, ANIM
Chairman Medical Advisory Committee
DR. B. S. ALABI
MBBS, FWACS, FMCOrth
Cert. Health Int. Mgt.
Director of Administration
DR. (MRS.) Y.C. AYO-BELLO FHAN
B.Sc., MHM (Pretoria, USA) Ph.D (Berlin)

Old Jebba Road, Oke Oso,
P.M.B. 1459, Ilorin,
Kwara State, Nigeria.

E-mails:
- uithilorin1980@yahoo.com
- info@uith.org

Telephones:
- 08035763942
- 08037301311

UITH ERC Protocol Number: ERC PAN/2015/03/[illegible]
UITH ERC Approval Number: ERC PAN/2015/05/[illegible]

UITH/CAT/189/19[th]/146

Date: 14/05/2015

COMPARATIVE EFFICACY OF MCKENZIE TECHNIQUE AND STABILISATION EXERCISES IN THE TREATMENT OF PATIENTS WITH CHRONIC LOW BACK PAIN

UITH Ethical Research Committee (ERC) assigned number: NHREC/02/05/2010
Name of Applicant/Principal Investigator: ADERIBIGBE OLUBANKE IFEOLU
Address of Applicant: Dept. of Physiotherapy, College of Medicine, University of Ibadan.
Date of receipt of application: 11/03/2015
Type of Review: Full Committee Review
Date of full Committee Decision on the Research: [illegible]/03/2015
Date of full Committee Approval: 14/05/2015

Notice of full Committee Approval

I am pleased to inform you that the research described in the submitted protocol, the consent forms and other participant information materials have been reviewed by the UITH Ethical Review Committee (ERC) and given full Committee approval.

This approval dates from 14/05/2015 to 13/05/2016. You are requested to inform the committee at the commencement of the research to enable it appoint its representative who will ensure compliance with the approved protocol. If there is delay in starting the research, please inform the ERC so that the dates of approval can be adjusted accordingly.

Note that no participant accrual or activity related to this research may be conducted outside these dates.

The UITH ERC requires you to comply with all the institutional guidelines and regulations and ensure that all adverse events are reported promptly to the ERC.

No changes are permitted in this research without prior approval by the ERC. Please note that the ERC reserves the right to conduct compliance visit/oversight visit to your research site without prior notification.

Thank you

PROF. C.T. ADEDOYIN MBBS (IL), FWACP (Paed.), FRCP (Edin), ASN/ISN Fellow, Cert. HP&M
Chairman, UITH Ethics Review Committee (ERC)

Appendix C

Fig. 7: The pressure biofeedback

Appendix D

Chronic Pain Grading Scale (Modified)

(Vonkorff et al., 1992).

Pain intensity Score

1. How would you rate your pain on a 0-10 scale at the present time, that is right now, where 0 is "No pain" and 10 is "pain as bad as it could be"

No Pain — Pain as bad as it could be

0 1 2 3 4 5 6 7 8 9 10

2. In the past 3 months, how intense was your worst pain rated on a 0-10 scale where 0 is the "No pain" and 10 is pain as it could be

No Pain — Pain as bad as it could be

0 1 2 3 4 5 6 7 8 9 10

3. In the past 3 months, on the average, how intense was your pain rated on 0-10 scale where 0 is "no pain" and 10 is "pain as bad as it could be"

No Pain — Pain as bad as it could be

0 1 2 3 4 5 6 7 8 9 10

Disability Items

4. About how many days in the last 3 months have you been kept from your usual activities (work, school or housework?) because of pain?

Disability days_____

5. In the past 3 months, how much has pain interfered with your daily activities rated on a 0-10 scale where 0 is "no interference" and 10 is "unable to carry on any activities"

No interference unable to carry on any activities

0 1 2 3 4 5 6 7 8 9 10

6. In the past 3 months, how much has pain change your ability to take part in recreational, social and family activities where 0 is "no change" and 10 is "extreme change"?

No change extreme change

0 1 2 3 4 5 6 7 8 9 10

7. In the past 3 months, how much pain changed your ability to work (including housework) where 0 is "no change" and 10 is "extreme change"?

