IMPACT OF MOTOR DEVELOPMENT IN CHILDREN WITH CEREBRAL PALSY ON THE QUALITY OF LIFE AND GENERAL HEALTH STATUS OF CAREGIVERS

BY

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ABSTRACT

Cerebral Palsy (CP) is a neuropaediatric condition which occurs as a result of damage to an immature brain resulting in abnormal motor development requiring special care. Caring for children with CP may affect the quality of life and/or impact on the general health status of their caregivers. There is paucity of longitudinal studies exploring this inter-relationship. The relationship between motor development of Children With Cerebral Palsy (CWCP) and impact of caring on each of Quality of Life (QoL) and General Health Status (GHS) of caregivers of CWCP was therefore evaluated.

Participants in this longitudinal study comprised of consecutively recruited 107 CWCP and 107 Caregivers of CWCP (CCWCP) from four specialist hospitals in southwest Nigeria. Ninety eight caregivers of normally developing children were also recruited to constitute the Control Group (CG). The CCWCP and CG were matched for age and socio-economic status. However 67 participants in each of the CWCP, CCWCP, and 87 in the CG completed the study. Gross motor function of the CWCP was assessed in the clinic and their respective homes using the Gross Motor Function Measure (GMFM)(scored 0 to 100) at baseline and monthly for eight consecutive months in order to assess the likely influence of the home and the clinic environments on their motor function. The QoL and GHS of the CCWCP and CG participants were assessed at baseline and for eight consecutive months using the World Health Organization Quality of Life Questionnaire (WHOQoL) (scored 1 to 5) and General Health Questionnaire (GHQ)(scored 0 to 3) respectively. Data were analyzed using descriptive statistics, Wilcoxon Signed Rank, Friedman's ANOVA, Spearman's Correlation and Mann-Whitney U at $p = 0.05$.

At baseline, the CCWCP had a significantly lower median WHOQoL score of 84.0 (range 48.0-115.0) than their CG counterparts (median 96.0, range 62.0-123.0). CCWCP also recorded a significantly higher median GHQ score of 16.0 (range 4.0–48.0) than the controls (median 9.0, range 1.0-22.0) indicating lower QoL and GHS. At the 8th month, the CG had significantly higher WHOQoL scores (median 96.0, range 63.0-124.0 vs median 89.0, range 60.0-118.0). Among the CWCP, baseline GMFM score was higher at home (median 15.7, range 0-71.9) than in the clinic (median 13.6, range 0-71.9). Similarly the home GMFM scores were significantly higher at the 8th month (median 28.9, range 0-100.0) than in the clinic (median 25.8, range 0-100.0). The GMFM score increased significantly between baseline and 1st; 3rd and 4th; 5th and 6th; and 7th and 8th months. The GMFM scores had significant positive correlation with WHOQoL scores at the 5th (r = 0.3), 7th (r =0.4) and 8th months (r =0.4).

The better the motor development in children with cerebral palsy, the higher the quality of life and general health status of caregivers. Performance of motor function was better at home compared to the clinic suggesting that home environment should be simulated during management of children with cerebral palsy.

Keywords: Motor development, Cerebral palsy, General health status, Quality of life

Word Count: 479 words

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CERTIFICATION

This study was carried out by **Miss Margaret B. FATUDIMU** at the Department of Physiotherapy, Faculty of Clinical Sciences, College of Medicine, University of Ibadan, Nigeria

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

Cerebral palsy (CP) is one of the most crippling disorders in children which severely affect a child's development **(**Rosenbaum, 2003). It occurs as a result of damage to an immature brain and therefore affects a child in infancy (Bax et al, 2005). Cerebral palsy results in various forms of disability such as motor, sensory, and cognitive types (Dimitrijević and Jakubi, 2005). Such disabilities make this group of children require long-term care and management from their parents and rehabilitation professionals respectively (such as physiotherapists) in order to attain optimal functional status.

Helping children to attain significant functional ability level has been a major goal both for carers and professionals involved in the rehabilitation of children with cerebral palsy. Development of motor function in a child with CP can possibly be determined by impairments, personal and contextual factors and family ecology (Barlett and Palisano, 2000). Impairment would include aberrations in muscle tone, type and distribution of motor disorders, primitive reflexes, soft tissue contractures, and skeletal alignment (Barlett and Palisano, 2000). Personal and contextual factors or family ecology refers to family resources, quality of home environment, family support, parental expectations, and family function (Barlett and Palisano, 2000; Tieman et al, 2003).

Disability, as experienced by children with cerebral palsy has therefore been conceptualized as a mismatch between the person and environment rather than being viewed entirely as a problem with the individual (Hammal et al, 2004). The construct of person includes the individual's capability and personal factors. This implies that

performance of motor activity is influenced by the children's capability in all developmental domains (e.g. gross motor, fine motor, cognition, and vision, as well as personal factors such as age, personality, preferences and lifestyle) (Tieman et al, 2003). The 'environment' includes the concepts of setting and context. For children, everyday settings include the home, school, and outdoor/community while context refers to the physical, temporal, and social features of a particular setting (Tieman et al, 2003). The interaction of the person and the environment leads to the performance of gross motor activities which is needed in many activities of daily living as well as participation in the society. Considering that successful participation in society is contingent on the person-environment interaction, it is likely that the environment might influence the extent to which an individual can perform motor activities (Tieman et al, 2003).

Traditionally, physiotherapy intervention for children with cerebral palsy is commonly carried out within the hospital or clinic setting with the caregivers simultaneously encouraged by the physiotherapist to carry out certain prescribed activities as home programmes for the children. However the daily lives of children with CP include a variety of environmental settings, rather than just the clinical setting. Current trend in rehabilitation is therefore geared towards modifying individual environment in order to improve function and facilitate integration into the community (World Health Organization, 2001). Perusal of literature showed that emphasis of intervention has shifted to evaluating and intervening in natural environments (Tieman et al, 2001; Tieman et al, 2003; Ostensjo et al, 2003; Tieman et al, 2004). In this paradigm shift, the physiotherapist is expected not to assume that children's motor behaviours in an isolated hospital/therapy setting will suffice as the predictor of their functional abilities in real life environment or

that performance in a therapeutic setting would transfer to tasks that the child needs to perform at home. It became imperative therefore not to limit decisions on treatment to the information gathered based on examination performed in the clinical setting only but to gain more knowledge on the effect of various settings on functional performance in children with cerebral palsy (WHO, 2001; Tieman et al, 2003). This is an important reason for this kind of study.

Motor growth curves based on cross-sectional population data stratified by severity have also been developed using the validated Gross Motor Function Classification System (GMFCS) for cerebral palsy by Palisano et al (2000). However there still exists a need to further describe the trend of gross motor development of children with cerebral palsy by severity using longitudinal observations. This would serve as a basis for prognostic counseling for parents and planning clinical management. In addition, two major features of cerebral palsy being managed by physiotherapy include spasticity and lack of selective motor control. However studies on the relationships among motor development, spasticity and selective motor control in children with cerebral palsy are scarce. Hence this study also seeks to investigate this relationship.

A common and important observation about managing patients with cerebral palsy is that the primary caregivers of these children tend to have a varied opinion on performance of gross motor activities in settings outside the clinics where the child is receiving treatment. Since the ultimate goal of rehabilitation is achievement of functional independence and participation in the environment, it was therefore necessary to study the difference in performance of gross motor function in various settings and the possible

influence the environment might have on gross motor function in children with cerebral palsy.

A child with cerebral palsy (CP) requires long-term care that exceeds that of a normally developing child. This is as a result of possible presence of limitations in self-care functions such as mobility, feeding, and other age-appropriate activities of daily living. Such a child will also require prolonged access to healthcare facilities. The responsibility of providing the needed care and ensuring continuous access to the healthcare facilities falls primarily on the caregivers of these children, especially in the West African societies like Nigeria (Hamzat and Mordi, 2007). Juggling this role of caring for children with CP with the requirements of everyday living might become daunting for the informal caregivers thereby leaving little or no room for them to attend to their own personal needs. This may result in harmful physical, mental, and emotional consequences for the caregiver (Pinquart and Sorensen, 2003).

Significant proportion of information available on effects of long term care giving were generated from studies involving caregivers of adult population with disability or degenerative disease conditions (Navaie-Waliser et al., 2002; Pinquart and Sorensen, 2003; Brehaut et al, 2004; Chiou et al, 2005). Considering the peculiarities of care giving for children with childhood disabilities and the effect it might have on the outcome of treatment intervention, it becomes necessary to know the impact that long term care will have on the general health status and quality of life of this group of caregivers of the children with disability, such as those with cerebral palsy. This may be useful especially if

investigated alongside the course of motor development of children with cerebral palsy over a specified time frame and in various environmental settings.

1.2 Statement of the Problem

Children with cerebral palsy have various childhood disability conditions, thus requiring special care which are more tasking and prolonged than that required by normally developing children. This may impact on the health status of the caregivers in various ways. Some cross sectional studies (Brehaut et al, 2004; Raina et al, 2005; Hamzat and Mordi, 2007) have documented the effect of caring for children with cerebral palsy on their caregivers. However those studies focused essentially on mental health and entailed only one - time assessment, with its inherent limitations. There was therefore the need for a long term study on the relationship between the trend of motor development in children with cerebral palsy, the general health status, and the quality of life of their caregivers. Hence this study was designed to answer the following question:

What would be the impact of motor development in children with cerebral palsy on the quality of life and general health status of their caregivers?

1.3 Aims of Study

The aims of this study were to:

1 Evaluate the trend of quality of life and general health status of the caregivers of children with cerebral palsy over an eight-month period.

2 Assess the relationship between gross motor function in children with cerebral palsy, the general health status and quality of life of their caregivers over an eight-month period.

1.4 Hypotheses

1.4.1: Major Hypothesis

There will be no significant impact of motor development in children with cerebral palsy on the quality of life and general health status of caregivers over an eight-month period.

1. 4.2: Sub Hypotheses

1 There would be no significant difference in the gross motor functional ability in children with cerebral palsy over an eight-month period.

2 There would be no significant difference in lying and rolling sub-domain score of the GMFM in children with cerebral palsy over an eight-month period.

3 There would be no significant difference in sitting sub-domain score of the GMFM in children with cerebral palsy over an eight-month period.

4 There would be no significant difference in crawling and kneeling rolling sub-domain score of the GMFM in children with cerebral palsy over an eight-month period.

5 There would be no significant difference in standing sub-domain score of the GMFM in children with cerebral palsy over an eight-month period.

6 There would be no significant difference in walking running and jumping sub-domain score of the GMFM in children with cerebral palsy over an eight-month period

7 There would be no significant relationship between the gross motor functional ability score and degree of spasticity in children with cerebral palsy over an eight-month period.

8 There would be no significant relationship between the gross motor functional ability and selective motor activity in children with cerebral palsy over an eight-month period.

9 There would be no significant difference in the quality of life of the caregivers of children with cerebral palsy over an eight-month period.

10 There would be no significant difference in the general health status of the caregivers of children with cerebral palsy over an eight-month period.

11 There would be no significant difference in the general health status of the caregivers of children with cerebral palsy and the control group over an eight-month period.

12 There would be no significant difference in the quality of life of the caregivers of children with cerebral palsy and the control group over an eight-month period.

13 There would be no significant relationship between gross motor function development in children with cerebral palsy and the general health status of their caregivers over an eight-month period.

14 There would be no significant relationship between gross motor function development in children with cerebral palsy and the quality of life of their caregivers over an eight-month period.

15 Clinic and respective homes of the children with cerebral palsy would not produce significantly different effect on their motor development over an eight-month period.

16 Clinic and respective homes of the children with cerebral palsy would not produce significantly different effect on their lying and rolling score on the GMFM over an eight- month period

17 Clinic and respective homes of the children with cerebral palsy would not produce significantly different effect on their sitting score on the GMFM over an eight-month period

18 Clinic and respective homes of the children with cerebral palsy would not produce significantly different effect on their crawling and kneeling score on the GMFM over an eight- month period

19 Clinic and respective homes of the children with cerebral palsy would not produce significantly different effect on their standing score on the GMFM over an eight-month period

20 Clinic and respective homes of the children with cerebral palsy would not produce significantly different effect on their walking, jumping and running sub-domain score on the GMFM over an eight- month period

1.5 Delimitation

This study was delimited to the following

Subjects:

(i) Children with cerebral palsy aged between 6 months and 6 years old who presented at the Paediatric neurology clinic of the University College Hospital Ibadan, Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) Ile-ife and Oni Memorial Children Hospital, Ring Road Ibadan.

(ii) Primary caregivers of the same children with cerebral palsy.

(iii) Caregivers of normally developing children without cerebral palsy were also involved to serve as control to the caregivers.

Instruments:

The instruments for the study was delimited to the following:

(i) Gross Motor Function Classification System (GMFCS) to classify children with cerebral palsy into their functional ability levels.

(ii) Gross Motor Function Measure (GMFM) to assess the gross motor function of children with cerebral palsy

(iii) General Health Questionnaire (GHQ) to assess the general health status of all the caregivers

(iv) World Health Organization Quality of Life Questionnaire (WHOQol Bref) to assess the quality of life of all the caregivers

(iv) Boyd and Graham Selective Motor Control Instrument (BGSMCI) to assess selective motor control in children with cerebral palsy

(v) Modified Tardieu Scale (MTS) to assess spasticity in children with cerebral palsy.

Environment :

The environment for the study was delimited to the following:

(i) The home of children with cerebral palsy

(ii) Oni Memorial Children Hospital

(iii) Paediatric Gymnasia of each of the Department of Physiotherapy, University College Hospital Ibadan and Obafemi Awolowo University Teaching Hospitals Complex Ile-Ife.

(iv) Immunization Clinic of the University College Hospital Ibadan.

1.6 Significance of the Study

The outcome of this study has provided scientific information on the effect of longterm caregiving on the general health and quality of life of caregivers of children with cerebral palsy and this can be used by the physiotherapists and other health care providers involved with the management of these children on how to appropriately counsel their carers on issues pertaining to their health as they carry out their role of caregiving. Also information on the trend of development of gross motor function over time in children with cerebral palsy over an eight month period has been provided by the study. This important information might be utilized in setting achievable motor function goals while managing children with cerebral palsy especially in this environment. In addition knowing the relationship that exists between spasticity, selective motor control and motor development

as done in this study might be useful in directing the focus of treatment and setting treatment goals and while managing cerebral palsy. Information on the effect of environmental settings on the performance of gross motor function of children with cerebral palsy was obtained from the study as well. This might be used to determine changes that could be made in order to ensure that rehabilitation services are offered in an environment that facilitates better treatment outcome.

1.9 Operational Definition of Terms

Primary Caregivers: The biological parent (father or mother), or a relative (grandmother, aunt, uncle) that is informally in charge of care, or actively involved with everyday life and care of the child.

CHAPTER TWO

LITERATURE REVIEW

2.1 Cerebral Palsy

2.1.1 Definition

Cerebral palsy (CP) has been defined as a group of disorders of development of movement and posture causing activity limitations attributable to non-progressive disturbances that occur in the developing foetal or infant brain (Bax et al, 2005). This can lead to global dysfunction in children that always includes motor problems (Dimitrijević and Jakubi, 2005). The motor disorders of cerebral palsy are often accompanied by several comorbid conditions which include epilepsy, learning difficulties, behavioural challenges, and sensory impairments that are as important as the motor disabilities (Rosenbaum, 2003).

2.1.2 Prevalence of Cerebral Palsy

Cerebral palsy is a common condition seen in neuropeadiatric clinics. The prevalence of which is said to be lower in developed countries than in developing countries (Zeldin, 2007). The general estimated rate is 2 to 2.5 cases per 1000 live births in developed countries (Rosenbaum, 2003; Majnermer and Mazer, 2004) and about 3.5 cases per life births in the developing countries (Winter et al, 2002). In the United States, studies published on the prevalence of cerebral palsy agree on a prevalence of 2 to 3 per 1000 live births (Stanley et al, 2000; (Zeldin ,2007) although there is appears to be conflicting evidence regarding changes in rates over time (Steven et al, 2003). Prevalent studies concluded that the prevalence of CP in the United States may have risen to 20% over the

years a as a result of the increased survival of low and very low birth weight infants (Winter et al, 2002). Data from CP registries from Sweden show an increasing trend in the rate of CP from the late 1960s to the mid-1980s which was 1.3 per life birth to 2.5 per 1000 live births with this trend being most pronounced in those children born preterm with spastic/ataxic diplegia (Winter et al, 2002). Odding et al (2006) reported a prevalence of 3.8/1000 term live birth in Ausralia. A high prevalence has also been recorded in low birth weight survivors from the United Kingdom (Steven et al, 2003). Although, Platt et al (2007) based on data from a large population- based study provided evidence that the prevalence of cerebral palsy in children of with low birthweight especially those less than 1500 g has fallen compared to values previously documented in the United Kingdom. Wichers et al, (2000) however stated that in the Netherlands, although the population prevalence of CP over the birth year period 1977–1988 was calculated to be 1.51 per 1000 inhabitants (average over the 12 birth years), the calculated CP prevalence has risen significantly over time: from 0.77 (1977–1979) to 2.44 (1986–1988). A prevalence of 4.4 per 1000 live births was reported in Turkey by Serdaro [gcaron]lu et al (2006).

Cerebral Palsy has been reported to be the commonest condition managed at neuro-peadiatric clinics in various parts of Nigeria (Peters et al, 2008). Ogunlesi et al (2008) found the prevalence of CP at the paediatric neurology clinic of the Olabisi Onabanjo University Teaching Hospital to be 50.3% thus supporting earlier findings on prevalence of CP in the SouthWestern part of Nigeria. Wammanda et al (2007) also recorded a prevalence of 55.3% in a similar study carried out in the Northern part of Nigeria. Studies reviewed on the trend of aetiological factors showed similar pattern. Lagunju and Okafor (2009) reported that cerebral palsy accounted for 36% of cases seen in peadiatric clinic at

the University College Hospital Ibadan. Ogunlesi et al (2008) in their study found the commonest individual aetiologies for cerebral palsy were perinatal asphyxia in 57.6% of cases, kernicterus in 36.9%. Results of the study of review paediatric neurology cases seen at Bayero University Teaching Hospital carried out in Kano, Nigeria, by Belonwu et al (2009) also revealed that 42.4% cases seen were cases of cerebral palsy with birth asphyxia being the leading cause (45.7%), followed by neonatal jaundice which was found in 12.6% of the cases.

