

## Radiological ageing process in the cervical spine of Nigerian women

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### Summary

The study was designed to determine the age of commencement of ageing process in Nigerian women. Four hundred (400) consecutive women requesting for cervical spine radiographs were recruited for this study. A study chart was made showing different variables like osteoarthritis, detached osteophytes, postural alterations and disc degenerations in a four year period from 1st January, 1993 to 31st December, 1996 the modified Kellgren and Lawrence grading system was used to assess radiographic changes. The highest rate of osteoarthritis (31.13%) was found in the fifth decade. Incidence of postural alterations of the cervical spine rose sharply in the 5th and 6th decades of life. Grade 2 osteoarthritis (Kellgren and Lawrence) was commonest (61.3%); Grades 3 and 4 had the lowest incidence (3.45%). Disc degeneration was commonest in the 5th; the most involved disc was C5/C6 and the least involved was C2/C3. It is concluded that the ageing process in the Nigerian women commences in the fourth decade of life, and apparently shows no difference with caucasian women.

**Keywords:** Ageing, disc degeneration, osteoarthritis, cervical spine, Nigerian women, Kellgren and Lawrence grading system.

### Résumé

L'étude a été conçue pour déterminer l'âge de commencement des processus de notification d'âge chez les femmes nigérianes. Quatre cent (400) femmes consécutives furent recrutées pour l'examen radiographique de vertèbres cervicales dans cette étude. Un diagramme représentant cette étude montrait les différents changements comme l'ostéoartrite, les ostéophytes détachés, les altérations de position et la dégénération de disque en quatre ans à partir du Premier Janvier 1993 à 31 Décembre 1996, le système modifié de classification de Kellgren et Lawrence a été utilisé pour déterminer les changements radiographiques. La proportion la plus élevée d'ostéoartrite (31,13%) a été trouvée dans la cinquième décennie. L'incidence des altérations de position des vertèbres cervicales s'élevait brusquement dans la cinquième et la sixième décennies de vie. La classe 2 d'ostéoartrite (classification modifiée de Kellgren et Lawrence) était la plus fréquente, les classes 3 et 4 avaient la moindre fréquence (3,45%). La dégénération de disque était la plus fréquente dans la cinquième décennie le disque le plus affecté était C5 ou C6 et le moins affecté était C2/C3. La détermination d'âge chez les femmes nigérianes semble commencer entre l'âge de 30 à 40 ans et il apparaît qu'il n'y a pas de différence raciale avec les femmes caucasiennes.

### Introduction

In recent times there has been an international awakening to the phenomenon of ageing with emphasis on the female gender. Dizfalussy and Benagiano highlighted the socio-economy as well as the medical demands of the elderly, and the gender inequality of life expectancy, even in Nigeria was extensively discussed [1,2].

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The menopause (change of life) is the counterpart of menarche and it is a phenomenon in the life of a woman which can be used as a parameter to determine the ageing process. In any given population, menopause is usually within the ages of 45 and 52 years and it is associated with some characteristic symptoms. In contrast to their caucasian counterparts, most African women do not seem to manifest these symptoms, probably due to racial and socio-cultural differences [3].

Therefore we felt it would not be appropriate to use this parameter of menopause to determine the ageing process in an African population like Nigeria. The radiological features of the cervical spine, showing spondylosis (spinal osteoarthritis) was preferred. Osteoarthritis is known to be influenced by genetic and occupational factors [4]. The effect of climate and race has also been reported [4,5,6]. As a joint disease, it is also a sign of the ageing process and it is known to occur in both sexes [4,5,6,9,10]. The report on women is an initial report; the counterpart paper on men as well as a comparative report of both sexes will follow shortly.

Ageing is indeed a basically new feature in the history of humanity [7] with very high demands for health and social services. These problems have been identified and pursued vigorously in the advanced countries [2,7]. Very little, if any, has so far been done in developing countries like Nigeria [1]. It is in this context that this study is undertaken as a preliminary work on the ageing phenomenon among Nigerian women.

### Materials and methods

The plain radiographs of 400 consecutive women above the age of 30 years were reviewed in a 4-year period grades between 1st January 1993 to 31st December 1996. Women who had been involved in any form of accident which could affect the spine were automatically excluded from the study. The antero-posterior and lateral radiographs of the cervical spine were reviewed to identify osteoarthritic changes. These changes include osteophyte formation, disc degeneration and also alignment anomalies. Furthermore a modified Kellgren and Lawrence grading system was used to assess the radiographic changes as follows:

- Grade 0 - Normal joint
- Grade I - A minute osteophyte of doubtful significance
- Grade II - Definite osteophyte with joint space preservation
- Grade III - Osteophyte with decrease in joint space
- Grade IV - Marked impairment of joint space with sclerosis of subchondral bone.

The data were analysed using the chi-squared test or the student's T-test where relevant.

### Results

Table 1 shows the prevalence of osteoarthritis in the various age groups with or without detached osteophytes. The highest incidence was found in the fifth decade 33 (31.13%); only one (0.94%) was found in the eighth decade. Incidence of postural alterations of the cervical spine with age, is shown in Table 2. A sharp increase in the number of cases 28 and 33 were noted in the 5th and 6th decades, respectively.