No change extreme change

0 1 2 3 4 5 6 7 8 9 10

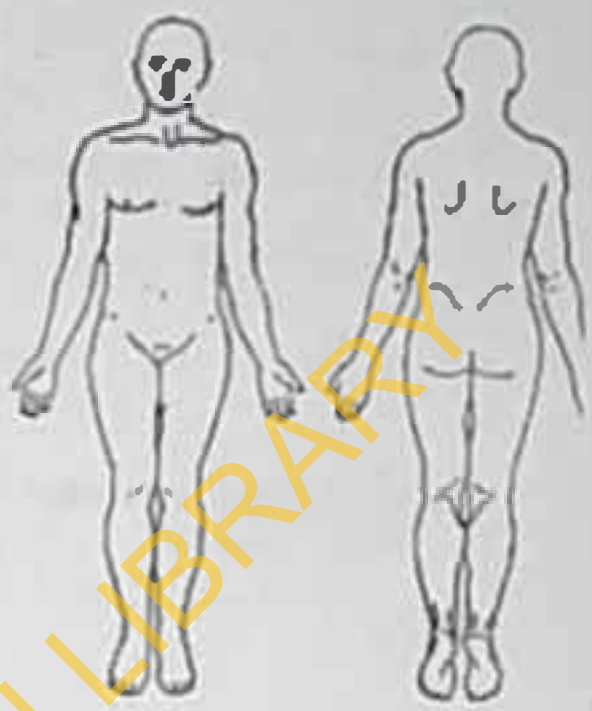
Appendix E

THE MCKENZIE INSTITUTE LUMBAR SPINE ASSESSMENT (McKenzie, 2005)

Date _____

No. _____ Sex M/F _____

Date of Birth _____ Age _____



Referral: GP/Ortli/Self/Other

_____

Work: Mechanical Stresses

_____

_____

Leisure: Mechanical Stresses

_____

Functional Disability from present episode

_____

Functional Disability score _____

VAS Score (0-10) _____

HISTORY

Present Symptoms _____

Present Since _____ Improving/Unchanging/Worsening

Commercial as a result of _____ or no apparent reason

Symptoms at onset: back/thigh/leg _____

Constant symptoms: back/thigh/leg _____ Intermittent symptoms: back/thigh/leg

Worse bending sitting/rising standing walking lying

Am/as the day progresses/pm when still / on the move

Other _____

Better bending sitting/rising standing walking lying

Am/as the day progresses/pm when still / on the move

Other _____

Disturbed Sleep Yes / No Sleeping postures: prone /sup / side / R/L Surface: firm / soft/ sag

Previous Episodes 0 1-5 6-10 11+ Year of first episode _____

Previous History _____

_____

Previous Treatments _____

_____

SPECIFIC QUESTIONS

Cough/Sneeze /Strain /+ ve / -ve Bladder: normal / abnormal Gait: normal / abnormal

Medications: Nil / NSAIDS / Analgesics / Steroids / Anticoagulants/ Other _____

General Health: Good / Fair/ Poor _____

Imaging: Yes / No _____

Recent or major surgery: Yes / No _____ Night Pain: Yes / No _____

Accidents: Yes / No _____ Unexplained weight loss: Yes / No

Other _____

The McKenzie Institute Lumbar Spine Assessment

EXAMINATION

POSTURE

Sitting: Good /Fair/Poor Standing: Good/Fair/Poor Lordosis: Red/Acc/Normal Lateral Shift: Right/Left Nil

Correction of Posture: Better/Worse/No effect _____ Relevant: Yes/No

Other Observations: _____

NEUROLOGICAL

Motor Deficit _____ Reflexes _____

Sensory Deficit _____ Dural Signs _____

MOVEMENT LOSS

	Mj.	Mod.	Min.	Nil	Pain
Flexion					
Extension					
Side Gliding R					
Side Gliding L					

TEXT MOVEMENTS: Describe effect on present pain – During: produces, Abolishes, increases, decreases, no effect. Centralising, peripheralising. After: better, whose, no better, no worse, no effect, centralising, peripheralised.