2.1.3 Clinical Presentations of Cerebral Palsy

Motor deficits in cerebral palsy are usually seen in the first 12 to 18 months of life, except the mildest forms which are seen much later in life (Rosenbaum, 2003). Early diagnosis of CP could be difficult and often, it seems impossible to diagnose under the age of four months and even under six months of age in slightly affected children (Dimitrijević and Jakubi, 2005). The condition presents when children fail to reach their motor milestones within the range of time considered normal for children, and when they show qualitative differences in motor development, such as asymmetric gross motor function or unusual muscle stiffness or floppiness (Rosenbaum, 2003). Stanley and Alberman (2000) stated that the problems presented by children with cerebral palsy stem from impairments of the developing central nervous system. Cerebral palsy affects gross motor function of a child to a varying extent, with the child showing compromised overall development especially motor, functional and learning (Zeldin, 2007). Delayed or aberrant motor function affects the development of a child's capacity to actively explore and learn about

space, effort, independence, the social consequence of moving, touching (Rosenbaum, 2003) and exploring his environment.

Children with cerebral palsy could also present with associated conditions such as mental retardation especially in children with quadriplegia which is found in 52% of cases. Also epilepsy occurs in 45% of children with cerebral palsy, speech and language disorders in 38%, vision defects in 28%, hearing defects in 12% and other abnormalities such as oral-motor dysfunction, and dysphagia have been reported (Goldstein, 2004). Children with hemiplegia and diplegia have communicative, learning, and attention disorders as their major challenges (Goldstein, 2004).

2.1.5 Classification of Cerebral Palsy

Cerebral palsy can be classified according to the topography of the body parts affected, the type of motor impairment involved, and the severity of the disorder. Topographical distribution of cerebral palsy describes affectation by the body parts involved. Hemiplegia, for example, refers to unilateral impairment of the arm and leg on the same side; diplegia describes motor impairment primarily of the legs (usually with some relatively limited involvement of arms); monoplegia indicates an affectation of one extremity; while paraplegia indicates an involvement of the lower extremities and in quadriplegia which is the commonest type (Dimitrijević and Jakubi, 2005; Ogunlesi et al 2008), all four limbs are functionally compromised (Rosenbaum 2003; Epstein 2004).

Using the type of motor impairment as a classification model, cerebral palsy can be described as spastic, ataxic, choreoathetoid, dyskinetic and dystonic types. The spastic cerebral palsy, which is most common (Hagberg et al, 2001; Dimitrijević and Jakubi 2005;

Ogunlesi et al; 2008) is characterized by at least two of abnormal movement pattern of posture or movement, increased tone (not necessarily constant) and pathological reflexes (increased reflexes, hyperreflexia, or pyramidal signs like Babinski response). Ataxic cerebral palsy is characterized by both abnormal pattern of posture and/or movement and loss of orderly muscular coordination so that movements are performed with abnormal force, rhythm, and accuracy. Dyskinetic cerebral palsy features both abnormal patterns of posture or movement, involuntary, uncontrolled, recurring, and occasionally stereotyped movements. Dystonic cerebral palsy is dominated by both hypokinesia and hypertonia. Choreoathetotic cerebral palsy is characterised by hyperkinesia and hypotonia (Cans, 2000; Epstein, 2004).

Another widely accepted form of classification of cerebral palsy is that based on severity using the Gross Motor Function Classification System (GMFCS) which classifies children into 5 levels. In the GMFCS, children on Level I walk without restrictions; limitations in more advanced gross motor skills. Level II refers to children who walk without devices; limitations in walking outdoors and in the community. Level III describes those who walk with mobility devices; limitations in walking outdoors and in the community. Level IV describes self mobility with limitations; children are transported or use power mobility outdoors and in the community while Level V defines those whose self mobility is severely limited even with the use of supporting technology.

2.1.6 Management of Cerebral Palsy

Management of cerebral palsy should start with very early assessment, diagnosis, and treatment because a very early treatment will give quicker and better results as the baby does not yet show much abnormality and therefore has little experience (Dimitrijević and Jakubi, 2005). The general goals of managing cerebral palsy are to use appropriate combinations of interventions, including development, physical, medical, surgical, chemical and technical modalities to promote function, prevent secondary impairment and above all increase a child's developmental capabilities in order to promote his or her participation in the environment. This is in keeping with the World Health Organization's model of health and disease which focuses on function and participation (WHO, 2000). Various approaches are used by physiotherapists in achieving these goals. Examples of which include neurodevelopmental technique, neuromuscular electrical stimulation, sensory integration, body weight support treadmill training, patterning, conductive education; constraints induced therapy, hyperbaric oxygen therapy, exercise therapy, and the Vojta method, Adeli suit therapy etc (Patel, 2005).

(a) The Neurodevelopmental Technique (NDT) Approach: The NDT therapeutic approach developed by Berta and Karl Bobath was based on their personal observations working with children with cerebral palsy (Mayston, 2004). The basis of NDT approach as conceptualized by the Bobaths is that the motor abnormalities in children with CP are due to failure of normal development of postural control and reflexes because of the underlying dysfunction of the central nervous system (Liptak, 2005).

The aim of the NDT approach is to facilitate normal motor development and function and to prevent development of secondary impairments due to muscle contractures,

joint, and limb deformities. Originally, the Bobath approach used various techniques to inhibit and control abnormal tone, reflexes and movement patterns (Butler and Darrah, 2001). This was postulated to facilitate normal postural and righting reflexes, and movement patterns. The normal developmental sequence of child development is used as the underlying guiding principle. It was postulated that such normal therapeutic experience in automatic movements and reflexes will translate into the child developing normal tone and volitional movements with improved functional capabilities. With further experience, the Bobaths noted that there was a lack of such carry-over effects, and modified their approach so as to allow the child to take over more control of balance and movement, treat children in natural play environments, and not necessarily to follow rigid developmental sequence (Butler and Darrah, 2001).

Paci (2003) in his review of fifteen published literature on clinical trials investigating the efficacy of the NDT approach concluded that the these trials selected showed no evidence proving the effectiveness of NDT or supporting NDT as the optimal type of treatment, but neither did methodological limitations allow for conclusions of non-efficacy. Brown and Burns (2001) in another review of literature for evidence regarding the efficacy of the NDT approach also stated that overall, the results regarding the efficacy of NDT were largely inconclusive since there were a similar number of published research studies supporting the benefit of NDT intervention (n=6) as compared with no benefit (n=9). It therefore follows that research evidence to the efficacy of the neurodevelopmental treatment is equivocal at best (Tsorlakis et al, 2004).

(b) Conventional exercise therapy: This includes a regimen consisting of passive movement, progressive resistance exercises, progressive habilitation exercises and weight

bearing exercises. A programme that uses low resistance and more repetitions will enhance local muscular endurance. Repetitive passive range of motion exercises are used to improve and maintain joint mobility. Passive, static, gentle stretches are performed on individual joints to decrease and prevent joint contractures. Such stretches should be performed within a pain-free joint range of motion. Exercises that will improve balance, posture control, gait, mobility, and ability to transfer (for instance from bed to wheel chair) are also included in the progressive resistive exercises programme.

Few studies have shown that conventional exercise therapy such as passive movement, progressive resistance exercises, progressive habilitation exercises and weight bearing exercises used in children with cerebral palsy (CP) improve muscle strength, local muscular endurance, and overall joint range of motion (Dodd et al, 2002; Mayston, 2004). However, strong evidence for the effectiveness of conventional physical therapy interventions for children with cerebral palsy is lacking. Although it is reported in the literature that the lack of evidence-based support for an intervention does not negate the clinical effectiveness or efficacy of that intervention if limited research on the subject has been completed especially when there is clinical consensus that the intervention is effective (Harvey and Martin 2009). In a review of evidence by Harvey and Martin (2009), they found 10 years prior to the review that there has been an increased interest in using strengthening, functionally based programmes and functional training for Children with CP. They also stated that there was good evidence of beneficial effects of strengthening targeted muscles for children with CP as measured by dynamometry, however carryover into improvements in activity and participation were not clearly stated in the studies reviewed. Further evidence from systematic reviews also showed that strength training

programs can increase muscle strength in children and young adults with CP without increasing spasticity (Russel, 2009).

(c) Neuromuscular Electrical Stimulation (NMES): Neuromuscular electrical stimulation (NMES) involves application of transcutaneous electrical current that results in muscle contraction (Kerr et al, 2004). The NMES has been postulated to increase muscle strength by increasing the cross-sectional area of the muscle and by increased recruitment of Type- II muscle fibers. Functional electrical stimulation (FES) refers to the application of electrical stimulation during a given task or activity when a specific muscle is expected to be contracting (Kerr et al, 2004).

Patel (2005) in his review of studies on therapeutic modalities for the management of children with cerebral palsy observed that some studies support the use and effectiveness of Neuromuscular Electrical Stimulation in children with CP. However, these studies are limited by many confounding variables including concomitant use of other therapies, wide variation in methods of application, heterogeneity of subjects, difficulty in measuring functional outcomes and lack of control subjects (Patel, 2005). In general, it has been noted that the effectiveness of many other interventions used in the treatment of cerebral palsy has not been clearly established based on well-controlled trials (Rosenbaum, 2003).

(d) Spider Therapy: This new therapy developed by Norman Lozinski in Poland utilizes a device called the "Spider". The Norman Company, established in 1994 in Poland, provides therapy using the "Spider", which is comparable to the use of the Adeli Suit. The "Spider" consists of a number of elastic cords of different elasticity attached to certain points on the patient's body at one end and to the different points on the surrounding

construction on the other one. This unique suspension device enables the independent and controlled movement as well as strengthening of the affected parts of the body. The equipment enables the practitioner to create a unique "Spider's" web prescribed individually for each patient (Mehl- Madona, 2001). The flexible connectors allow changes to help the patient improve balance and posture as well as to develop voluntary movements with greater precision and ease of movement. The "Spider" promotes independence with security and sometimes motivates reluctant patients to participate in therapy. Studies carried out on the effectiveness of the Spider therapy (Patel, 2005).

(e) The Sensory Integration Technique

The theory of sensory integration (SI) was originally developed by A. Jean Ayres in the 1970s (Schaaf and Miller 2005). The principles of SI theory are used by therapists in developing treatment approaches for children with sensory processing difficulties, including CP. As conceived by Ayres, the SI model was developed to treat learning disabilities. SI theory is based on the hypothesis that in order to develop and execute a normal adaptive behavioral response, the child must be able to optimally receive, modulate, integrate, and process the sensory information (Patel, 2005). Schaaf and Miller (2005) and Wuang et al, (2009) in separate review of literature on the efficacy of this treatment approach concluded that evidence on the efficacy of this treatment approach is equivocal

(f) Body Weight Support Treadmill Training: Stepping movements are normally present in newborns and infants, before the infant starts to bear weight, stand and walk (Stanger and Oresic 2003). In treadmill training, the child is supported in a harness on the

treadmill in an upright posture limiting weight bearing. The child then attempts to walk on the slowly moving treadmill, eliciting the stepping movements (Stranger and Oresic 2003; Cheng et al, 2007). Treadmill training, thus allows development of stepping movements needed for ambulation. Studies using 3-4 sessions per week lasting for 3-4 months have shown improvement in lower extremity movements and gait patterns in children with cerebral palsy (Stanger and Oresic 2003; Schmidt et al, 2000, Cheng et al, 2007)

(g) Conductive Education: The Conductive Education (CE) was developed by Peto in the 1940s. (Liptak, 2005). It is based on the concept that children with motor disabilities learn the same way as those with no disability. CE is carried out by trained "conductors" who use repeated verbal reinforcement to promote and facilitate intended motor activity by the child. (Liptak, 2005; Mayston, 2004; Roth et al, 2004). Participation in CE requires reasonable cognitive abilities to comprehend the verbal instructions. The idea is to develop independence in daily activities by the child by facilitating all aspects of child's development. The child is encouraged to participate and practice all daily activities to the best of his or her abilities (Darrah et al 2004). CE is typically carried out in separate group sessions for school age children. The effectiveness of CE in improving functional capabilities of children with CP has not been established by any controlled clinical trial, (Darrah et al 2004; Roth, 2004).The conductive education method is said to be as effective as but not better than conventional approaches (Roth, 2004).

2.2. Motor Development

Motor development in normal children follows a particular sequence known as developmental milestones in which a child is expected to achieve certain functional ability

within an acceptable time frame. However as a result of pathology of damage to an immature brain, there is an alteration or delay in motor development among children with cerebral palsy (Rosenbaum, 2003). Several factors affect motor development in children with cerebral palsy.

In order to define these factors, Bartlett and Palisano (2000) introduced a multivariate model of determinants of motor change for children with CP, based on literature and expert opinion. In this model possible determinants of motor change include impairments namely secondary or primary, personal and contextual factors (family ecology) and interventions. Impairment include aberrations in muscle tone, type of motor disorder, distribution of motor disorder, primitive reflexes, joint contracture, and skeletal alignment, muscle weakness, loss of voluntary selective motor control, disturbances of sensation, perception, and cognition (Barlett and Palisano, 2000). Personal and contextual factors (family ecology) refers to family resources, quality of home environment, family support, parental expectations, and family function (Barlett and Palisano, 2000; Tieman et al, 2003). A few studies (Barlett and Palisano, 2000; Palisano et al, 2000; Tieman et al, 2003; Gorter et al, 2009) have tried to find the relationship between the factors mentioned above and how they affect motor development in order to improve management procedures and eventually prognosticate motor development. The findings from these studies suggest that motor development especially in children with cerebral palsy occurs as a result of interaction of these factors but a lot is still unknown about this interrelationship.

2.3 Motor Function and the Environment.

An activity is said to be performed when an individual interacts with the environment (Tieman et al, 2003). Disability, rather than being viewed as a problem with the individual, may be conceptualized as a mismatch between the person and environment (WHO, 2001). The environment includes the concepts of setting and context. For children, everyday settings include the home, school, and outdoor/community. Context refers to the physical, temporal, and social features of a particular setting (Tieman et al, 2003). This suggests that various differences in environmental settings and context where an activity is to be carried out might influence the performance of such an activity (Tieman et al, 2003).

Awareness of the impact of the environment on individuals with disabilities has been on the increase over the years (WHO, 2001). The International Classification of Functioning, Disability and Health (ICF) takes account of the social model of disability which considers disability to result from the interaction between individuals and their environment rather than being a characteristic of the individual (Colver, 2006). The ICF introduces Environmental Factors into its classification, defining them as the physical, social and attitudinal environment in which people live and conduct their lives. These factors include arrangements for educational provision, social attitudes and norms, legislation on access to buildings, anti-discrimination legislation, transport design, rehabilitation, therapeutic services and assistive technology.

Schenker et al, 2005 in a study conducted on participation of children with cerebral palsy in the school environment found that functional performance is not an abstract set of skills that is unrelated to the environment in which the person lived, worked or attended

school but that the environment had an effect on performance of activities in children with cerebral palsy. Hammal et al, 2007 also opined that participation of children with disability is partly a product of their environment in their study aimed at determinining whether degree of participation of children with cerebral palsy (CP) is influenced by where they live, as predicted by the social model of disability.

Haley et al (1994) proposed the inclusion of environmental setting and context in paediatric functional assessments based on the outcome of their work with Paediatric Evaluation of Disability Inventory (PEDI). They proposed that new methodologies and approaches to context – specific functional testing of patient groups and individual patients need to be incorporated into physiotherapy practice. They encouraged the use of (1) tests that incorporate major physical and social contextual elements and (2) tests that measure function in specific setting. They also opined that if the physiotherapist has reason to believe that different environments or varying task requirement will have a strong influence on individual performance, and detailed information for identifying status or change in an individual within and between settings are important, and then the physiotherapist would require an assessment that includes a strong contextual framework. This framework will be such that takes the environment into consideration. Various authors (Palisano et al, 2003; Ostensjo et al, 2003; Tieman et al, 2004; Tieman et al, 2004b) who have studied the influence of different environmental settings on motor function in children with cerebral palsy recommended that a child should be seen as a part of an environment. They further suggested that assessment of the child's motor function should incorporate the environment in which the function is being carried out.

2.4 Health of Caregivers

A caregiver is anyone who provides assistance to someone who is in need of care (American Medical Association -AMA, 2009). This could involve caring for a spouse who has suffered a stroke, a child with disability, a mother-in-law with Alzheimer's disease, or a grandfather with cancer. Most caregivers are unpaid family members or friends who provide care on either a full- or part-time basis (AMA, 2009). A large and growing body of evidence reveals that providing care for a chronically sick person can have harmful physical, mental, and emotional consequences for the caregiver (Pinquart and Sorensen, 2003; Brehaut et al, 2004; Family Caregiver Alliance, 2006). As families struggle to care for others, their own health might be put in danger. As a result, caregiver's health is quickly becoming a public health issue that requires more focused attention from health professionals, policy makers and caregivers themselves to ensure the health and safety of those individuals dedicating their lives to the care of others (Family Caregiver Alliance, 2009).

Various authors (Grunfeld et al, 2004; Spector and Tampi, 2005; Chiou et al, 2005) have investigated the effect of caregiving on the health status and quality of life of caregivers of people living with disability. These studies have especially been carried out involving caregivers of the adult population of people living with chronic illnesses such as cancer, dementia, Alzheimer's disease and stroke. Conversely little information is available on the effect of caregiving on the health status and quality of life of parents of children with chronic disabling conditions. The studies on caregivers of adult population have shown that the psychological health of the family caregiver is negatively affected by

providing care. Higher levels of stress, anxiety, depression and other mental health effects are common among family members who care for an older relative or friend (Pinquart and Sorensen 2003; Grunfeld et al, 2004). Spector and Tampi, (2005) also identified that depressed caregivers are more likely to have coexisting anxiety disorders, substance abuse or dependence, and chronic disease.