**Table 1:** Incidence of radiological changes of osteoarthritis in women age, and prevalence of detached osteophytes.

Age range (year)	incidence of osteoarthritis	Presence of detached osteophytes
30-39	11(10.38)*	0
40-49	28(26.42)	0
50-59	33(31.13)	2
60-69	23(21.70)	3
70-79	10 (9.43)	1
80-89	1 (0.94)	0

\*Figures in parentheses are percentages

**Table 2:** Prevalence of vertebral postural alterations with age.

Ages (years)	Postural alterations		Total
	Straightening	Reversal	
30-39	10	0	10(10.20%)
40-49	18	0	18(18.36%)
50-59	25	3	28(28.57%)
60-69	28	5	33(33.67%)
70-79	6	2	8(8.16%)
80-89	1	0	1(1.02%)

Table 3 shows the prevalence of osteoarthritis according to age using modified Kellgren and Lawrence scale grades. Grade II of the modified Kellgren and Lawrence was the commonest with 136 (61.3%) and was statistically significant ( $P < 0.05$ ) to the other grades, while a very low prevalence 4 (1.81%) was noted for grades III and IV. The highest incidence occurred in the 5th decade in all the three grades.

**Table 4:** Incidence of disc degeneration with age

Age range in years	C2/C3	C3/C4	C4/C5	C5/C6	C5/C7	Total
30-39	-	-	4	6	-	10(0.4%)
40-49	-	3	15	20	5	43(18.45%)
50-59	-	10	28	30	7	75(32.18%)
60-69	2	15	22	23	11	73(31.35%)
70-79	3	6	8	8	4	29(12.44%)
80-89	-	1	1	1	-	3 (1.29%)
<b>Total</b>	<b>5(2.45%)</b>	<b>35(5.02%)</b>	<b>78(33.46%)</b>	<b>88(37.77%)</b>	<b>27(11.5%)</b>	<b>223</b>

Table 4 shows the incidence of disc degeneration with age. The highest incidence of the disc degeneration occurred in the fifth decade (32.18%). This was followed by the 6th decade with 31.33% and in the 4th decade with 18.45%. The most involved disc was found to be C5/C6 with an incidence of 37.77%. Next to this was C4/C5, with 33.48%. The least involved was the C2/C3 disc with an incidence of 2.45%. The results were subjected to statistically analysis – students T-test ( $P \leq 0.05$ ).

**Discussion**

The cervical spine and consists of seven vertebral bodies and six intervening disc spaces. These components of the spine have been said to undergo normal aging process described

**Table 3:** The prevalence of Osteoarthritis according to age using modified Kellgren and Lawrence grades

Ages (years)	Grades			Total
	I	II	III+IV	
30-39	10	8	0	
40-49	26	28	0	54
50-49	25	47	1	73
60-69	18	34	2	54
70-79	3	18	1	22
80-89	0	1	0	1
<b>Total</b>	<b>82(36.9%)</b>	<b>136(61.3%)</b>	<b>4(1.88%)</b>	<b>222</b>

radiologically as degenerative changes of osteoarthritis. The incidence of osteoarthritis in our study population was 26.5% and this is much higher than the incidence rate of 19.9% in a South African Negro population [4]. Brain [8], reported that 60% fell between the 40-59 years age bracket. We came to a similar result whereby 58% of our patients with osteoarthritis fell within the above stated age group (Table1). Our result is also in line with the Bronx Veterans study conducted at the Bronx Veterans Hospital in U.S.A. between 1963 and 1972 [9]. This study had equal number of cases in each of the 4th and 5th decades. In our study we had 28 cases in the 5th decade and 33 in the 6th decade whereby the difference is not statistically significant, as shown in (Table 1)  $P = < 0.05$ .

The cervical spine curvature normally shows two distinct degenerative manifestations - either there is straightening or there is reversal of the usual cervical curvature (Table 2). Of these two manifestations, straightening in our study was more prominent with 89.8% of the total. However postural

alterations were noted to increase with age as seen in Table 2. This is in full agreement with Boden *et. al.* [10], thus confirming cervical postural changes as another index of ageing process.

Using the modified Kellgreen and Lawrence scale [11], we found that the moderate type of osteoarthritis (Grade II) was the commonest in our study; this was followed by a low prevalence of Grades III and IV. These results are similar to the findings of previous studies of negroid populations [4,6,12]. Furthermore it was found that a sharp increase in the incidence of osteoarthritis manifested in the 4th decade of life. It can then be assumed that the aging process commences in the Nigerian women in the same fourth decade of life. Another feature of cervical osteoarthritis which can be used



to evaluate aging is detached osteophytes. These were seen in our cases from the fifth decade of life but with low prevalence.

Disc degeneration is normally an early manifestation of ageing [10]. This is because nutrition to the disc is by diffusion since there is no direct blood supply, making the daily trauma of aging poorly tolerated by the discs and like the previously reported osteoarthritic changes in Table 3, it is seen to increase with age. A sharp rise in incidence occurred in the 4th decade while the peak incidence was noted in the fifth. After the fourth decade there was involvement of two or more discs, whereby the commonest disc involved is the fifth in agreement with the study by Miles [9].

Other radiological signs of osteoarthritis of the spine such asolisthesis or slip of one vertebra on another as a result of disc incompetence and disc calcification both reported by Boden et al [10], as well as vacuum phenomenon, a radiological sign described by Knutsson [13] were not found in our study. Vacuum phenomenon, a documented radiological sign of disc degeneration, was not demonstrated in this study because it is known that its appearance is associated with radiological extension views of the spine [13,14,15], whereas we reviewed only flexion views. Furthermore its absence in this study can also be attributed to its preference for the lumbar spine as reported by Resnick et al [16]. We, however, reviewed the cervical spine.

In conclusion, it can be said that aging process begins at the fourth decade of life in the Nigerian women. This is similar to the findings in their caucasian counterparts who manifest degenerative changes also in the fourth decade [4]. However more studies are needed in this area because of the ever increasing importance of geriatrics in modern medical practice worldwide.

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