	Symptoms During Testing	Symptoms After Testing	Mechanical Resoonse ↑ Rom	↓ Rom	No Effect
Pretest Symptoms Standing					
FIS					
Rep FIS					
EIS					
Rep EIS					
Pretest Symptoms lying:					
FIS					
Rep FIS					
EIS					
Rep EIS					
If required pretest symptoms					
SCIS - R					
Rep SCIS - R					
SCIS - L					
Rep SCIS - L					

STATIC TESTS

Sitting slouched _____ Sitting erect _____

Standing slouched _____ Standing erect _____

Lying prone in extension _____ Long Sitting _____

OTHER TESTS _____

PROVISIONAL CLASSIFICATION

Department Dysfunction Postures Others

Derangement: Pain location _____

PRINCIPLES OF MANAGEMENT

Education _____ Equipment provided _____

Mechanical Therapy Yes/No _____

Extension Principles _____ Lateral Principle _____

Flexion Principle _____ Other _____

Treatment Goals _____

Appendix F

The Oswestry disability index (version 2).

Could you please complete this questionnaire? It is designed to give us information as to how your back or leg trouble has affected your ability to manage in everyday life. Please answer every section. Mark one box only in each section that most closely describes you today

Section 1: Pain intensity
1. I have no pain at the moment.
2. The pain is very mild at the moment.
3. The pain is moderate at the moment.
4. The pain is fairly severe at the momcot.
5. The pain is very severe at the moment.
6. The pain is the worst imaginable at the moment.

Section 2: Personal care (washing, dressing, etc.)
1. I can look after myself normally without causing extra pain.
2. I can look after myself normally but it is very painful.
3. It is painful to look after myself and I am slow and careful.
4. I need some help but I manage most of my personal care.
5. I need help every day in most aspects of self-care.
6. I do not get dressed, wash with difficulty and stay in bed.

Section 3: Lifting
1. I can lift heavy weights without extra pain.
2. I can lift heavy weights but it gives extra pain.
3. Pain prevents me from lifting heavy weights off the floor, but I can manage if they are Conveniently positionated (e.g. on a table).
4. Pain prevents me from lifting heavy weights, but I can manage light-to-medium weights if they are conveniently positionated.
5. I can lift only very light weights.
6. I cannot lift or carry anything at all.

Section 4: Walking
1. Pain does not prevent me walking any distance.
2. Pain prevents me walking more thao I mile.
3. Pain prevents me walking more than a quarter of a mile.
4. Pain prevents me walking more than 100 yards.
5. I can only walk using a stick or crutches.
6. I am in bed most of the time and have to crawl to the toilet.

Section 5: Sitting
1. I can sit in any chair as long as I like.
2. I can sit in my favorite chair as long as I like.
3. Pain prevents me sitting more than 1 h.

4. Pain prevents me from sitting more than half an hour.
5. Pain prevents me from sitting more than 10 min.
6. Pain prevents me from sitting at all.

Section 6: Standing
1. I can stand as long as I want without extra pain.
2. I can stand as long as I want but it gives me extra pain.
3. Pain prevents me from standing for more than 1 h.
4. Pain prevents me from standing for more than half an hour.
5. Pain prevents me from standing for more than 10 min.
6. Pain prevents me from standing at all

Section 7: Sleeping
1. My sleep is never disturbed by pain.
2. My sleep is occasionally disturbed by pain.
3. Because of pain I have less than 6 h sleep.
4. Because of pain I have less than 4 h sleep.
5. Because of pain I have less than 2 h sleep.
6. Pain prevents me from sleeping at all.

Section 8: Sex life (if applicable)
1. My sex life is normal and causes no extra pain.
2. My sex life is normal but causes some extra pain.
3. My sex life is nearly normal but is very painful.
4. My sex life is severely restricted by pain.
5. My sex life is nearly absent because of pain.
6. Pain prevents any sex life at all.

Section 9: Social life
1. My social life is normal and causes me no extra pain.
2. My social life is normal but increases the degree of pain.
3. Pain has no significant effect on my social life apart from limiting my more energetic interests (e.g. sport, etc.).
4. Pain has restricted my social life and I do not go out as often.
5. Pain has restricted social life to my home.
6. I have no social life because of pain.

Section 10: Travelling
1. I can travel anywhere without pain.
2. I can travel anywhere but it gives me extra pain.
3. Pain is bad but I manage journeys over 2 h.
4. Pain restricts me to journeys of less than 1 h.
5. Pain restricts me to short necessary journeys under 30 min.
6. Pain prevents me from travelling except to receive treatment.