High rates of depressive symptoms and mental health problems among caregivers, compounded with the physical strain of caring for someone who cannot perform activities of daily living (ADLs) such as bathing, grooming and other personal care activities, put many caregivers at serious risk for poor physical health outcomes. Caregivers have reported lower levels of subjective well-being and physical health than non-caregivers (Pinquart, and Sorensen, 2003). A survey by Ho et al (2005) revealed that 3/5th of caregivers studied reported fair or poor health status, one or more chronic conditions, or a disability, compared with 1/3 of non-caregivers. Caregivers also reported chronic conditions (including heart attack/heart disease, cancer, diabetes and arthritis) at nearly twice the rate of noncaregivers (45 vs. 24%). In addition, higher rate of mortality was recorded by Christakis and Allison (2006) after the hospitalization of a spouse.

Although care giving is a normal part of being the parent of a young child, this role takes on an entirely different significance when a child experiences functional limitations and possible long-term dependence (Raina et al, 2005). One of the main challenges for parents of a child with chronic health problem is to manage their child's health problems effectively and juggle this role with their own requirements of everyday living. Consequently, the task of caring for a child with complex disabilities at home might be daunting for caregivers (Raina et al, 2005). The provision of such care may prove

detrimental to both the physical health and the psychological well-being of parents of children with chronic disabilities (Brehaut et al, 2004). Children with cerebral palsy are among the group of patients who require long term care from their caregivers. These children usually require a long term access to specialized health care and professionals and ensuring this accessibility becomes the responsibility of the caregivers of these children. Depending on the severity of the disability, many children with cerebral palsy might attend such facilities for months or years as the case may be.

A study conducted on the mothers of children with Asperger Syndrome (AS) and High-Functioning Autism (HFA) showed that they had lower SF-12 scores which indicated poorer physical health than the controls who were parents of age- matched apparently healthy children (Allik et al, 2006). The mothers of children with AS/HFA also had lower physical SF-12 scores compared to the fathers. In the AS/HFA group, maternal health was related to behavior problems such as hyperactivity and conduct problems in the child (Allik et al, 2006). Roach et al (1999) examined parental stress in socioeconomically-matched samples of mothers and fathers of children with Down syndrome and typically developing children. Parents of children with Down syndrome perceived more caregiving difficulties, child-related stress (distractibility, demandingness, unacceptability), and parent-related stress (incompetence, depression, health problems, role-restriction) than did parents of typically developing children (Roach et al, 1999). In the same study, for the combined groups of parents, mothers' stress was associated with children's caregiving difficulties; fathers' stress, with children's group status (Down syndrome, typically developing). Mothers who reported more responsibility for childcare perceived more difficulties with health, role restriction, and spousal support (Roach et al, 1999). Fathers

who reported more responsibility for childcare perceived fewer difficulties with attachment and parental competence. Partner stress was also associated both with mothers' and with fathers' stress (Roach et al, 1999).

Brehaut et al (2004) found in a study conducted in Canada that caregivers of children with CP had lower incomes than did the general population of other caregivers despite the absence of any important differences in education between the 2 groups. The CP children's caregivers reported being less likely to report working for pay and less likely to be engaged in full-time work and more likely to list caring for their families as their main activity. In the same study measures of psychologic health showed greater reported distress , chronicity of distress, emotional problems, cognitive problems and a greater likelihood of a variety of physical problems, including back problems migraine headaches, stomach/intestinal ulcers , asthma, arthritis/rheumatism, experience of pain, as well as a greater overall number of chronic physical conditions. Raina et al (2005) in another study also reported a decline in health status and well being of caregivers of children with cerebral palsy primarily due to child behavior and caregiving demands. In a cross sectional study conducted in Nigeria by Hamzat and Mordi (2007), the authors found a significantly lower General Health Questionnaire scores in the caregivers of children with cerebral palsy than in the caregivers of age-matched children without cerebral palsy and concluded that caring for children with cerebral palsy apparently had a negative impact on the health of their caregivers when compared with the health of caregivers of children without cerebral palsy. They however did not find any significant correlation between the severity or degree of disability and the general health status of the caregivers.

2.5 Quality of Life Caregivers of Patients with Neurological Disorders

One definition that is often cited in quality of life literature states that quality of life is the individual's perceptions of their position in life in the context of the culture and value systems in which they live, in relation to their goals, expectations, and concerns, in other words, it is an individual's personal interpretation of his/ her environment and how it is referenced to affect his/her well-being (Schalock et al., 2001). The idea of situating a person's quality of life status within their culture and values speaks to the importance of understanding people's realities from their internal vantage point rather than exclusively from the perspective of outside observers (Rosenbaum, 2008). Therefore quality of life research should focus on the interaction between an individual and the environment, and specifically explore individual's well-being by examining factors, such as family situation, social supports, leisure activities, spiritual values, career opportunities, and economics (Schalock et al, 2001).

Studies that have been conducted on caregivers of people with neurological conditions have revealed the effect of caring on the quality of life of these set of people especially caregivers of adult population (Markowitz et al, 2003; Morimoto, 2002; Cummins, 2001). For example, Markowitz et al (2003) investigated the relationship of caregivers' health-related quality of life (HRQOL) to the burden of caring for patients with Alzheimer disease and resource utilization and found that compared with a normative age-adjusted sample, caregivers of patients with Alzheimer's disease had lower mental and physical scores thus concluding that the burden of caregiving has substantial negative effect on their quality of life. Morimoto et al (2002) in another study of 100 caregivers of

stroke survivors in Japan stated that increased burden significantly related to decreased health-related quality of life among stroke caregivers. In addition, in the same study the prevalence of depressive symptoms among the of stroke survivors caregivers was twice that of community dwelling older people.

Fewer studies have been carried out on the quality of life of caregivers of children with childhood disabilities especially those with cerebral palsy. However in most of the studies that have been carried out on caregivers of children with cerebral palsy, similar results have been obtained. Tuna (2004) investigated the quality of life of 40 primary caregivers of children with CP in comparison with primary caregivers of children without cerebral palsy. The results from this study showed that the primary caregivers of children with CP scored significantly lower than the comparison group in four subscales of the SF-36 health survey questionnaire (physical functioning, vitality, general health, and emotional role) thus suggesting a poorer quality of life compared to that of controls. In another study carried out by Ones et al (2005) in Turkey a similar result was obtained when the quality of life of mothers of children with cerebral palsy was compared with that of mothers of normally developing children, the quality of life in the former was significantly lower than that of control mothers.

2.6 Measurement of Motor Function, Quality of Life, and General Health Status

2.6.1 Measurement of Motor of Function in Cerebral Palsy.

The main goals of physical therapy intervention in pediatric rehabilitation is believed, are to reduce barriers limiting the performance of daily routines and to facilitate the successful integration of children into the home and school environments (Kothari et al, 2003).

Therefore functional status measures, which focus on assessment of motor function which are needed for daily routines in the home and the community, are needed to evaluate the effectiveness of physical therapy intervention. Several of such outcome measures are available although with varied characteristics which will eventually determine its suitability for the type of assessment to be carried out. Examples of which include the Gross Motor Function Classification System (GMFCS), the Gross Motor Function Measure(GMFM), Bayley Scales of Infant Development for Cognitive Function (BSIDCF), Peabody Developmental Motor Scales (PDMS), Alberta Infant Motor Scale(AIMS), Paediatrics Evaluation Disability Inventory(PEDI). Boyd and Graham Selective Motor Control Instrument (BGSMCI), Modified Tardieu Scale (MTS) etc

Gross Motor Function Classification System (GMFCS): The Gross Motor Function Classification System (GMFCS) was chosen by researcher and used to classify the children with cerebral palsy into their functional ability levels (Appendix ii). This instrument is the only one presently available that could be used to classify children and without necessarily caring out extensive assessment of motor function thus making its time of administration short. The Gross Motor Function Classification System is a standardized method for describing the gross motor functional ability of children with cerebral palsy in one of the five ordered levels (Palisano et al, 1997). It was developed by Palisano and Colleagues (1997) in response to the need to have a standardized instrument for describing and classifying the severity of movement disability among children with cerebral palsy. The construct of self-initiated functional abilities in sitting, walking and need for assistive devices such as walkers or wheel chairs was used to distinguish between the levels of the system. In this five level ordinal scale, Children with CP at level 1 are those who can

perform all activities of their normally developing age matched peers (although with affected speed and quality of movement) whereas children at level 5 have difficulty controlling their head and trunk posture in most positions or achieving any voluntary control of movement. The GMFCS scores are also based on four age bands: less than 2 years; 2-4 years; 4-6 years; and from 6-12 years.

Validity of the instrument was tested using the Nominal group technique which yielded over 12/15 agreement, and the Delphi Method which resulted in more than 16/20 rating (Bartlett, 2006). Wood and Rosenbaum (2000) reported an inter-rater reliability G= 0.93, test-retest reliability of G=0.79; Bodkin et al, (2003) also reported an inter-rater reliability K= 0.84 for children of all ages. In addition, Hamzat and Fatudimu (2008) found an inter rater reliability of 0.82 when they compared the assessment by caregivers to that of physiotherapists using this instrument. Since the initial publication in 1997 describing its development, the GMFCS has had a major impact on observational and experimental research into children with CP. There have been more than 100 citations across the spectrum of health care professions and physical management interventions (Morris and Bartlett, 2004).

Gross Motor Function Measure (GMFM): The GMFM is a criterion-referenced measure constructed for the purpose of evaluating change in gross motor function in children with CP (Russel et al, 2000). The GMFM was used by the researcher to assess the gross motor function of children with cerebral palsy on a monthly interval for 9 months (Appendix iii). The GMFM was selected for use for this purpose among other instrument such as the Peadiatric Evaluation of Disability Inventory, Infant Neuromotor Assessment, Alberta Infant Motor Scale, the Peabody Developmental Motor Scales etc because it takes

into consideration every stage of motor development in children with cerebral palsy and it is the responsive to change. Keteleer and Vermeer (1998) carried out a systematic literature review of assessment measures of functional motor abilities in children with cerebral palsy and also concluded that only the GMFM and the Peadiaric Evaluation Disability inventory (PEDI) fulfilled the criteria of reliability and validity with respect to responsiveness to change.

The GMFM consists of 88 items grouped into 5 sub-domains: (1) lying and rolling (17 items); (2) sitting (20 items); (3) crawling and kneeling (14 items); (4) standing (13 items); and (5) walking, running, and jumping (24 items). It takes about 45 minutes to administer. The GMFM is scored by observation of a child's performance on each item. Items are scored on a 4-point ordinal scale. Scores for each dimension are expressed as a percentage of the maximum score for that dimension. A total score is obtained by adding the scores for all dimensions and dividing by 5 (i.e. the total number of dimensions). Each dimension, therefore, contributes equally to the total score. The GMFM total scores can range from 0 to 100. Good test-retest reliability (0.99) was obtained by Bjornson et al (1998). Russell et al (2000) noted that the instrument has good face validity. The criterion validity was tested by comparing it with the GMFCS and it was found to correlate highly with this measure (ρ =0.92). Construct validity was tested using the a priori hypothesis (Russell et al, 2000). The advantage the GMFM has over other instrument is that it covers all aspects of gross motor function and it is very sensitive to changes in gross motor function.

The Boyd and Graham Selective Motor Control Instrument

This instrument was developed in 1999 by Boyd and Graham with the aim of finding a valid and reliable measure for selective motor control in children with CP which was before then unavailable. It was used in this study to assess selective motor control (SMC) in children with cerebral palsy. Inter rater reliability tests were conducted on this instrument using the ankle dorsiflexors for the left and right lower extremities. A weighted Kappas score of 0.61 and 0.72 was obtained respectively. Showing the instrument to be reliable (Smits et al, 2009). On this instrument, the subject will be given a score of 4 if he/she carries out isolated selective dorsiflexion through available range, using a balance of tibialis anterior activity without hip and knee flexion. A score of 3 will be given if dorsiflexion is achieved using mainly tibialis anterior activity but accompanied by hip and / or knee flexion. 2 will be given if dorsiflexion occurs by using extensor hallucis longus, extensor digitorum longus and some tibialis anterior activity. 1 will be scored if there is limited dorsiflexion using mainly extensor hallucis longus and/or extensor digitorum longus. A score of 0 will be given if no movement occurred. The instrument takes about 5 minutes to administer and it is easy to use.

Modified Tardieu Scale (MTS)

Modified Tardieu Scale (MTS) which is a modification of the Tardieu scale grades spasticity by measuring the joint angle of the ROM at which an increase in muscle tone ('catch') is encountered at a high velocity (< 1 sec) passive stretch (R1). Mehrholz et al (2005) in a study carried out to compare the psychometric properties of the Modified Tardieu Scale and the Modified Ashworth scale found the test-retest reliability of the

Modified Tardieu Scale to be moderate to very good (k = 0.52-0.87), the test - retest reliability was significantly higher within the Modified Tardieu Scale in comparison with the Modified Ashworth Scale ($Z<1.96$; $p<0.05$) except for shoulder extensor and internal rotator muscles ($Z<1.96$; $p<0.05$). Although inter-rater reliability of both scales was poor to moderate (Modified Ashworth Scale: k = 0.16-0.42; Modified Tardieu Scale: k = 0.29-0.53), significantly higher k-values were revealed with the Modified Tardieu Scale for all tested muscle groups ($Z<1.96$; $p<0.05$) except for wrist extensors ($Z<1.96$; $p<0.05$). Acceptable inter-rater reliability of the MTS has been reported in two studies in children with CP (Fosang et al, 2003; Wright et al, 2008).

2.6.2 Measurement of Quality of Life and General Health Status

Attempt to measure quality of life started since the 1940s, when the World Health Organization defined health as being not only the absence of disease and infirmity but also the presence of physical, mental, and social well-being (Bircher, 2005). Health is thus a dynamic state of wellbeing characterized by a physical, mental and social potential, which satisfies the demands of a life commensurate with age, culture, and personal responsibility (Bircher, 2005).

Therefore quality-of-life issues have become steadily more important in health care practice and research. There has been a nearly exponential increase in the use of quality-of-life evaluation as a technique of clinical research since 1973 with the growing fields of outcomes research and health-technology assessment evaluating the efficacy, cost effectiveness, and net benefit of new therapeutic strategies to determine whether the

associated increases in expenditures for health care are justified (Kontodimopoulos et al, 2007). Quality-of-life assessment measures changes in physical, functional, mental, and social health in order to evaluate the human and financial costs and benefits of old and new programs and interventions. A number generic as well as disease-specific 'QOL' assessment instruments are available examples include the EORTC QLQ-LC13, World Health Organization scale (WHOQoL 100), World Health Organization Quality of Life Questionnaire Bref (The WHOQol Bref) etc.

The General health Status measures are used to assess the physical, psychological and mental health of individuals. There are also disease specific types and generic types. Examples include the General Health Medical Outcomes Study 36-Item, Short-Form Health Survey (SF-36), General Health Questionnaire etc

World Health Organization Quality of Life Questionnaire (The WHOQol Bref):

The WHOQoL-Bref was derived from the 100 item World Health Organization scale (WHOQoL 100). The WHOQoL Bref comprises of 26 items, two from overall quality of life and general health facets and 24 from each of 24 facets contained in the WHOQoL - 100.It covers four domains, which are the physical health, psychological health, social relationship and environment domains. Each of the 26 items of WHOQoL-Bref is rated on a 5-point scale, which is in the positive direction i.e. higher scores mean higher quality of life. In order to calculate the overall score, the mean score of items within each domain is calculated and converted to 4-20 range by multiplying it by 4and dividing by the number of items in each domain. The second transformation is done by multiplying the value obtained in the 4-20 range by 100 and then dividing it by 16. The second transformation converts domain scores to a 0-100 scale (Akinpelu et al, 2006). A Report from the

WHOQoL Group on assessment of Psychometric properties and results of the international field trial stated of this instrument stated that the WHOQoL-Bref is a sound, cross-culturally valid assessment of quality of life (Skevington, 2004). It has also been translated to various languages and used across various cultures such as Chinese, Spanish, Japanese, Yoruba etc

The General Health Questionnaire: The General Health Questionnaire is a screening device for identifying minor psychiatric disorder (Goldberg, 2003). It can also be used with the general population or with patients in any sort of non-psychiatric clinical or primary care settings by researchers and clinicians (Goldberg, 2003). The GHQ is simple to administer, easy to complete, score and widely used in many studies (Jackson, 2007). The GHQ can be scored in a variety of ways which is useful in providing multiple outcome measures. Reliability coefficients have ranged from 0.78 to 0.95 in various studies (Jackson, 2007). A high degree of internal consistency was observed for each of the 12 items with Cronbach's alpha value of 0.37–0.79, while total score was 0.79 in the population study (Quek et al, 2001). Jacob et al, (1997) found the GHQ to be highly sensitive with a sensitivity of 96·7% and a specificity of 90%. The Yoruba translation of this instrument has been used and validated by Hamzat and Mordi (2007) among Nigerian subjects.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Participants

One hundred and seven children (64 males and 43 females) with cerebral palsy aged between 1 and 6 years old were involved in the study. The children satisfied inclusion criterion of a diagnosed cerebral palsy made by a paediatrician and referred for physiotherapy. Children with cerebral palsy who presented with co-mobid neuromuscular or musculoskeletal disorders (e.g spinal bifida, muscular dystrophy or myopathy) were excluded from the study. One hundred and seven primary caregivers of the children with cerebral palsy who could understand either Yoruba or English language took part in the study. They constituted the caregivers of children with cerebral palsy group (CCWCP). To serve as control to the CCWCP, 98 caregivers of age-matched children that did not have cerebral palsy and who could understand either Yoruba or English language were surveyed.

3.2 Materials

3.2.1: Instruments

Data Collection Form: This form (Appendix i) was used to document information on hospital number, gender, age, position of child in the family, type and topographical distribution of cerebral palsy and information on educational status of the primary caregiver. The instrument was tested for face validity before use.