Appendix G

SEXUAL FUNCTION QUESTIONNAIRE (PART A)

Date: Although loss of sexual desire is common in depression, some medication can affect our sexual functioning The purpose of this questionnaire is to assess the effects of medication treatment on sexual function. (All information is confidential). Please read each question below and circle the **One** number that best describes your feelings and performance.

For the purposes of this study, sexual activity is defined as any stimulation of the genitals for the purpose of pleasurable sensation. This includes Intercourse (vaginal or rectal), oral sex, or manual or foreign body stimulation of the genitals

BACKGROUND QUESTION

Have you ever been evaluated or received any treatment for a sexual problem?

0 = No 1 = Yes

1. During the past week, how often have you found yourself thinking about sex with any interest or desire?
   1 = Several times a day
   2 = At least once a day
   3 = At least twice a week
   4 = At least once a week
   5 = Not at all

2. Were you sexually active during the past week?
   0=No 1=Yes

If 'YES', please complete the remainder of this questionnaire

During the past week:

3. How would you describe your ability to enjoy sex?
   1 = Fully enjoyed
   2 = Sometimes enjoyed
   3 = Barely enjoyed
   4 = Never enjoyed

4. Overall, how satisfied were you with your sexual functioning?
   1 = Completely
   2 = Highly
   3 = Moderately
   4 = Slightly
   5 = Not at all

SEXUAL FUNCTION QUESTIONNAIRE (PART B)

Please read each question below and circle the ONE number that best describes your feeling and performance.

FOR WOMEN ONLY:

During the past week:

5. How often have you become sexually aroused (sexually excited)?
   1 = Often
   2 = Sometimes
   3 = Rarely
   4 = Never
6. How easily have you become sexually aroused (sexually excited)?
   1 = Very easily
   2 = Sometimes easily
   3 = Rarely easily
   4 = Never easily
7. Have you had adequate vaginal lubrication during sexual activity?
   1 = Very easily
   2 = Sometimes easily
   3 = Rarely easily
   4 = Never easily
8. How often did you have difficulty achieving orgasm?
   1 = Very easily
   2 = Sometimes easily
   3 = Rarely easily
   4 = Never easily
9. How often were you unable to reach orgasm?
   1 = Very easily
   2 = Sometimes easily
   3 = Rarely easily
   4 = Never easily
10. How satisfied were you with your ability to achieve orgasm?
    1 = Highly
    2 = Moderately
    3 = Slightly
    4 = Not at all
11. How satisfied were you with the intensity of your orgasm?
    1 = Highly
    2 = Moderately
    3 = Slightly
    4 = Not at all

SEXUAL FUNCTION QUESTIONNAIRE (PART C)

Please read each question below and circle the ONE number that best describes your feeling and performance.

FOR MEN ONLY: During the past week:

12. How often did you have an erection?
    1 = Often
    2 = Sometimes
    3 = Rarely
    4 = Never

13. Describe your ability to have an erection
    1= Always able to achieve
    2 = Able to achieve most of the time
    3= Able to achieve much of the time
    4 = Able to achieve some of the time
    5 = Never able to achieve

	NO	YES
14. Did erection take a long time to achieve?	0	1
15. If you were able to have an erection, could you maintain it as long as necessary to have intercourse?	0	1
16. Did you experience any difficulty with ejaculation?	0	1

17. How often did you have orgasm with little or no ejaculation?
    1 = Always
    2 = Usually
    3 = Frequently
    4 = Occasionally
    5 = Rarely or never

18. How often was ejaculation delayed (took a long time to ejaculate)?
    1 = Always
    2 = Usually
    3 = Frequently
    4 = Occasionally
    5 = Rarely or never

19. How often did you ejaculate too quickly?
    1 = Always
    2 = Usually
    3 = Frequently
    4 = Occasionally
    5 = Rarely or never

Appendix II

Question 20: WHOOL-Bref

How satisfied are you with your sexual life?

1. Very dissatisfied
2. Dissatisfied
3. Neither satisfied or dissatisfied
4. Satisfied
5. Very satisfiedp

APPENDIX I

INFORMED CONSENT FORM

COMPARATIVE EFFICACY OF MCKENZIE AND STABILISATION PROTOCOLS IN THE MANAGEMENT OF PATIENTS WITH CHRONIC LOW BACK PAIN

This study is being conducted by Mrs Aderibigbe, Olubamike Ifeolu of the University of Ibadan. The objective of this study is to comparatively evaluate the efficacy McKenzie protocol or Stabilisation protocol on physical functions (such as pain intensity and functional disability) and psychosocial factors such as Fear Avoidance Beliefs and Sexual Dysfunction in patients with chronic low back pain. This study is also aimed at using the two protocols of exercise as interventions for eight weeks of treatment. Each participant will be given a patient guide that help participant with various positions that can be adopted to prevent pain while having sex, this is to ensure each can enjoy a fulfilled sexual life while the back pain is been treated.

In the McKenzie protocol you will be required to undergo a specialized assessment. A Specialized treatment and exercise program will be given to you in line with the report of the assessment. These exercises are to be performed both in the clinic and at home for a specified number of times per day. You will also be given a book titled "Treat your own Back" .This you will read at home. There will be discussions at each treatment session by the researcher and each participant on preventive measure and care of the back to treat the back and prevent further occurrence of low back pain.

In the Stabilisation protocol you will be required to undergo a specialized assessment. This is followed by a training programme to activate and retrain the muscles that stabilise your spine. The training will run for eight weeks the visits will be twice a week. The programme will be in four stages. after each visit you will be given some exercises as home programme. You will be given some materials: a book titled "Treat your own Back" this will be to help you to maintain good posture while you carry out daily activities so that you prevent re-injury to your back.

We will use lottery to divide participants in this study into two groups. Each participant will go through either of two treatment protocols for treatment of low back pain, the McKenzie protocol or to Stabilisation protocol. Each treatment protocol has been strategically designed to effectively treat pain affecting the Low Back. Each treatment protocol will last for 8 weeks. This will consist of an initial 6 weeks of treatment and a follow up treatment 2 weeks later. You will

be required to attend treatment sessions twice weekly for the initial 4 weeks of treatment making a total of 8 sessions of treatment. Each treatment session will last for one hour. At each treatment session ice therapy will be applied for pain relief. You will be required to complete questionnaires at initial assessment, after every two weeks of treatment until the 8th week.

There are no associated risks involved in this research program. The goal of this research is to identify the best protocol of treatment for treatment of low back pain in this environment. We hope that the best protocol will be identified so that many patients with low back pain could benefit from the best form of treatment available. All information collected in this study will be treated as confidential. The information will be given code numbers and no name will be recorded. This cannot be linked to you in any way and your name or any identifier will not be used in any publication or reports from this study.

Your participation in this research is entirely voluntary. If you choose not to participate, this will not affect your treatment in this hospital in any way. You can choose to withdraw from the research at any time. Please note that some of the information that has been obtained about you before you chose to withdraw may have been modified or used in publications and reports. These cannot be removed anymore. However the researcher promise to make good faith effort to comply with your wishes as much as is practicable.

If you suffer any injury as a result of your participation in this research you will be treated at the hospital where you participated in the research. The research will bear the cost of this treatment and compensation to the participant. The researcher will inform you of the outcome of the research though telephone and email messages. During the course of this research you will be informed about any information that may affect your continued participation or your health.

I have fully explained this research to.....

and I have given sufficient information, including about risks and benefits, to make an informed decision.

Date:.....

Name:.....

Signature:.....

I have read the description of the research. I have also talked it over with the Physiotherapist to my satisfaction. I understand that my participation is voluntary. I know enough about the purpose, methods risks and benefits of the research study to judge that I want to take part in it. I understand that I may freely stop being part of this study at any time. I have received a copy of the consent form and additional information sheet to keep for myself.

Date:.....

Name:.....

Signature:.....

This research has been approved by the ethics committee of the University of Ibadan and the chairman of this committee can be contacted at Biode Building, room T10, 2nd floor, Institute for Advanced Medical Research and Training, College of Medicine, University of Ibadan. In addition if you have any question about your participation in this research, you can contact the principal investigator Mrs O.I Aderibigbe, Department of Physiotherapy, College of Medicine, University of Ibadan, 07032769398, olubamike345@yahoo.co.uk

PLEASE KEEP A COPY OF THE SIGNED INFORMED CONSENT. Thank you