Gross Motor Function Classification System (GMFCS): This instrument was developed by Palisano and Colleagues in 1997. It is a standardized method for describing the gross

motor functional ability of children with cerebral palsy in one of the five ordered levels (Palisano et al, 1997). Children with CP at level 1 are those who can perform all activities of their normally developing age matched peers (although with affected speed and quality of movement) whereas children at level 5 have difficulty controlling their head and trunk posture in most positions or achieving any voluntary control of movement. Levels 2, 3 and 4 fall between. The GMFCS scores are also based on four age bands: less than 2 years; 2-4 years; 4-6 years; and from 6-12 years. Validity of the instrument was tested using the Nominal group technique which yielded over 12/15 agreement, and the Delphi Method which resulted in more than 16/20 rating (Bartlett, 2006). This instrument has been used by the researcher in previous studies and no modification was made to this instrument for the purpose of the present study (Hamzat and Fatudimu, 2008). The Gross Motor Function Classification System (GMFCS) was used by the researcher to classify the children with cerebral palsy into their functional ability levels (Appendix ii).

Gross Motor Function Measure (GMFM): The GMFM was used by the researcher to assess the gross motor function of children with cerebral palsy on a monthly interval for 8 months (Appendix iii). It is a criterion-referenced measure constructed for the purpose of evaluating change in gross motor function among children with CP (Russel et al, 1989). The GMFM consists of 88 items grouped into 5 sub-domains: (1) lying and rolling (17 items); (2) sitting (20 items); (3) crawling and kneeling (14 items); (4) standing (13 items); and (5) walking, running, and jumping (24 items). The instrument is scored by observation of a child's performance on each item. Items are scored on a 4-point ordinal scale as follow; 0 = does not initiate, 1 = initiates; 2 = partially completes and 3 = completes. The instrument was suitable for use as originally designed without need for modification

The General Health Questionnaire (GHQ): This was used to assess the general health status (Appendix iv) of the caregivers of the children with cerebral palsy and that of caregivers of children without cerebral palsy. The instrument consists of 12 items which is scored on a 4 point ordinal scale of 0-3. Reliability coefficients of 0.78 to 0.95 have been reported for the GHQ in various studies (Jackson, 2007). The Yoruba translation of this instrument which has been used and validated by Hamzat and Mordi (2007) was administered without further modification by the researcher to those caregivers who did not understand English Language (Appendix v).

World Health Organization Quality of Life Questionnaire (WHOQol-Bref): This was used to assess the quality of life of both the caregivers of the children with cerebral palsy and also those of the caregivers of children without cerebral palsy (Appendix vi). The instrument consists of 26 items which is scored on a 5 point ordinal scale of 1-5. The Yoruba translation of this instrument (Appendix vii) was administered to those caregivers who could speak only Yoruba. The Yoruba translation of the instrument which had been validated by Akinpelu et al (2006) was used by the researcher as it is without any adjustment made to it.

The Boyd and Graham Selective Motor Control Instrument

This instrument (Appendix viii) was developed in 1999 by Boyd and Graham and used in this study to assess selective motor control (SMC) in children with cerebral palsy in the clinic. It was scored 0-4 where 4 was given if isolated selective dorsiflexion through available range, using a balance of tibialis anterior activity without hip and knee flexion was carried out. A score of 3 was assigned if dorsiflexion was achieved using mainly tibialis anterior activity but accompanied by hip and / or knee flexion. 2 was given if

dorsiflexion occured by using extensor hallucis longus, extensor digitorum longus and some tibialis anterior activity. 1 was scored if there was limited dorsiflexion using mainly extensor hallucis longus and/or extensor digitorum longus. A score of 0 was given if no movement occurred. Smits et al (2009) obtained a weighted Kappa score of 0.61 and 0.72 respectively in separate studies to determine the reliability of the instrument.

Modified Tardieu Scale (MTS: Modified Tardieu Scale (MTS) was used to assess spasticity in children with cerebral palsy. Test-retest reliability of the Modified Tardieu Scale has been reported to range from moderate to very good (k = 0.52 - 0.87) (Mehrholz et al 2005; Wright et al, 2008)

3.3 Methods

3.3.1 Sample Size and Sampling Technique

Sample Size

A sample size of 90 was obtained from the formula below for each group of participants i.e. children with cerebral palsy, caregivers of the same set of children and caregivers of children without cerebral palsy.

Sample size calculation

$N = z^2_{\alpha/2}\ \sigma / d^2$

Where $z_{\alpha/2} = 1.96$

σ= 2SD of GMFM score = 24.4 (Tieman et al, 2003

d= precision=1 unit

$= 1.96^2\ (24.4)/1^2$

=90

Sampling Technique

The participants were recruited using a consecutive sampling technique. Recruitment of participants continued until 110 children with cerebral palsy (CWCP) aged between six months and six years, who satisfied the inclusion criteria had been involved in the study. Recruiting more participants above the calculated sample size for the study was done in order to cater for subject attrition. One hundred and ten caregivers of this same set of children with cerebral palsy who were bringing their children to attend physiotherapy clinics at Oni Memorial Children Hospital and the University College Hospital were also recruited. Ninety eight caregivers of age-matched children without cerebral palsy were purposively recruited in the study to serve as controls. These control participants were sourced from the Immunization clinic of the University College Hospital Ibadan.

However only 67 of the total number of children recruited eventually completed the study. This was because many of the mothers complained of the social issues involved with taking care of a child with disability such as CP. Many of them hid the children at home due to unkind comments, stigmatization and being ostracized by neighbours. In addition, despite several attempt by the researcher to ensure compliance, many of the subjects also dropped out due to the belief of caregivers that the cause and treatment for the condition was spiritual and non medical in nature. This affected the sample size for the study.

3.3.2 Research design

The study was a longitudinal study that involved repeated observation and examination of gross motor function in children with cerebral palsy in the clinic and their respective homes over an eight-month period. The general health status and quality of life of caregivers of the same set of children with cerebral palsy and caregivers of normally developing children were also repeatedly observed and examined over an eight- month period.

3.3.3 Ethical Consideration

Confidentiality of Data: All information gathered was held under strict confidence and was used solely for the purpose of this research. The name of the participants and their relatives was not included in the data collection, which further ensured confidentiality.

Beneficence to Participants: The outcome of this study has provided information on the effect of longterm caregiving on the general health and quality of life of caregivers of children with cerebral palsy which can be used by the physiotherapists and other health care providers involved with the management of these children on how to appropriately counsel their carers on issues pertaining to their health as they carry out their role of caregiving.

Non Maleficence to Participants: the research was of non maleficence to the participants. There was no invasive procedure involved.

Right of Decline/ Withdrawal from study without loss of benefit: The participants were free to withdraw from the study. In addition they were not mandated to take part in the study and did not lose any benefit by declining to participate in the study

3.3.4 Procedure

Approval of the University of Ibadan/ University College Hospital Health Research Ethics Committee (UI/EC/09/0129) was obtained before commencing this study. The procedures of the research work was explained to the caregivers of the children with cerebral palsy and their informed consent obtained before involving them and their children/ward in the study. Informed consent of the caregivers of the children without cerebral palsy was also obtained. Biodemographic information such as age, gender, position of the child among siblings, type of cerebral palsy, topography of affectation of cerebral palsy was gathered using the data collection form (Appendix i). Information on age and gender was also obtained for the children of control subjects from their caregivers. Age was recorded in years as age at last birthday for all the participants.

A research assistant was employed for this research specifically to treat the children with CP monthly in the clinic using a standardized protocol called the Neurodevelopmental Technique (NDT) developed by Berta and Karl Bobath in 1943, conventional exercise therapy programme such as repeated passive movement and progressive habilitation exercises were also used as treatment modalities. The treatment served as an incentive to the children with cerebral palsy who were already receiving treatment from their respective physiotherapists on regular basis in the physiotherapy clinic that they were attending. While the research assistant carried out the incentive treatment, the researcher assessed the gross motor function, spasticity and selective motor control using the GMFM, MTS and the BGSMCI as follows:

(a) Classification of Children into Gross Motor Functional Categories Using the GMFCS: All the children with cerebral palsy were classified according to their motor functional ability using the GMFCS. Each child was observed while performing age-appropriate motor activity by the researcher and classified according to the level that corresponded to his/ her functional ability by picking one of the ordered levels on the GMFCS. This classification was done at the researcher's first contact with the participant in the clinic.

(b) Assessment of Gross Motor Function Using the GMFM: The gross motor function was assessed at baseline using the GMFM both in the clinic and at the homes of children with cerebral palsy by the researcher. The time interval between when the assessment was carried out at home and in the clinic was within a week. This time frame was specifically chosen based on the fact that motor function in children with cerebral palsy would not be expected to have changed significantly within a time interval of a week. The gross motor function of each child with cerebral palsy was assessed by observing the way he/she performs each item on the GMFM. The performance was then scored by the researcher. A child was scored 0 if he/she does not initiate a particular activity being assessed. A child who initiates an activity was scored 1. A score of 2 was given for partially completing an activity and a score of 3 was recorded for a child who fully completes the activity being scored. The gross motor function was assessed at baseline and on a monthly interval for eight consecutive months.

(c) Measurement of Spasticity: Spasticity was assessed in the children with cerebral palsy using the Modified Tardieu Scale in the clinic by the researcher thus:

The starting position was supine lying in order to assess the adductors(Plate 3.1) and gastrocnemius(Plate 3,2).

Prone lying was assumed for the hamstrings to be assessed(Plate 3.3).

Spasticity in three groups of muscles namely: the adductor muscles, the hamstrings and the gastrocnemius muscles was assessed by measuring the angle of the range of motion during each of passive hip abduction, knee extension, and ankle dorsiflexion.

This is the angle at which an increase in muscle tone ('catch') is encountered at the high velocity (< 1 sec) passive stretch and recorded as SA, SG and SH for each of the right and left limbs. The individual scores were then added to get a total score i.e. the Spasticity Total Score (Gorter et al, 2009). Spasticity was measured at baseline and this procedure was repeated on a monthly interval for 8 months in children with cerebral palsy.

(d) Measurement of Selective Motor Control: The child being assessed was placed in long sitting position on a plinth, with ankles off the plinth and a pillow was placed at the back of a child who could sit independently to provide support (Plate 3.4). A child who could not sit was supported in this position by the caregivers with the ankles off the plinth, the researcher then stimulated the dorsiflexors of the subject's right side to observe the kind of movement that the subject performed.

The child was scored 4 if he/she carried out isolated selective dorsiflexion through available range, using a balance of tibialis anterior activity without hip and knee flexion (Plate 3.5).

A score of 3 was given if dorsiflexion was achieved using mainly tibialis anterior activity but accompanied by hip and / or knee flexion (Plate 3.6).

A score of 2 was given if dorsiflexion occured by using extensor hallucis longus, extensor digitorum longus and some tibialis anterior activity.

A score of 1 was assigned if there was limitation in dorsiflexion using mainly extensor hallucis longus and/or extensor digitorum longus.

A score of 0 was given if no movement occurred at the ankle when asked to dorsiflex. This procedure was carried out at baseline in the clinic and repeated on a monthly interval for 8 consecutive months in children with cerebral palsy.

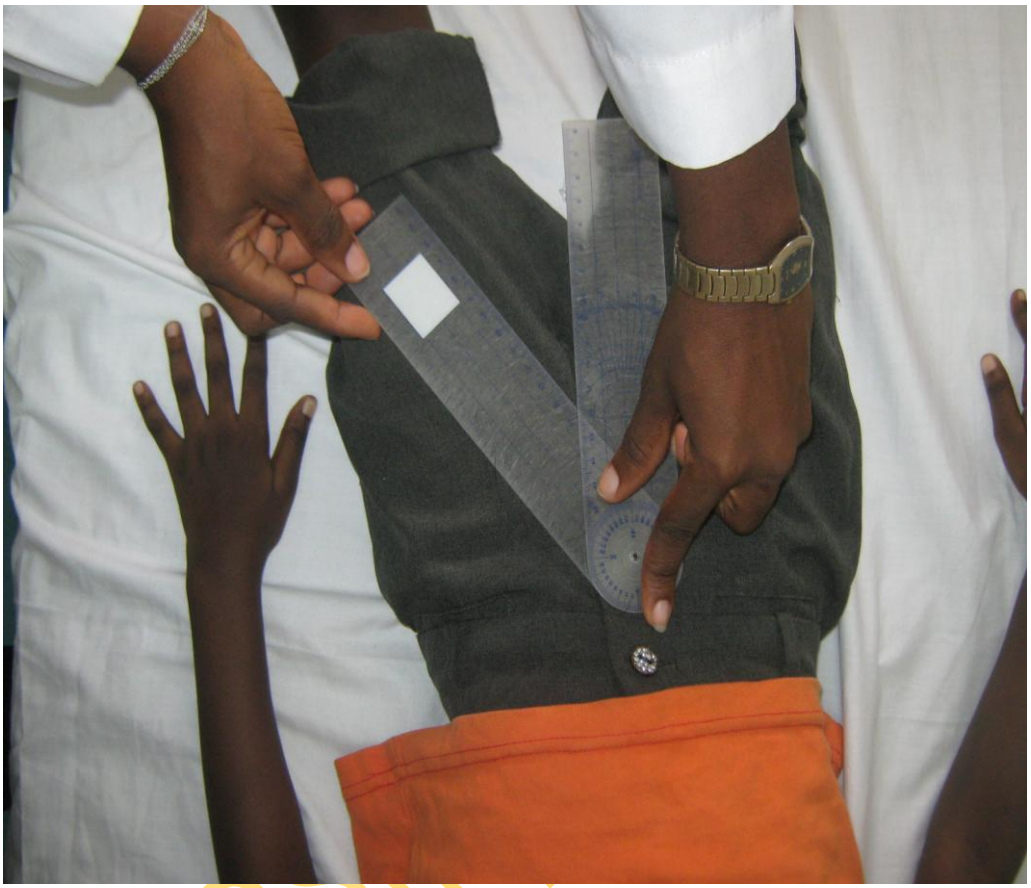

Plate 3.1: Picture showing measurement of spasticity of the hip adductors.

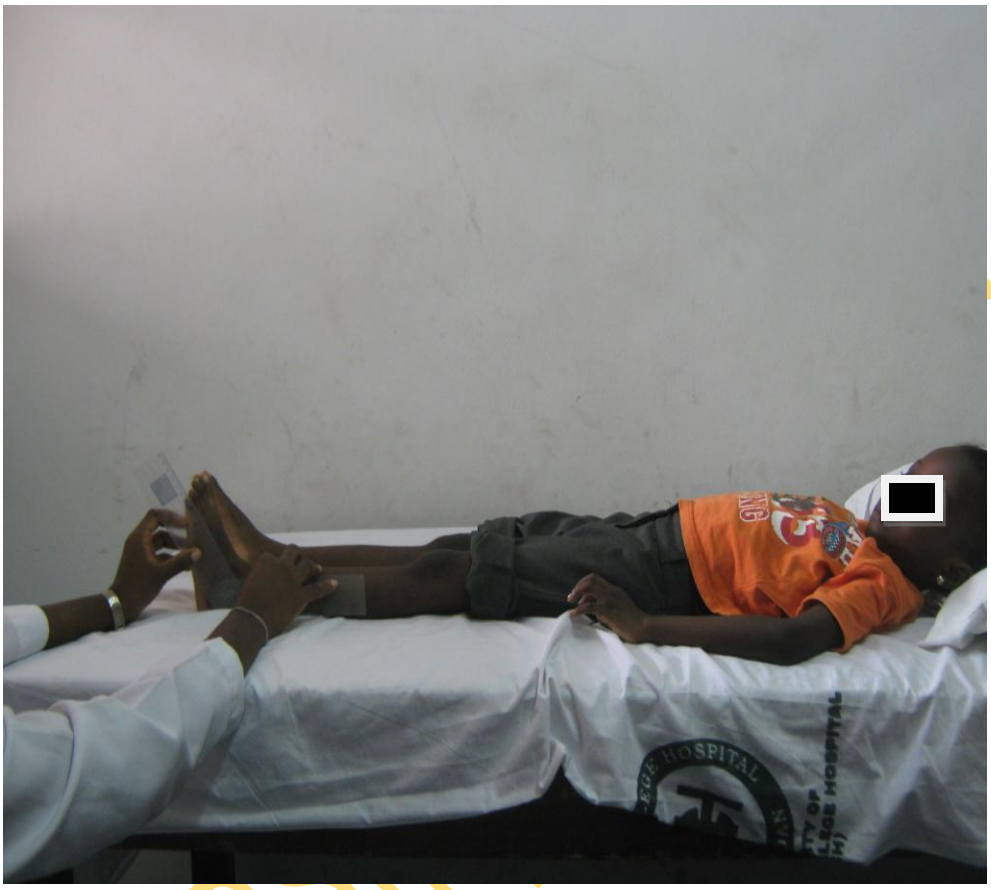

Plate 3.2: Picture showing measurement of spasticity of the gastrocnemius muscle.

Plate 3.3: Picture showing measurement of spasticity of the hamstrings

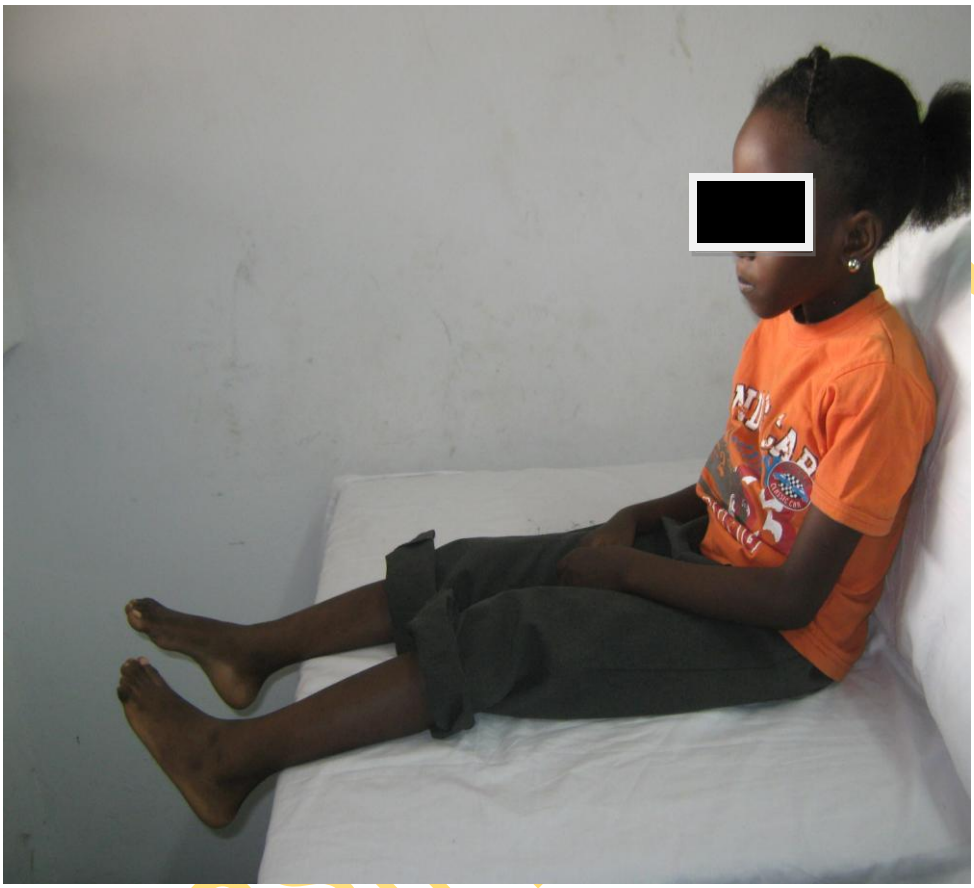

Plate 3.4: Picture showing the Starting Position for Assessing Selective Motor Control

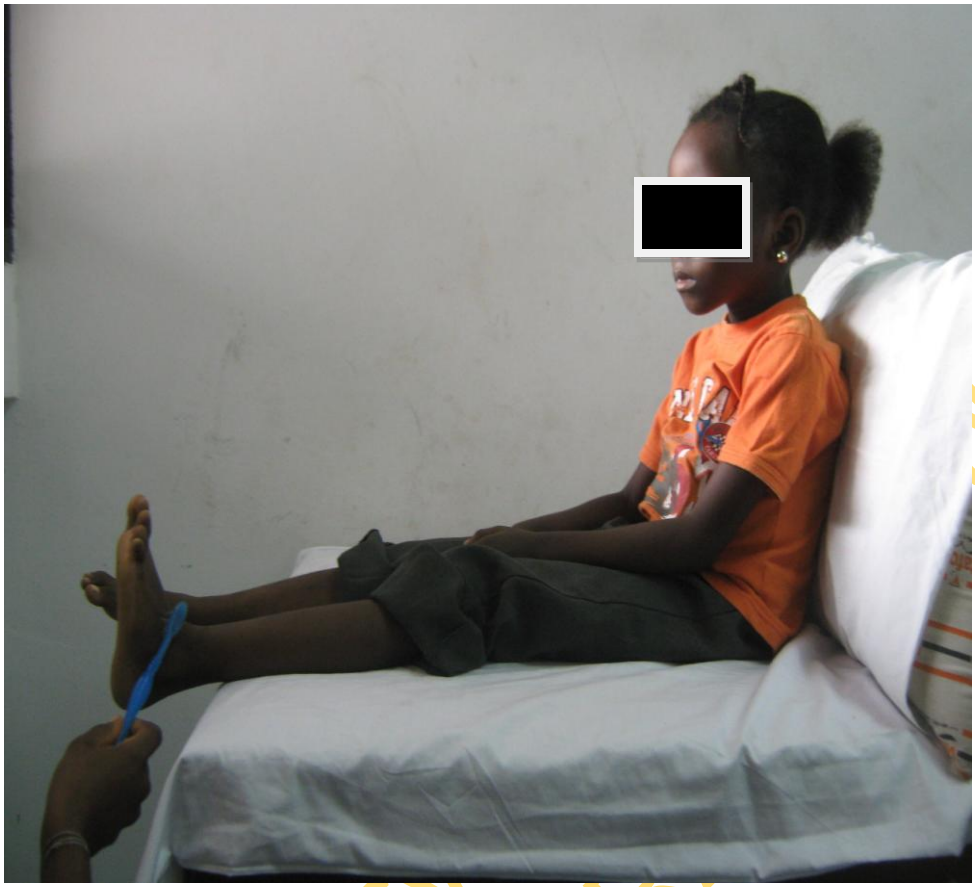

Plate 3.5: Picture Showing the Isolated Response of the Dorsiflexors

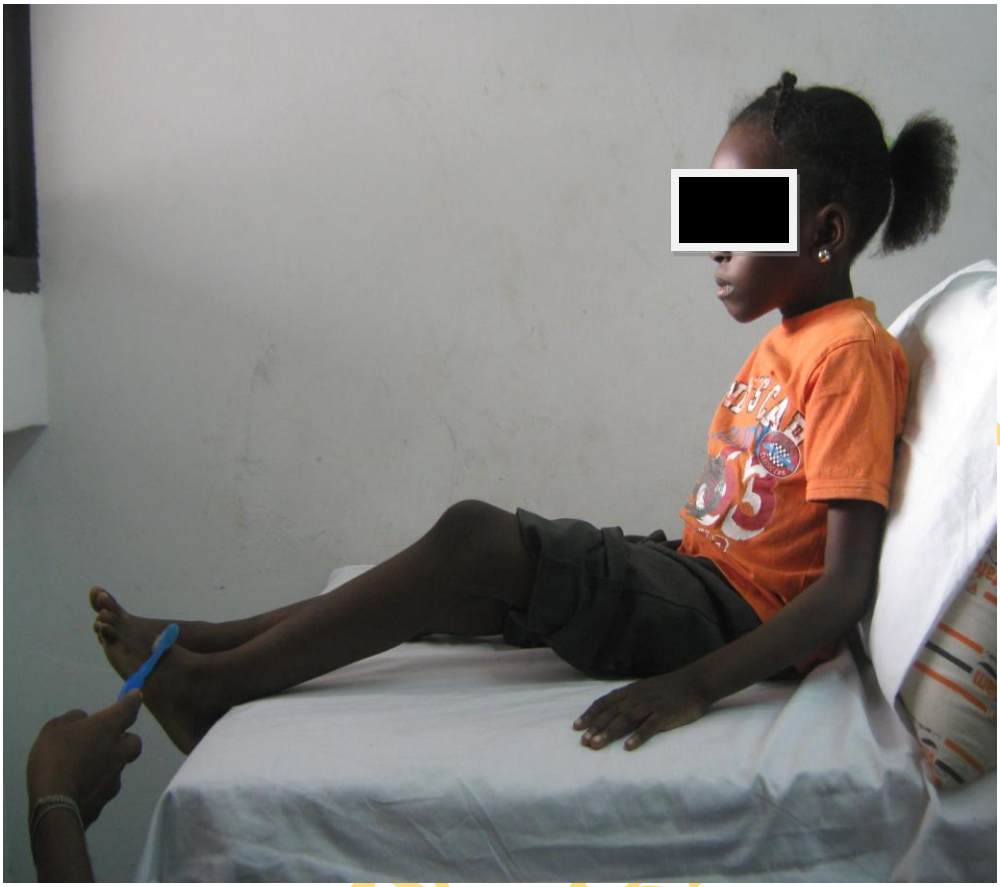

Plate 3. 6: Picture showing no isolated response of the dorsiflexors (Movement is accompanied by knee flexion)

(e) Assessment of General Health of Caregivers: The general health status of all the caregivers was assessed in the clinic at baseline and repeated on a monthly interval for eight months. The researcher administered the General Health Questionnaire (GHQ) to both groups of caregivers. The Yoruba version was used for caregivers who understood only Yoruba language (Hamzat and Mordi, 2007).

(f) Assessment of Quality of Life: The quality of life of the caregivers of children with cerebral palsy and those of children without cerebral palsy (control group) were assessed using the WHOQoL Bref at baseline and on a monthly interval for eight months in the clinic. The Yoruba version was used for caregivers who understood Yoruba only language(Akinpelu et al, 2006).

3.3.5 Venue of the Study

The GMFCS, WHOQoL Bref, SCMI, MTS and the GHQ were administered in the respective clinic where the children with cerebral palsy were receiving their physiotherapy care (i.e. Peadiatric gymnasia of Oni Memorial Children Hospital, Obafemi Awolowo University Teaching Hospitals Complex, and University College Hospital Ibadan). The GMFM was administered in the clinic and at the homes of children with cerebral palsy. The treatment of each child was carried out at each clinic.

3.3.6 Analysis of Data

Data collected were analyzed as follows

1 Descriptive statistics of mean and percentages was used to summarize the data of the participants such as age and gender of all the participants, position of child in the family, type of cerebral palsy, topography of cerebral palsy, the children's classification on the GMFCS and educational status of the caregivers as appropriate.

2 Friedman's ANOVA was computed to determine the trend in the gross motor functional development in children with cerebral palsy over an eight-month period.

3 Friedman's ANOVA was computed to determine the difference in each sub-domain score on the GMFM in children with cerebral palsy over an eight-month period.

4 Friedman's ANOVA was computed to determine the difference in the quality of life of the caregivers of children with cerebral palsy over an eight- month period

5 Friedman's ANOVA was computed to determine the difference in the general health status of the caregivers of children with cerebral palsy over an eight-month period.

6 Mann Whitney U was computed to compare the general health status of the caregivers of children with cerebral palsy and the control group over an eight-month period.

7 Mann Whitney U was computed to compare the quality of life of the caregivers of children with cerebral palsy and the control group over an eight-month period

8 Wicoxon Signed rank was computed to compare the gross motor function in children with cerebral palsy assessed in different environmental settings (i.e. clinic and home) over an eight-month period

9 Wicoxon Signed rank was computed to compare each of the sub-domain score on the GMFM in children with cerebral palsy assessed in different environmental settings (i.e clinic and home) over an eight-month period?

11 Spearman's correlation co-efficient was computed to determine the relationship between gross motor function development in children with cerebral palsy and the general health status and quality of life of their caregivers over an eight-month period.

12 Spearman's correlation co-efficient was computed to determine the relationship between the development of gross motor functional ability and spasticity in children with cerebral palsy over an eight-month period.

13 Spearman's correlation co-efficient was computed to determine the relationship between each of the sub-domain score on the GMFM and spasticity in children with cerebral palsy over an eight-month period.

14 Spearman's correlation co-efficient was computed to determine the relationship between development of functional ability measured on the GMFM and selective motor activity in children with cerebral palsy over an eight-month period.

15 Spearman's correlation co-efficient was computed to determine the relationship between each of the sub-domain score on the GMFM and selective motor control in children with cerebral palsy over an eight-month period.

Alpha level was set at 0.05

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Results

4.1.1 Physical Characteristics of the Participants

One hundred and seven children with Cerebral Palsy (CP) were recruited out of which only 65(60.7%) completed the study. Table 4.1 shows the physical characteristics of the children with cerebral palsy. Sixty four of the 107 children with CP involved were males (59.8%), 92 (86%) had spastic CP and 70(65.4%) were quadriplegic. The distribution of the GMFCS revealed that majority were in stage V (n = 48; 45.7%) and stage IV (n = 35; 33.3%) as shown in Figure 4.1. Figure 4.2 shows the position of the children in the family. The distribution of the physical characteristics of the caregivers of children with cerebral palsy and the control group is presented in Table 4.2. Majority of the caregivers (83.2%) were mothers of the index child.

4.1.2: Trend of Gross Motor Function in Children with Cerebral Palsy over an eight-month Period

Results showed that there was a significant increase in the total GMFM score and each of the subdomain scores over the eight month period. The results are as presented in Table 4.3.

Table 4.1: Physical Characteristics of Children with Cerebral Palsy (N=107)

Variable	n	%
Age (years)		
<1	27	25.2
1- 2	33	30.8
2- 3	22	20.6
3 -6	25	23.4
Sex		
Male	64	59.8
Female	43	40.2
Type of cerebral palsy		
Spastic	99	92.5
Flaccid/Floppy	3	2.8
Mixed	5	4.7
Topography		
Diplegic	21	20.4
Quadriplegic	70	68.0
Hemiplegic	12	11.7

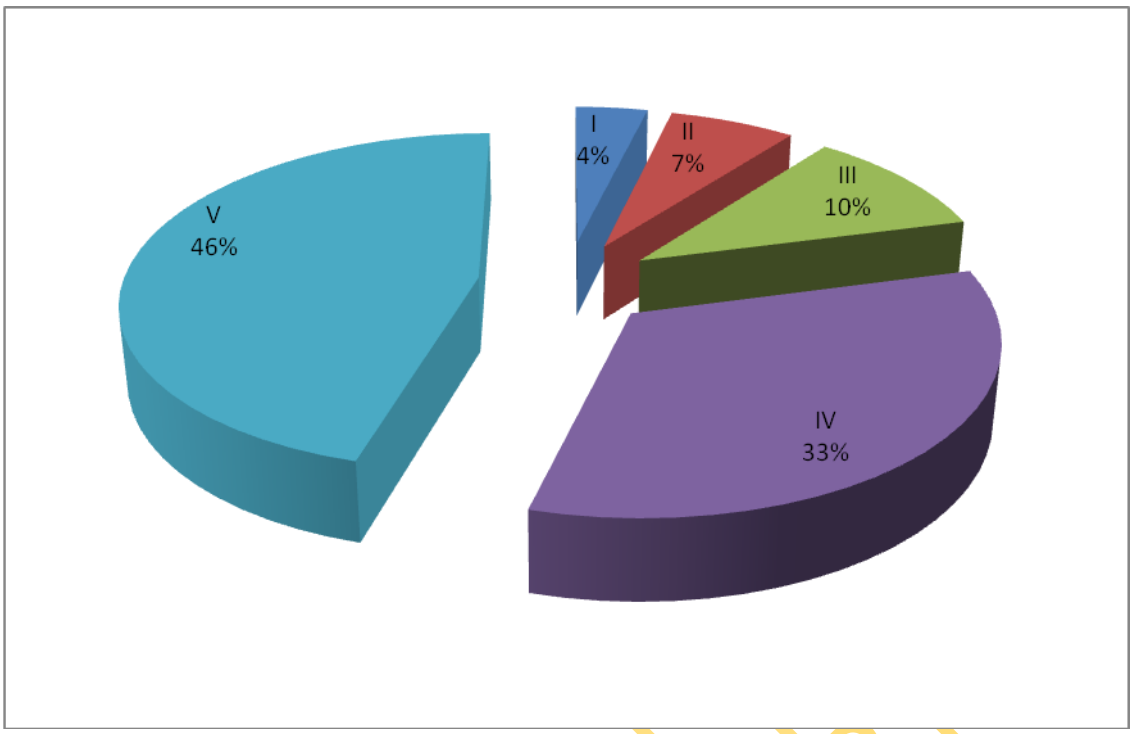

Figure 4.1 : Classification of Children with Cerebral Palsy into stages using the Gross Motor Function Classification System.

Key

I – Stage 1

II - Stage 2

III – Stage 3

IV – Stage 4

V – Stage 5

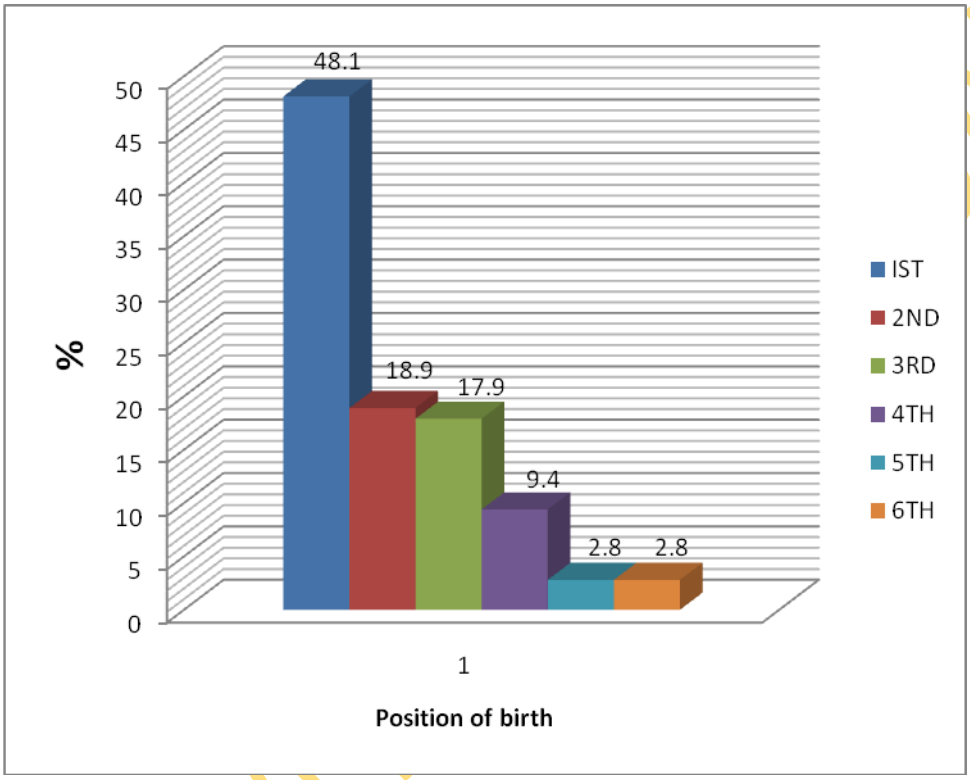

Figure 4.2: Position of the Children with Cerebral Palsy in the Family

Table 4.2: Physical Characteristics of Caregivers of Children with Cerebral Palsy (CCWCP) and the Control Group (CG)

Variable	CCWCP (n=107)		CG (n= 98)	
	n	%	n	%
Age (Yrs)				
<30	23	26.4	28	28.6
30-39	43	49.4	56	57.1
40-49	21	24.1	14	7.1
Education				
None	2	1.9	8	8.2
Primary	22	20.6	8	8.2
Secondary	35	32.7	26	26.5
Tertiary	48	44.8	56	57.1
Relationship				
Child's mother	89	83.2	92	93.8
Fathers	2	1.87	6	6.1
Grandmothers	16	14.9	0	0

Key

CCWCP – Caregivers of Children with Cerebral Palsy

CG - Control Group

Table 4.3: Comparison of Gross Motor Function of Children with Cerebral Palsy Over an Eight-month Period using Friedman's ANOVA (N = 107)

Time (Months)	Total GMFM	GMFM SUBDOMAIN				
		Sub-D 1	Sub-D 2	Sub-D 3	Sub-D 4	Sub D 5
Baseline	21.2	53.1	35.9	12.5	2.4	1.2
1	20.3	52.9	34.0	8.2	2.5	0.9
2	21.5	53.7	35.9	12.2	3.7	2.0
3	22.4	58.1	36.8	10.7	3.1	1.0
4	26.5	61.5	44.5	18.1	5.2	2.5
5	29.0	66.4	47.3	23.0	5.1	3.2
6	28.3	63.6	44.1	21.7	5.3	4.0
7	31.3	68.0	51.1	24.3	6.6	5.9
8	33.2	67.7	52.0	26.5	10.9	6.9
F	136.8	78.7	104.4	56.2	33.1	32.6
p	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*

Key
Sub- D – Sub Domain
GMFM – Gross Motor Function Measure
F- Friedman's ANOVA
***** - significant p value

4.1.3 Correlation between Gross Motor Function and Selected Measures of Impairments

There was a negative and statistically significant correlation between the GMFM scores and spasticity score over the eight months period indicating an inverse relationship. However a significant positive association was obtained between the SMC score and the overall GMFM score except in at the baseline (Table 4.4).

4.1.4 Trend of Quality of Life and General Health Status of the Caregivers of Children with Cerebral Palsy over an Eight- month Period

The WHOQoL-Bref score of caregivers of children with cerebral palsy showed statistically significant increase over the eight-month period which means an improvement in their Quality of Life. This is presented in table 4.5. The GHQ score of the caregivers of children with cerebral palsy also showed statistically significant decrease over the eight months.

Table 4.4: Correlation between Gross Motor Function Measure and Selected Measures of Impairment among Children with Cerebral Palsy over an Eight- month Period using Spearman's Correlation (N=107)

Time (Months)		Spasticity ρ	Spasticity p value	SMC ρ	SMC p value
Baseline	GMFM	-0.2	0.10	0.2	0.10
1	GMFM	-0.3	0.00*	0.4	0.00*
2	GMFM	-0.3	0.00*	0.4	0.00*
3	GMFM	-0.3	0.00*	0.5	0.00*
4	GMFM	-0.4	0.00*	0.4	0.00*
5	GMFM	-0.4	0.00*	0.5	0.00*
6	GMFM	-0.2	0.10	0.4	0.00*
7	GMFM	-0.4	0.00*	0.4	0.00*
8	GMFM	-0.4	0.00*	0.4	0.00*

Key SMC- Selective Motor Control

p - p value

ρ- spearman's rho

* -significant p value

Table 4.5: Comparison of Quality of Life and General Health Status of Caregivers of Children with Cerebral Palsy using Friedman's Anova (N = 107)

Time(Months)	Baseline	2	5	8	F	p
WHOQol- Bref	84.0	87.0	90.0	89.0	82.1	0.00*
GHQ	16.0	9.0	10.0	8.0	35.4	0.00*

Key

WHOQoL Bref- World Health Organization Quality of Life
GHQ- General Health Questionnaire
F- Friedman's Anova
p- p value
*-significant p value

4.1.5 Comparison of the Quality of Life and General Health Status of Caregivers of Children with Cerebral Palsy and Control Counterparts over an- eight month period.

The baseline WHOQOL Bref score was higher in the control group compared to caregivers of children with cerebral palsy (p = 0.00). The difference remained statistically significant for the remaining months with control group having a significantly higher median score (Table 4.6). However the GHQ score was significantly lower baseline in the , 2nd and 8th months among the control group when compared with the caregivers of children with cerebral palsy (Table 4.7)

4.1.6: Correlation between Gross Motor Function in Children with Cerebral Palsy, the General Health Status and Quality of Life of their Caregivers over an Eight-month Period

Results showed that there was a negative correlation between the GMFM score and the GHQ score in the study (Table 4.8). Table 4.8 also shows a significantly positive correlation between GMFM scores and WHOQoL Bref scores at the 2nd, 5th and 8th month.

4.1.7: Comparison of the Gross Motor Function in Children with Cerebral Palsy Assessed at Clinic and at Home over an Eight-month Period

The differences in GMFM score and subdomains scores measured at home and in clinic for the eight months of the study are shown in Table 4.9. At baseline, the overall GMFM scores measured at home were significantly higher than those measured in the clinic

Table 4.6: Comparison of the Quality of Life Caregivers of Children with Cerebral Palsy with the Control Group over an Eight-month period

	WHOQol-Bref			
Time(Months)	**CCWCP (n= 107) Median(Range)**	**CG (n=98) Median (Range)**	**μ**	**p**
Baseline	84.0(48.0 – 115.0)	96.0(62.0-123.0)	-.2.231	0.00*
2	87.0 (14.0- 118.0)	96. (68.0- 129.0)	-0.481	0.00*
5	90.0 (28.0-110.0)	95.0 (58.0-119.0)	-2.204	0.00*
8	89.0(6.0.0–118.0)	96.0(63.0 – 124.0)	-2.752	0.00*

Key
WHOQol-Bref- World Health Qualityof Life Questionnaire
CCWCP- Caregivers of Children with Cerebral Palsy
CG – Control Group
μ- Mann Whitney U test
p- p value
*- significant p value

Table 4.7 : Comparison of the General Health Status of Caregivers of Children with Cerebral Palsy with the Control Group over an Eight-month period using Mann Witney U test

Time(Months)	GHQ			
	CCWCP (n = 107) Median (Range)	CG (n = 98) Median(Range)	μ	p
Baseline	16.0 (4.0 - 48.0)	9.0 (1.0 – 22.0)	0.24	0.00*
2nd	9.0 (6.0-30.0)	9.0 (3.0-24.0)	-0.32	0.74*
5th	10.0 (5.0-32.0)	6.0 (2.0-22.0)	0.14	0.00*
8th	8.0 (3.0-21.0)	7.0 (2.0-23.0)	-0.85	0.30*

Key

GHQ- General Health Questionaire
CCWCP- Caregivers of Children with Cerebral Palsy
CG – Control Group
μ- Mann Whitney U test
p- p value
*-significant p value

Table 4.8: Correlation Between Gross Motor Function in Children With Cerebral Palsy, Quality of Life and General Health Status of their Caregivers using Spearman's Correlation(N = 107)

		WHOQoL Bref		GHQ	
		ρ	**p**	ρ	**p**
Time (Months)					
Baseline	GMFM	0.1	0.20	-0.2	0.10
2nd Month	GMFM	0.2	0.10	-0.2	0.10
5th Month	GMFM	0.3	0.00*	-0.1	0.30
8th Month	GMFM	0.4	0.00*	-0.2	0.30

Key
ρ- spearman's rho
GHQ- General Health Questionaire
WHOQoL Bref - World Health Quality of life Questionnaire Bref
GMFM- Gross Motor Function Measure
p- p value
***** -significant p value

Table 4.9: Comparison of Gross Motor Function in the Clinic and at the Homes of Children With Cerebral Palsy using Wilcoxon Sign Rank Test (N = 107)

Time(Month)	Total	Lying & Roll	Sit	Cr & Kn	Stand	Wlk & Run
Baseline						
Clinic	21.7	53.1	35.9	12.5	2.4	1.2
Home	22.7	56.1	36.8	12.8	2.4	1.5
z	5.10	3.83	3.21	2.81	0.21	0.42
p	0.00*	0.00*	0.00*	0.00*	0.83	0.67
2nd Month						
Clinic	21.5	53.7	35.9	12.2	3,7	2.0
Home	23.3	58.2	37.7	12.6	4.3	2.0
z	3.63	3.87	1.91	0.57	1.38	0.00
p	0.00*	0.00*	0.05	0.57	0.17	0.99
3rd Month						
Clinic	29.0	66.4	47.3	23.0	5.1	3.2
Home	31.4	70.4	49.8	25.0	6.4	4.0
z	4.80	3.06	2.74	2.95	2.44	1.82
p	0.00*	0.00*	0.01*	0.03*	0.01*	0.06
4th Month						
Clinic	33.2	67.7	52.0	26.5	10.9	6.9
Home	35.3	72.1	54.7	27.6	12.2	7.5
z	5.44	4.23	3.34	2.67	2.56	2.67
p	0.00*	0.00*	0.00*	0.01*	0.01*	0.01*

Key

Lying & Roll .- lying and Rolling
Stand - standing
Cr & Kn – Crawling and kneeling
Sit – sitting
Wlk & Run - walking and running
z - Wilcoxon Sign Rank test
* -significant p value

(p= 0.00). This pattern was also obtained for subdomains A, B and C and the differences were statistically significant. There were no significant differences between home and clinic measurements for sub-domains D and E (Table 4. 9).

4.2 Hypotheses Testing

Hypothesis 1

There would be no significant difference in the gross motor functional ability on the GMFM in children with cerebral palsy over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 2

There would be no significant difference in lying and rolling sub-domain score on the GMFM of children with cerebral palsy over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 3

There would be no significant difference in sitting sub-domain score on the GMFM of children with cerebral palsy over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 4

There would be no significant difference in crawling and kneeling rolling sub-domain score on the GMFM of children with cerebral palsy over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 5

There would be no significant difference in standing sub-domain score on the GMFM of children with cerebral palsy over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 6

There would be no significant difference in walking running and jumping sub-domain score on the GMFM of children with cerebral palsy over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 7

There would be no significant relationship between the gross motor functional ability score and degree of spasticity in children with cerebral palsy over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 8

There would be no significant relationship between the total GMFM score and selective motor activity in children with cerebral palsy over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 9

There would be no significant difference between the quality of life of the caregivers of children with cerebral palsy over an 8- month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 10

There would be no significant difference between the general health status of the caregivers of children with cerebral palsy over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 11

There would be no significant difference between the general health status of the caregivers of children with cerebral palsy and the control group over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 12

There would be no significant difference between the quality of life of the caregivers of children with cerebral palsy and the control group over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 13

There would be no significant correlation between gross motor function development in children with cerebral palsy measured on the GMFM and the general health status of their caregivers over an 8-month period

Level of significance	P value			
	Baseline	2nd month	5th month	8th Month
> 0.05	0.10	0.10	0.30	0.30

Since the p value was greater than 0.05, the hypothesis is hereby **Failed to be Rejected**

Hypothesis 14

There would be no significant relationship between gross motor function development in children with cerebral palsy measured on the GMFM and the quality of life of their caregivers over an 8-month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 15

There would be no significant difference between the gross motor function in children with cerebral palsy assessed in different environmental sittings (such as hospital/clinic and home) over an 8- month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 16

There would be no significant difference between the lying and rolling score on the GMFM in children with cerebral palsy assessed in different environmental settings (i.e hospital/clinic and home) over an 8- month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 17

There would be no significant difference between the sitting score on the GMFM in children with cerebral palsy assessed in different environmental settings (i.e. hospital/clinic and home) over an 8- month period

Level of significance	P value
> 0.05	0.00

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 18

There would be no significant difference between the crawling and kneeling score on the GMFM in children with cerebral palsy assessed in different environmental settings (clinic and home) over an 8- month period

Level of significance	P value
> 0.05	0.01

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 19

There would be no significant difference between the standing score on the GMFM in children with cerebral palsy assessed in different environmental settings ((clinic and home) over an 8- month period

Level of significance	P value
> 0.05	0.01

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

Hypothesis 20

There would be no significant difference between the walking, jumping and running sub-domain score on the GMFM in children with cerebral palsy assessed in different environmental settings (clinic and home) over an 8- month period.

Level of significance	P value
> 0.05	0.01

Since the p value is less than 0.05, the hypothesis is hereby **Failed to be Accepted**

4.3 Discussion

4.3.1: Physical Characteristics of Participants

Results showed that majority of the children with cerebral palsy were males. Genetics particularly the male gender is known to be one of the risk factors associated with cerebral palsy (Badawi et al, 1998; Hagberg et al, 2001). Several studies on the prevalence of CP obtained similar results where they found more males than females having cerebral palsy (Blair and Stanley, 1997; Hagberg et al, 2001; Wammanda, 2007). The distribution of the GMFCS revealed that majority were in stage IV (33. %) and V (45.7%) of the GMFCS which means that most of the patients who presented at the clinic were those

severely affected. Mothers constituted the largest percentage of caregivers thus suggesting that the role of caregiving especially for children with disability in the setting where the study was conducted was majorly carried out by women. This observation is in consonance with that of Hamzat and Mordi (2007) when they found that female caregivers for children with cerebral palsy were more common than the male caregivers.

4.3.2 Comparison of Gross Motor Function in Children with Cerebral Palsy over an 8- month Period

Results showed that there was a steady significant increase in the total GMFM and each of the subdomain scores over the 8 month period. Significant difference was particularly observed between baseline and 1st; 3rd and 4th; 5th and 6th; and 7th and 8th months. This significant increase indicates significant improvement in motor function of the children and a pattern of motor development. The increase in motor function may be accounted for by regular conventional physiotherapy intervention that the children were being exposed to as all the children who eventually completed the study were regularly attending the physiotherapy clinics. In addition more than half (56%) of the subjects involved were aged below 2 years. Improvement in gross motor function is said to occur faster with early presentation for intervention (Dimitrijević and Jakubi, 2005; Blauw-Hospers and Hadders-Algra, 2005; Gagliardi et al, 2008). Considering that majority of these children with CP reported within their first two years of life in this study, the improvement in motor function suggesting motor development may be accounted for in part by the observation that improvement in gross motor function occur faster with early presentation for intervention (Dimitrijević and Jakubi, 2005; Blauw-Hospers and Hadders-

Algra, 2005; Gagliardi et al, 2008). This is also corroborated by the observation in this study where children aged two years and below showed better improvement in GMFM scores compared to older children.

4.3.3 Relationship between Gross Motor Function and Selected Measures of Impairments (Spasticity and Selective Motor Control) over an 8-month period

There was a negative but statistically significant correlation between the GMFM scores and spasticity score over the 8-month period indicating an inverse relationship. A reduction in spasticity score was associated with an improvement in GMFM score over time in this study. This means that as the muscles of the children became less spastic, their gross motor function improved. Likewise a significant positive association was obtained for overall GMFM score and SMC score which means with an improvement in selective motor control, a corresponding improvement was also obtained in gross motor function. This trend of result suggests that reducing spasticity and improving selective motor control in a child with CP may be beneficial in the attainment of gross motor skills. This trend is in line with the multivariate model of determinants of motor change for children with CP by Bartlett and Palisano introduced in 2000 based on literature and expert opinion. In this model possible determinants of motor change include secondary impairments, personal and contextual factors (family ecology) and interventions. Clinical observations by physiotherapists while managing patients with cerebral palsy also revealed that children with very spastic muscles and poor selective motor control usually have poor motor function abilities compared to others as was also observed in this study.

The pattern of relationship between gross motor function and spasticity observed in this study is in consonance with those of earlier studies where they found a modest relationship between spasticity (ICF body function level) and capabilities/performance (ICF activities and participation level) (Abel et al, 2003; Ostensjo et al 2003; Ross and Engsberg, 2007; Wright et al, 2008). Gorter et al, (2009) also found a negative but significant correlation when they compared the gross motor function of children with cerebral palsy with their level of spasticity.

Spasticity was originally defined by Lance (1980) as a motor disorder characterized by a velocity dependent increase in tonic stretch reflexes (muscle tone) with exaggerated tendon jerks, resulting from hyper excitability of the stretch reflex, as one component of the upper motor neuron syndrome. Becher et al (1998) stated that when a non-contracting (resting) muscle is stretched in a child with CP, the force opposing the movement is due to tension originating through the passive mechanical properties of the muscle, as well as any abnormal muscle activation evoked in spastic muscle. According to Scholtes et al (2006), the functional abilities of the child with spastic paresis often deteriorate during development and it is generally postulated that spasticity, a prominent symptom in spastic paresis, is related to this decline. Booth et al(2001) also found an accumulation of type I collagen in the endomysium of the vastus lateralis muscle obtained from children with spastic CP and suggested that this increase in hydroxyproline concentration in spastic muscles may affect the muscle's mechanical properties, contributing either directly or indirectly to the formation of contractures and thus affecting motor function.

4.3.4 Comparison of Quality of Life and General Health Status of the Caregivers of Children with Cerebral Palsy over an eight- month Period.

The WHOQoL-Bref score in caregivers of children with cerebral palsy increased significantly over the eight months period. In the interpretation of WHOQoL Bref instrument, a higher score represents better quality of life. The improvement in quality of life over observed among the caregivers of children with CP over the study period might be accounted for by several factors. These include possibility of better understanding of the child's condition as time passed, acceptance of, and adjustment to the child's condition by the caregiver. In addition possible improvement in the clinical status of the child as obtained from this study might also account for this trend.

A similar trend was noticed in the General Health Status of the caregivers of children with CP where an improvement was recorded in the study over time. This improvement might also be accounted for by the same reasons as that of quality of life. The general health of caregiver improved, possibly because the child's condition also improved.

4.3.5 Comparison of the Quality of Life and General Health Status of Caregivers of Children with Cerebral Palsy and the Control Group.

At baseline, the WHOQoL-Bref score was higher among the control group compared to caregivers of children with cerebral palsy. Higher WHOQoL score represents better quality of life. The result trend observed in this study implied that the quality of life of caregivers of children who did not have CP was better than that of caregivers of children with CP. Caring for a child with cerebral palsy who presents with various motor, sensory

and cognitive disabilities might be responsible for the lower quality of life of caregivers of children with CP compared to the control counterparts. Children with cerebral palsy require special care from their caregivers which differs from what normally developing children require. Component of this care might include some or all of personal care and grooming, feeding, taking the children to physiotherapy clinics and other relevant outpatient clinics, setting time aside to carry out prescribed home programmes.. These activities could constitute a burden especially if continued on a long-term basis as seen in cases of caring for children with CP, therefore resulting in a negative impact on the quality of life of the caregivers.

The caregivers of children with cerebral palsy recorded significantly higher GHQ score at the baseline, 2nd and 8th months when compared with the control group where the higher GHQ score indicates lower general health status. The GHQ was used to assess the general health status of the caregivers in this study. As noted in this study, majority of the children involved were spastic. Caring for a child with spasticity might have proven demanding on the physical health of the caregivers thereby impacting negatively on their health. A child with spasticity will require continuous passive mobilization and stretching exercises as home programme which oftentimes is the responsibility of the primary caregivers of the children.

In addition, 48.1% of the children with cerebral palsy were the first born children of their parents. This means that the primary caregivers especially the mothers had no prior experience on raising a child of their own. Starting out a family with a child with disabilities such as seen in children with cerebral palsy might have proven daunting for the

inexperienced caregivers especially the mothers thereby impacting negatively on both their quality of life and general health.

Previous cross sectional studies conducted by Brehaut et al (2004), Raina et al (2005), Hamzat and Mordi (2007), Allik et al (2006), Roach et al (1999), and Chiou et al (2005) which looked into general health status of caregivers of children with childhood disabilities concluded that caring for a child with chronic disability is detrimental to general health of the carers. This present study also corroborates earlier findings.

Raina et al (2005) stated that although care giving is a normal part of being the parent of a young child, this role takes on an entirely different significance when a child experiences functional limitations and possible long-term dependence. One of the main challenges for parents of a child with chronic health problem is how to manage their child's health problems effectively and juggle this role with their own requirements of everyday living. Consequently, the task of caring for a child with complex disabilities such as cerebral palsy might be daunting for the caregivers and thus prove detrimental to both the physical health and the psychological well-being of the parents.

In an African setting where the study was carried out, people live a communal life where the opinions, believes, attitudes, and reactions of the neighbours count and might have a negative effect on the psychology of the caregiver. Stigmatization is also a likely occurrence when one has to care for a child with disability where the caregiver feels that she and the child are unaccepted or different from every other person in the community thus this might also have a detrimental effect on the mental health of the care givers.

4.3.6 The Relationship between Gross Motor Function in Children with Cerebral Palsy, the General Health Status and Quality of Life of their Caregivers over an Eight-month Period

Results showed that there was a negative correlation between the GMFM score and the GHQ score in the study. The GHQ was used to measure the general health status of caregivers while the GMFM was used to assess gross motor function in children with cerebral palsy. The lower the score on the GHQ, the better the general health status. A parent or caregiver of a child with disability is likely to feel relieved and happy when he/she notices even the slightest change / improvement in the condition of the child thus accounting for the kind of association resulting in the study.

At baseline there was a positive though non-significant correlation between the GMFM score and the WHOQoL Bref score. However at the 5th and the 8th month, the correlation became significant. The strength of the correlation between GMFM scores and WHOQoL increased over the eight months period which means an improvement in the motor development corresponded with an improvement in the quality of life of caregivers. A strong concurrent improvement in gross motor function in children with cerebral palsy and quality of life of their caregivers was obtained from the 5th month of the study. An improvement in the child's motor condition is likely to translate to reduced hospital appointments, less physical stress on the caregiver, and general feeling of relief for the carers thus resulting in improvement in their quality of life. This might have accounted for the significant positive association between quality of life of the caregivers and motor function in children with cerebral palsy.

4.3.7 Comparison of the gross motor function in children with cerebral palsy assessed at the clinic and at home over an eight-month period

At baseline and throughout the duration of the study, the overall GMFM scores measured at home were significantly higher than those measured in the clinic. This result was also obtained for each of the 'lying and rolling', 'sitting', 'crawling and kneeling' subdomains on the GMFM. The present study compared the gross motor function performance of the children as measured in the clinic and at home over an-eight month period. Overall, the study found GMFM scores in the clinic to be significantly lower than those taken at home throughout the eight month period. This result suggests that the children performed gross motor function abilities better in their homes than in the clinic. In addition in each sub domain such as 'Lying and Rolling', 'Sitting', 'Crawling and Kneeling,' children who performed an activity did significantly better in it at home than in the clinic. This difference could be accounted for by the difference in the physical, temporal, and social features of the home and the clinic. A child is likely to be more relaxed and familiar with the home environment compared to a formal setting such as obtains in the clinic. In addition the presence and encouragement of other siblings and carers resulted in the child attempting to perform more activities and even do better at those activities at home when compared with the clinic as observed by the researcher in this study.

Various authors (Palisano et al, 2003; Ostensjo et al, 2003; Tieman et al, 2004; Tieman et al, 2004b) had evaluated the possible influence of various environmental settings on motor function. These authors concluded that a child needs to be seen as part of an environment and that they tend to carry out functional activities better at home and

therefore recommended that assessment of the child's function should take into consideration the environment in which the function is being carried out when assessing and planning treatment for a child with cerebral palsy. The result of this study also suggests that the environment where motor function is carried out and assessed might possibly have an influence on motor performance.

Disability, as experienced by children with cerebral palsy therefore, needs to be conceptualized as a mismatch between the person and environment rather than be viewed entirely as a problem with the individual (Fougeyrolias et al, 1998; Law et al, 1999). The construct of person includes the individual's capability and personal factors. This implies that performance of motor activity may be influenced by the capability of the children in all developmental domains (e.g. gross motor, fine motor, cognition, and vision) as well as personal factors (e.g. age, personality, preferences and lifestyle) (Tieman et al, 2003). The 'environment' includes the concepts of setting and context. For children, everyday settings include the home, school, and outdoor/community while context refers to the physical, temporal, and social features of a particular setting (Tieman et al, 2003). The interaction of the person and the environment leads to the performance of gross motor activities which is needed in many activities of daily living as well as participation in the society.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Cerebral palsy (CP) is a group of disorders of development of movement and posture causing activity limitations attributable to non-progressive disturbances that occur in the developing foetal brain. This neuropaediatric condition results in abnormal motor development requiring intervention from rehabilitation professionals such as physiotherapist and also peculiar care from their caregivers. Traditionally, physiotherapy assessment and intervention for children with cerebral palsy is commonly carried out within the hospital or clinic setting, although the daily lives of children with CP include a variety of environmental setting rather than just the clinical setting. Current trend in rehabilitation further suggests that children's motor behaviours in an isolated hospital/therapy setting might not suffice as the predictor of their functional abilities in real life environment or that performance in a therapeutic setting would transfer to tasks that the child needs to perform at home. This necessitated this study. This study was carried out to investigate the likely influence of the environment on performance of gross motor function in children with cerebral palsy. In addition, caring for children with CP may affect the quality of life and/or impact on the health status of their caregivers. This study was also designed to evaluate an eight-month inter- relationship among motor development of Children With Cerebral Palsy (CWCP), impact of caring on the Quality of Life (QoL) and General Health Status (GHS) of caregivers of CWCP.

The general estimated prevalence of cerebral palsy is 2 to 2.5 cases per 1000 live births in the Western countries such as United States and Europe (Rosenbaum, 2003;

Majnermer and Mazer, 2004,). Cerebral Palsy has also been reported to be the commonest condition managed at neuro-peadiatric clinics in various parts of Nigeria (Izuora and Ileoje, 1989; Nottidge and Okogbo, 1991; Wammanda et al, 2007; Peters et al, 2008; Ogunlesi et al, 2008). Management of the condition when commenced early with prompt assessment, diagnosis, and treatment is reported to yield quicker and better results as the baby would not have started showing much abnormality (Dimitrijević and Jakubi, 2005). The general goals of managing cerebral palsy will then be to use appropriate combinations of interventions, including development, physical, medical, surgical, chemical and technical modalities to promote function, prevent secondary impairment and above all increase a child's developmental capabilities in order to promote his or her participation in the environment. Methods used by physiotherapists in achieving these goals include neurodevelopmental technique, neuromuscular electrical stimulation, sensory integration, body weight support treadmill training, patterning, conductive education; constraints induced therapy, hyperbaric oxygen therapy, exercise therapy, the Vojta method etc (Patel, 2005).

Three groups of participants took part in this longitudinal study. They comprised consecutively recruited 107 CWCP, 107 Caregivers of CWCP (CCWCP) and purposively sampled 98 caregivers of normally developing children who constituted Control Group (CG). However 67 (62.6%) participants in each of the CWCP, CCWCP, and 87(88.8) in the CG completed the study. The baseline Gross Motor Function of the CWCP was assessed in the clinic and their respective homes using the Gross Motor Function Measure (GMFM) and repeated monthly for eight consecutive months to see the influence of environment on their motor function performance. The CWCP received routine

physiotherapy while the study lasted. Selective Motor Control (SMC) and spasticity in the CWCP, Quality of Life (QoL) and General Health Status (GHS) of the CCWCP and CG participants were also assessed at baseline and for eight consecutive months using the Boyd and Graham Selective Motor Control Scale, Modified Tardieu scale, World Health Organization Quality of Life Questionnaire (WHOQoL) and General Health Questionnaire (GHQ) respectively. Data were analyzed using descriptive statistics, Wilcoxon Signed Rank, Friedman's Anova, Spearman's Correlation and Mann-Whitney U at $p = 0.05$.

The results obtained from this study showed that at baseline, the caregivers of children with cerebral palsy lower WHOQoL score (84.0 range 48- 115) than the control group (96.0 range 62-123) and also a higher GHQ score (16.0 range 4.0-44.0) than the control group (9.0 range 1.0-22.0) indicating lower quality of life and general health status. At the 8th month of the study, the control group had higher QOL scores (96.0 range 63.0-124.0 vs 89.0 range 60.0-118). The baseline GMFM score was higher at home (15.7 range 0 - 71.9) than in the clinic (13.6 range 0- 71.9). Similar trend was observed at the 8th month (28.9 range 0-100.0 vs 25.8 range 0 - 100.0). The GMFM score increased significantly across the 8 months with significant difference between baseline and Ist month, 3rd and 4th, 5th and 6th, and between7th and 8th month. A significant positive correlation was obtained between the GMFM and WHOQoL in the 5th($r = 0.3$), 7th ($r = 0.4$) and 8th month ($r = 0.4$). A significant positive correlation (r = between 0.4 and 0.5) between the GMFM and SMC from the 1st month through to the 8th month was also obtained.

5.2 Conclusions

Based on the findings of this study, it was concluded that:

1 Quality of life was lower among caregivers of children with cerebral palsy than their counterparts caring for normally developing children.

2 The general health status of caregivers of children with cerebral palsy was poorer than that of caregivers of normally developing children

3 Children with cerebral palsy generally demonstrated better performance in motor function at home when compared to the clinic.

5.3 Recommendations

The following recommendations were made based on the outcome of this study:

1 Caregivers of children with cerebral palsy should be appropriately counseled by health care providers on issues pertaining to their quality of life and general health status as they carry out their role of care giving. In addition measures should be put in place to ensure support for caregivers of children with cerebral palsy

2 Welfare and support groups for caregivers of children with cerebral palsy should be included in the health policies of the nation in order to relieve the burden of care on the caregivers which if done could lead to an improvement in their quality of life and health status.

3 Since children performed better in their homes than in the clinic, itinerant physiotherapy services and community based rehabilitation facilities should be provided for in health policies as a major part of care for children with cerebral palsy.

4 In addition, the home environment should be simulated as much as possible during management of children with cerebral palsy in order to achieve better treatment outcome.

5 Further studies exploring the interrelationship among development of motor function, cognitive function, and sensory function in children with cerebral palsy, general health status and quality of life of their caregivers should be conducted.

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Appendix i

Data Collection Form

Hospital No	Sex	Age	Position of Child	Educational Status of Caregivers	Distribution Tone	Topography

Appendix ii

Gross Motor Function Classification System (GMFCS)

Before 2nd Birthday

Level I Infants move in and out of floor sitting and floor sit with both hands free to manipulate objects. Infants crawl on hand and knees, pull to stand and take steps holding on to furniture. Infant walk between 18 months and 2 years of age without the need foe any assistive mobility device.

Level II Infants maintain floor sitting but may need to use their hands for support to maintain balance. Infants creep on their stomach or crawl on hands and knees. Infant may pull to stand and take steps holding on to furniture.

Level III Infants maintain floor sitting when the low back is supported. Infants roll and creep forward on their stomachs.

Level IV Infants have head control but trunk support is required for floor sitting. Infant can roll to supine and may roll to prone.

Level V Physical impairment limits voluntary control of movements. Infants are unable to maintain antigravity head and trunk postures in prone and sitting. Infant require adult assistance to roll.

Between 2nd and 4th Birthday

Level I Children floor sit with both hands free to manipulate object. Movements in and out of floor sitting and standing are performed without adult assistance. Children walk with as the preferred method of mobility without the need for any assistive mobility device.

Level II Children floor sit but may have difficulty with balance when both hands are free to manipulate object. Movements in and out of sitting are performed without adult assistance. Children pull to stand on stable surface. Children crawl on hands and knees with a reciprocal patter, cruise holding on to furniture and walk using an assistive device as preferred method of mobility.

Level III Children maintain floor sitting often by W- sitting (sitting between flexed and internally rotated hips and knees) and may require adult assistance to assume sitting. Children creep on their stomach or crawl on hands and knees (often without reciprocal leg movement) as their primary method of self mobility. Children may pull to stand on a stable surface and cruise short distances.

Level IV Children floor sits when placed, but are unable to maintain alignment and balance without use of their hand for support. Children usually require adaptive equipment for sitting and standing. Self Mobility for short distances (within a room) is achieved through rolling, creeping on stomach or crawling on hands and knees without reciprocal leg movement

Level V Physical impairment restricts voluntary control of movements and the ability to maintain antigravity head and trunk postures. All areas of motor functions are limited. Functional limitation in sitting and standing are not fully compensated for through the use of assistive equipment and assistive technology. At Level V, children have no means of independent mobility and are transported. Some children achieve self mobility using a power wheel chair with extensive adaptations.

Between 4th and 6th Birthday

Level I Children get into and out of, and sit in, a chair without the need for hand support. Children move from the floor and from the chair sitting to standing without the need of objects for support. Children walk indoors and outdoors and indoors and climb chairs. Emerging ability to run and jump.

Level II Children floor sit with both hands free to manipulate objects. Children move from the floor and from chair sitting to standing but often require a stable surface to push or pull up on with their arm. Children walk without the need for any assistive mobility device indoors and for short distances on level surface outdoors. Children climb stairs holding unto a railing but are unable to run and jump.

Level III Children sit on a regular chair but may require pelvic or trunk support to maximize hand function. Children move in and out of chair sitting to standing but often require a stable surface to push or pull up on with their arm. Children walk with the need for any assistive mobility device on a level surface and climb stairs with assistance from an adult. Children often are transported when travelling foe long distances or outdoors on uneven terrain.

Level IV Children sit on a chair but need adaptive seating for trunk control and to maximize hand function. Children move in and out of chair sitting with assistance from an adult or a stable surface to push or pull up on with their arms. Children may at best walk short distances with a walker and adult supervision but have difficulty turning and maintaining balance on uneven surface. Children are

transported within the community. Children may achieve self mobility using a power wheel chair.

Level V Physical impairment restricts voluntary control of movements and the ability to maintain antigravity head and trunk postures. All areas of motor functions are limited. Functional limitation in sitting and standing are not fully compensated for through the use of assistive equipment and assistive technology. At Level V, children have no means of independent mobility and are transported. Some children achieve self mobility using a power wheel chair with extensive adaptations.

Between 6th and 12th Birthday

Level I Children walk indoors and outdoors, and climb stairs without limitations. Children perform gross motor skills including running and jumping but speed and balance, and coordination are reduced.

Level II Children walk indoors and outdoors and climb stairs holding unto a railing but experience limitation walking on uneven surface and inclines, and walking in crowds or confined spaces. Children have at best only minimal ability to perform gross motor skills such as running and jumping.

Level III Children walk indoors or outdoors on a level surface with an assistive mobility device. Children may climb stairs holding unto a railing. Depending on upper limb function, children propel wheelchair manually or are transported when travelling foe long distances or outdoors on uneven terrain.

Level IV Children may maintain levels of function achieved before age 6or rely more on wheeled mobility at home school and in the community. Children may achieve self mobility using a power wheel chair.

Level V Physical impairment restricts voluntary control of movements and the ability to maintain antigravity head and trunk postures. All areas of motor functions are limited. Functional limitation in sitting and standing are not fully compensated for through the use of assistive equipment and assistive technology. At Level V, children have no means of independent mobility and are transported. Some children achieve self mobility using a power wheel chair with extensive adaptations.

Appendix iii

GROSS MOTOR FUNCTION MEASURE (GMFM)

GROSS MOTOR FUNCTION MEASURE (GMFM)

Scoring Key

0 = Does not initiate

1= Initiates

3= Partially Completes

4= Completes

Dimensions	**Calculation**
Lying and Rolling	Total Dimension A ÷ 51 ×100 = ? %
Sitting	Total Dimension B ÷ 60×100 = ? %
Crawling and Kneeling	Total Dimension C ÷ 42×100 = ? %
Standing	Total Dimension D ÷ 39×100 = ? %
Walking, Running & Jumping	Total Dimension E ÷ 72×100 = ? %

Total Score =A%+B%+C%+D%+E% ÷ 5 =?%

ITEM A: LYING AND ROLLING **SCORE**

1. Sup, Head in Midline: Turns head with extremities symmetrical……...0 1 2 3
2. Sup, Brings Hands to midline, fingers one with the other……. 0 1 2 3
3. Sup, lifts Head 45˚……..0 1 2 3
4. Sup, flexes R hip and knee through full range…….0 1 2 3
5. Sup, flexes L hip and knee through full range…….0 1 2 3

6. Sup, reaches out with R arm, hand crosses midline towards a toy……0 1 2 3

7. Sup, reaches out with L arm, hand crosses midline towards a toy……..0 1 2 3

8. Sup, Rolls to Pr over R side…….0 1 2 3

9. Sup, Rolls to Pr over L side…….0 1 2 3

10. Pr, Lifts head upright……...0 1 2 3

11. Pr on Forearms, Lifts head upright, elbows ext, chest raised……..0 1 2 3

12. Pr on Forearms, weight on R forearms, fully extends
    opposite arm forward……..0 1 2 3

13. Pr on Forearms, weight on L forearms, fully extends
    opposite arm forward……..0 1 2 3

14. Pr, rolls to sup over R side…….. 0 1 2 3

15. Pr, rolls to sup over L side…….. 0 1 2 3

16. Pr, pivots to R 90˚ using extremities…… ……...0 1 2 3

17. Pr, pivots to L 90˚using extremities……0 1 2 3

Total Dimension A_____

ITEM	B. SITING	SCORE

18 Sup, Heads grasped by the examiner; pulls self to sitting
with head control ……0 1 2 3

19 Sup, rolls to R side attains sitting……..0 1 2 3

20 Sup, rolls to L side attains sitting……..0 1 2 3

21 Sit on mat, supported at thorax by therapist, lifts head upright
Maintains 3 secs……...0 1 2 3

22 Sit on mat, supported at thorax by therapist, lifts head upright

Maintains 10 secs……....0 1 2 3

23 Sit on mat, arms popping, maintains 5 seconds……..0 1 2 3

24 Sit on mat, maintains arms free for 3 seconds……..……..0 1 2 3

25 Sit on mat with toy in front, leans forward touches toy and re erects without arms popping……0 1 2 3

26 Sit on mat, touches toy placed 45˚ behind child's R side, returns to start.....0 1 2 3

27 Sit on mat, touches toy placed 45˚ behind child's L side, returns to start.....0 1 2 3

28 R side sit, maintains arms free % seconds……...0 1 2 3

29 L side sit, maintains arms free % seconds……...0 1 2 3

30 Sit on mat, lowers to prone with control……...0 1 2 3

31 Sit on mat with feet in front attains 4 point over R side……0 1 2 3

32 Sit on mat with feet in front attains 4 point over L side……0 1 2 3

33 Sit on mat, pivots 90˚, without arms assisting……0 1 2 3

34 Sit on bench, maintains arms free and feet free, 10 seconds…….0 1 2 3

35 Std, attains sitting on small bench……...0 1 2 3

36 On the floor, attains to sit on small bench……...0 1 2 3

37 On the floor, attains to sit on small bench……...0 1 2 3

TOTAL DIMENSION B _____

ITEM C: CRAWLING AND KNEELING SCORE

38 Pr, Creeps forward 1.8m (6 inches)……...0 1 2 3

39 4 point, maintains weight on hands and knees, 10 seconds…….0 1 2 3

40 4 point, attains sitting arms free……...0 1 2 3

41 Pr, attains 4 point, weight on hands and knees……0 1 2 3

42 4 point, reaches forward with R arm, hand above shoulder level……0 1 2 3

43 4 point, reaches forward with L arm, hand above shoulder level……0 1 2 3

44 4 point, crawls or hitches forward, 1.8 m (6 inches)……0 1 2 3

45 4 point, crawls reciprocally forward, 1.8 m (6 inches)……0 1 2 3

46 4 point, crawls up 4 steps on hands and knee/ feet……0 1 2 3

47 4 point, crawls backwards down 4 steps on hands and knees/feet……0 1 2 3

48 Sit on mat, attains high kneeling using arms, maintain arms free 10 second…… 0 1 2 3

49 High kneeling, attains half kneeling on R knee using arms, maintains arms free, 10 seconds……0 1 2 3

50 High kneeling, attains half kneeling on L knee using arms, maintains arms free, 10 seconds……0 1 2 3

51 High kneeling, knee walks forward 10 steps arms free……0 1 2 3

TOTAL DIMENSION C_____

ITEM D: STANDING SCORE

52 On the floor, pulls to std at large bench……0 1 2 3

53 Std, maintains arms free, 3 seconds……...0 1 2 3

54 Std, holding unto large bench with one hand, lifts R foot, 3 seconds……0 1 2 3

55 Std, holding unto large bench with one hand, lifts L foot, 3 seconds……0 1 2 3

56 Std, maintaind arms free 20 seconds……..0 1 2 3

57 Std, lifts L foot, arms free, 10 seconds……...0 1 2 3

58 Std, lifts R foot, arms free, 10 seconds……..0 1 2 3

59 Sit on small bench, attains standing without using arms…….0 1 2 3

60 High Kn, attains std through half kn on R knee, without using arms…….0 1 2 3

61 High Kn, attains std through half kn on R knee, without using arms…….0 1 2 3

62 Std, lowers to sit on floor with control, arms free……..0 1 2 3

63 Std, attains squat, arms free……0 1 2 3

64 Std, picks up object from floor, arms free, returns to stand……..0 1 2 3

TOTAL DIMENSION D _____

ITEM E WALKING, RUNNING, & JUMPING SCORE

65 Std, 2 hands on large bench, cruises 5 steps to the R……0 1 2 3

66 Std, 2 hands on large bench, cruises 5 steps to the L……..0 1 2 3

67 Std, 2 hands held, walks forward 10 steps……0 1 2 3

68 Std, 1 hand held, walks forward 10 steps……..0 1 2 3

69 Std, walks forward 10 steps……..0 1 2 3

70 Std, walks forward 10 steps, turns 180˚ returns……..0 1 2 3

71 Std, walks backwards 10 steps……....0 1 2 3

72 Std, walks forward 10 steps, carrying a large object with 2 hands……....0 1 2 3

73 Std, walks forward 10 consecutive steps between parallel lines 20cm(8 inches) apart……..0 1 2 3

74 Std, walks forward 10 consecutive steps between parallel lines 2cm(3/4 inches) apart……..0 1 2 3

75 Std, steps over stick at knee level, R foot leading……0 1 2 3

76 Std, steps over stick at knee level, R foot leading……0 1 2 3

77 Std, runs 4.5m(15inches) stops and returns……..……0 1 2 3

78 Std, kicks ball with R foot……..0 1 2 3

79 Std, kicks ball with R foot……0 1 2 3

80 Std, jumps 30 cm(12 inches) high, both feet simultaneously……0 1 2 3

81 Std, jumps forward 30 cm(12 inches) high, both feet simultaneously…..…0 1 2 3

82 Std on R foot, hops on R foot 10 times within a 60 cm(24inches) circle....0 1 2 3

83 Std on L foot, hops on L foot 10 times within a 60 cm(24inches) circle....0 1 2 3

84 Std, holding 1 rail, walks up 4 steps, holding 1 rail, alternating feet……0 1 2 3

85 Std, holding 1 rail, walks down 4 steps, holding 1 rail, alternating feet.….0 1 2 3

86 Std, , walks up 4 steps, alternating feet……0 1 2 3

87 Std, walks down 4 steps, alternating feet……0 1 2 3

88 Std on 15cm (6 inches) step, jumps off, both feet simultaneously……...0 1 2 3

TOTAL DIMENSION E _____

Appendix iv
The General Health Questionnaire

Have you recently:

1. been able to concentrate on what you are doing?

(0)Better than usual (1) Same as usual (2) less than usual (3) much less than usual

2. lost much sleep over worry

(0) Not at all (1) not more than usual (2) less so than usual (3) much more than usual

3. felt that you are playing a useful part in things?

(0) more so than usual (1) same as usual (2) less so than usual (3) much less than usual

4 felt capable of making decisions about things

(0) more so than usual (1) same as usual (2) less so than usual (3) much less than usual

5 felt constantly under strain

(0) Not at all (1) not more than usual (2) less so than usual (3) much more than usual

6 felt you couldn't overcome your difficulties

(0) Not at all (1) not more than usual (2) less so than usual (3) much more than usual

7 been able to enjoy your normal day to day activities

(0) more so than usual (1) same as usual (2) less so than usual (3)much less than usual

8 been able to face up to your problems

(0) more so than usual (1) same as usual (2) less so than usual (3)much less than usual

9 been feeling unhappy or depressed

(0) Not at all (1) not more than usua l (2) less so than usual (3) much more than usual

10 been losing confidence in yourself?

(0) Not at all (1) not more than usual (2) less so than usual (3) much more than usual

11 been thinking of yourself as a worthless person

(0) Not at all (1) not more than usual (2) less so than usual (3) much more than usual

12 been feeling reasonably happy, all things considered?

(0) more so than usual (1) same as usual (2) less so than usual (3)much less than usual

Appendix v
Ibeere Nipa Ilera lapapo

Nje lenu loolo yii e

1 Le pokan po lori ohun ti e nse?

(1)Dara ju bo se mari n ri (1) Bakan naa (2) Dinku si ti tele (3) Dinku jojo si nti tele

2 Maa padanu oorun nitori ironu

(1)Rara (2) Ko ju bo se ri tele (2) Poju bo se ri (3) Po pupo ju bo se ri tele

3 Ro wipe ipa to wulo le n ko ninu ohun gbogbo

(0) Po ju bo se man ri (1) ko yato (2) Dinku si bose man ri (3) Dinku jojo sibo se man ri

4 Ro wipe e le da awon ipinun kan se lori awon nkan

(1) Po ju bo se man ri (1) ko yato (2) Dinku si bose man ri (3) Dinku jojo sibo se man ri

5 Ro wi pe gbogbo igba le n wa nini wahala

(1) Rara (2) ko po ju bo se maa ri (3) po ju bo se maa n ri (3) po pupo ju bo se man ri lo

6 Ro wipe e ko le bori isoro yin gbogbo?

(1) Rara (2) ko po ju bo se maa ri (3) po ju bo se maa n ri (3) po pupo ju bo se man ri lo

(0)Poju bo se man ri (1)ko yato (2) Dinku si bose man ri (3) Dinku jojo sibo se man ri

8. le ko ju awo isoro ti yin gangan

(0)Poju bo se man ri (1)ko yato (2) Dinku si bose man ri (3) Dinku jojo sibo se man ri

9 maa ri wipe inu yin ko dun tabi o su yin

(1) Rara (2) ko yato sib o se wa tele (3) po ju bose wa tele lo(4) po pupo ju bose wa tele lo

10, maa ro wipe oro ara yin gan ko ye ara yin mo

(0)Poju bo se man ri (1)ko yato (2) Dinku si bose man ri (3) Dinku jojo sibo se man ri

11 maa ro wipe e ko ulo rara

(0) Rara (1) ko yato sib o se wa tele (2) po ju bose wa tele lo(3) po pupo ju bose wa tele lo

12 Ro wipe inu yin dun be se to pelu bi gbogbo nkan se ri yii?

(0)Poju bo se man ri (1)ko yato (2) Dinku si bose man ri (3) Dinku jojo sibo se man ri

Appendix vi

WHOQOL – BREF

The following questions ask who you feel about your quality of life, health or other areas of your life. I will read out each question to you along with the response options. **Please choose the answer that appears most appropriate.** If you are unsure about which response to give to a question, the first response you think of is often the best one.

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life **in the last four weeks.**

1 How would you rate your quality of life?

1) Very poor 2) Poor 3) Neither poor nor good 4) Good 5) Very good

2 How satisfied are you with your health?

1) Very dissatisfied 2) Dissatisfied 3) Neither satisfied nor dissatisfied 4) Satisfied 5) Very satisfied

3 To what extent do you feel that your physical pain prevents you from doing what you need to do?

1) Not at all 2) A little 3) A moderate amount 4) Very much 5) An extreme amount

4 How much do you need any medical treatment to function in your daily life?

1) Not at all 2) A little 3) A moderate amount 4) Very much 5) An extreme amount

5 How much do you enjoy life?

1) Not at all 2) A little 3) A moderate amount 4)Very much 5) An extreme amount

6 What extent do you feel your life to be meaningful?

1) Not at all 2) A little 3) A moderate amount 4) Very much 5)An extreme amount

7 How healthy is your physical environment?

1) Not at all 2) A little 3) A moderate amount 4) Very much 5) Extremely

8 How well are you able to concentrate?

1) Not at all 2) A little 3)A moderate amount 4) Very much 5) Extremely

9 How safe do you feel in your daily life?

1) Not at all 2) A little 3)A moderate amount 4) Very much 5) Extremely

10 Do you have enough energy for everyday life?

1) Not at all 2) A little 3) Moderately 4) Mostly 5) Completely

11 Are you able to accept your bodily appearance?

1) Not at all 2) A little 3) Moderately 4) Mostly 5) Completely

12 Have you enough money to meet your needs?

1) Not at all 2) A little 3) Moderately 4) Mostly 5) Completely

13 How available to you are the information you need in your day-to-day life?

1) Not at all 2) A little 3 Moderately 4) Mostly 5) Completely

14 To what extent do you have opportunity for leisure activities?

1) Not at all 2) A little 3) Moderately 4) Mostly 5) Completely

15 How well are you able to get around?

1) Very poor 2) Poor 3) Neither poor nor good 4) Good 5) Very good

16 How satisfied are you with your sleep?

1) Very Dissatisfied 2) dissatisfied 3) Neither Satisfied nor Dissatisfied 4) satisfied

5) Very Satisfied

17 How satisfied are you with your ability to perform your daily living activities?

1) Very Dissatisfied 2) Dissatisfied 3) Neither Satisfied nor Dissatisfied 4) Satisfied

5 Very Satisfied

18 How satisfied are you with your capacity for work?

1) Very Dissatisfied 2) Dissatisfied 3) Neither Satisfied nor Dissatisfied 4) Satisfied

5) Very Satisfied

19 How satisfied are you with yourself?

1) Very Dissatisfied 2) Dissatisfied 3) Neither Satisfied nor Dissatisfied 4) Satisfied

5)Very Satisfied

20 How satisfied are you with your personal relationships?

1) Very Dissatisfied 2) Dissatisfied 3) Neither Satisfied nor Dissatisfied 4) Satisfied

5) Very Satisfied

21 How satisfied are you with your sex life?

1) Very Dissatisfied 2) Dissatisfied 3) Neither Satisfied nor Dissatisfied 4) Satisfied

5) Very Satisfied

22 How satisfied are you with the condition of you living place?

1) Very Dissatisfied 2) Dissatisfied 3)Neither Satisfied nor Dissatisfied 4) Satisfied

5) Very Satisfied

23 How satisfied are you with the support you get from friends?

1) Very Dissatisfied 2) Dissatisfied 3) Neither Satisfied nor Dissatisfied 4) Satisfied

5) Very Satisfied

24 How satisfied are you with your access to health services?

1) Very Dissatisfied 2) Dissatisfied 3) Neither Satisfied nor Dissatisfied 4) Satisfied

5 Very Satisfied

25 How satisfies are you with your transport?

1) Very Dissatisfied 2) Dissatisfied 3) Neither Satisfied nor Dissatisfied 4) Satisfied

5) Very Satisfied

26 How often do you have negative feelings such as blue mood, despair, anxiety, depression?

5) Never 4) Seldom 3) Quite often 2) Very Often 1)Always

Appendix vii

WHOQOL – BREF (Yoruba Translation)

1 Bawo ni o se ma a se odinwon igbe aye re?

1) Buru pupo 2) Buru 3) Ko buru, ko dara 4) Dara 5) Dara pupo

2 Bawo ni ilera re se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

3 O to bawo to se ro pe irora ara n di o lowo lati le se ohun ti o ni lati se?

1) Rara 2) Die 3) Niwon 4) Opo 5) O po gan an

4 Bawo ni o se ni lo itoju igbalode si lati se ise oojo re?

1) Rara 2) Die 3) Niwon 4) Opo 5) O po gan an

5 Bawo ni o se un gbadun aye si?

1) Rara 2) Die 3) Niwon 4) Opo 5) O po gan an

6 Bawo lo se ro pe aye re ni itumo si?

1) Rara 2) Die 3) Niwon 4) Opo 5) O po gan an

7 Bawo ni o se le fokan si nkan si?

1) Rara 2) Die 3) O mo niwon 4) Opo 5) O po pupo

8 Bawo ni o se ro pe o ni aabo si lojoojumo?

1) Rara 2) Die 3) O mo niwon 4) Opo 5) O po pupo

9 Bawo ni ilera agbegbe re se ri?

1) Rara 2) Die 3) O mo niwon 4) Opo 5) O po pupo

10 Nje o ni okun ti o to fun o lojoojumo?

1) Rara 2) Die 3) O mo niwon 4) Lopo igba 5) Ni gbogbo igba

11) Se o le fara mo bi ago ara re se ri?

1) Rara 2) Die 3) O mo niwon 4) Lopo igba 5) Ni gbogbo igba

12) Nje o ni owo to o to fun ini re?

1) Rara 2) Die 3) O mo niwon 4) Lopo igba 5) Ni gbogbo igba

13) Bawo ni iroyin ti o nilo fun aye re ni ojoojumo se wa ni arowoto re si?

1) Rara 2) Die 3) O mo niwon 4) Lopo igba 5) Ni gbogbo igba

14) Bawo ni o se ni anfaani awon ere idaraya si?

1) Rara 2) Die 3) O mo niwon 4) Lopo igba 5) Ni gbogbo igba

15 Bawo ni o se le rin kaakiri si?

1) Buru pupo 2) Buru 3) Ko buru, ko dara 4) Dara 5) Dara pupo

16 Bawo ni orun re se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

17 Bawo ni bi o se un se ise re se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

18 Bawo ni agbara ti o ni lati se ise se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

19 Bawo ni ara re se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

20 Bawo ni bi o se un ba elomiran se po se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

21 Bawo ni igbe aye ibalopo re(pelu okunrin tabi obinrin) se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

22 Bawo ni atileyin ti o n ri gba lati odo awon ore re se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

23 Bawo ni ibi ti o n gbe se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

24 Bawo ni eto ilera ti o n gba se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

25 Bawo ni eto oko re se te o lorun si?

1) Ko te mi lorun rara 2) Ko te mi lorun 3) ko te mi lorun sugbon ko buru

4) o te mi lorun 5) O te mi lorun pupo

26 O to bi igba melo ti erokero bii ibanuje ati iporuru okan ma n wa si o lokan.

1) Ko ri bee ri 2) O ri bee diedie 3) O ri bee leekokan 4) O ri bee lore koore

5) O ri bee ni gdogdo igba

Appendix viii

Boyd's and Graham's Selective Motor Control Instrument

Score	Interpretation
1	Isolated selective dorsiflexion through available range, using a balance of tibialis anterior activity without hip and knee flexion.
3	Dorsilexion is achieved using mainly tibialis anterior activity but accompanied by hip and / or knee flexion.
2	Dorsiflexion occurs using extensor hallucis longus, extensor digitorum longus and some tibialis anterior activity.
1	Llimited dorsiflexion using mainly extensor hallucis longus and/or extensor digitorum longus.
0	No movement occurred.