Original Article

Prediction of Low Back Pain among School-aged Adolescents using Parental Sociodemographic Variables in a Nigerian City

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ABSTRACT

Background: Low back pain (LBP) is the most prevalent musculoskeletal disorder among adults, but how parental sociodemographic factors associated with the prevalence of LBP among adolescents is still under investigation.

Materials and Methods: Eight schools were selected randomly; from each school, 100 students were consecutively selected amounting to 800 participants for the study. LBP questionnaire from a study of Chiwaridzo and Naidoo was adopted for the research. The Likert scale questionnaire was administered to each participant and collected as soon as it was completed. Descriptive and inferential statistics were used to analyse the data. Alpha level was set at 0.05.

Results: The results showed that 710 questionnaires, which were 88.7% of the total, were analysable. More than 46% of the participants recorded LBP in the last 1 year. There was significant association between occurrence of LBP and each of family history of LBP ($\chi^2 = 13.357$, $P = 0.000$), fathers' occupation ($\chi^2 = 13.357$, $P = 0.000$) and education ($\chi^2 = 13.357$, $P = 0.000$); mothers' occupation ($\chi^2 = 13.357$, $P = 0.000$) and education ($\chi^2 = 13.357$, $P = 0.000$). Prediction equation for the occurrence of LBP is: Y = K + B (Occupation) + C (Education) + D (LBP in the family). The r^2 value was 0.473 interpreting that the percentage contribution of these factors to the prediction of LBP among adolescents was 47.3%.

Conclusion: The study showed that prevalence of pain at low back was 46% among 10–14 years' adolescents. Some parental sociodemographic variables may contribute to the occurrence of LBP among adolescents.

Key words: Adolescents, education, family, low back pain, occupation

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INTRODUCTION

Low back pain (LBP) is the most prevalent musculoskeletal condition and the most common cause of disability in developed nations.[1] The lifetime prevalence rate of 40% in the United Kingdom[2] and 34.5% in the United States of America[3] has been documented. The prevalence of LBP has also been reported in low-income countries; 58% in South Africa[4] and 25% in Nigeria.[5] In clinical settings, LBP in children and adolescents is often perceived to be uncommon; most research studies on LBP have focused on adults.[6,7] The prevalence rate for children and adolescents is lower than that seen in adults but is rising.[8] The 1-year prevalence rate of LBP in children has been reported from 7% to 58%.[9] The likelihood of a child from a family with positive family history of LBP of having LBP is almost two times more than those without positive history of back pain.[1] Children with LBP in childhood are at higher risk of LBP in adulthood.[10] The period of adolescence has been described as a critical stage of spinal development characterised by rapid growth until early adulthood.[11,12] During this period of rapid growth, the adolescent spine is thought to be vulnerable to stress.[11-13] A study has reported adverse effects on muscles with prolong sitting, which subject the muscles of the back to prolonged low-level static loading.[13] Prolonged activity leads to impaired oxygenation of the muscle tissues and has been implicated as

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a cause of back pain.[14] Therefore, prolonged sitting will end up in pain and limiting the spinal movements.[15] The red flags associated with LBP include osteoporosis, previous or current cancer, focal neurological deficit, unexplained fever and immunosuppression.[16] Modifiable risk factors of developing LBP can be classified as lifestyle (physical inactivity, smoking, obesity and poor muscle strength) and occupational (heavy lifting, twisting, bending, prolonged sitting, stooping, awkward posture at work and poor ergonomics).[17,18] Sitting, especially prolonged sitting, is generally accepted as a risk factor in developing LBP.[19] In general, most students (60%) spend on average of 20 h per week sitting, for prolonged hours in class or front of technology (computer or television),[20] which may predispose them to LBP. Long periods of sitting and lack of spinal motion may increase the stress of the back, neck, and legs and may put an extra pressure to the back muscles and the supporting tissues, leading to muscle tension and fatigue, joint strain and spinal disc compression.[21] Relatively, little has been done to understand the prevalence of LBP among adolescents and how parental sociodemographic factors such as education and occupation associate with the prevalence of LBP among adolescents.[9] The study therefore determined the prevalence of LBP among school-aged adolescents and its association with parental sociodemographic variables in Ile Ife, Nigeria.

MATERIALS AND METHODS

Participants
Junior secondary school (JSS) 1–3 students from selected schools in Ife Central Local Government of the State of Osun, Nigeria, participated in this study.

Inclusion criteria
Apparently healthy male and female pupils between the ages of 10 and 14 years in JSS 1–3 who volunteered to participate in the study.

Exclusion criteria
Students of the age bracket but unwilling to participate from the study or the parent did not give the consent.

Instrument
The LBP study questionnaire used by Chiwaridzo and Naidoo was adapted for the study.[22] The choice of a questionnaire as a survey tool was based on the fact that pain is a highly subjective phenomenon best evaluated by self-report.[23] In addition, self-administered questionnaires have been reported to yield similar results as compared to other self-report methods such as face-to-face interviews.[24] Section A of the questionnaire evaluated the primary outcome measures of the prevalence of recurrent LBP. A mannequin was used with an arrow pointing to a posterior view of the lumbar region to assist the respondents in identifying the lower back. As the study sought information on LBP, respondents were specifically instructed to report on back pain localised to the identified region of a spine but not on pain related to the experience of menses. Pain intensity was evaluated based on the visual analogue scale (VAS) from 0 (no pain) to 10 (maximum pain). Section B captured information regarding the highest level of education of parents, occupation of the parent and family history of LBP. Participants were thoroughly tutored on the meaning of LBP as the pain that is situated at the level of first lumbar vertebrae to the sacral region; a picture was shown to describe the location of the pain. The family history was limited to the nuclear family, father, mother and siblings, and each participant was educated on how to assess the pain intensity using VAS.

Research design
The study was a cross-sectional study.

Determination of sample size
Using the formula for determining sample size from a population that is >10,000 sample formula:

$$n = z^2 \, pq/d^2$$

where

n = the desired sample size.

z = the standard normal deviate, usually set at 1.96 (or more simply 2.0), which corresponds to the 95% confidence level.

p = the proportion in the target population estimated to have a particular characteristic. If there is no reasonable estimate, 50% is used.

q = 1.0 – p

d = degree of accuracy desired, usually set at 0.05 or occasionally at 0.02.[25]

The calculated sample size for this study would then be:

$$n = (1.96)^2 \, (0.5) \, (0.5)/(0.05)^2$$

$$= 384.2$$

Therefore, the minimum sample size for this study was approximated to 384, but 800 participants were recruited for the study to make the sample size appreciably large.

Sampling technique
Simple random sampling using the fishbowl technique was used to select a total of eight secondary schools from Ife Central Local Government. Using consecutive sampling technique, 100 students were selected in each school from JSS 1–3 making 800 participants in all from the eight schools for the study. Approval was obtained from the Local Inspector of Education, Ife Central Local Government Area, Ile-Ife.

Procedure
Ethical approval for this study was obtained (IPHOAU/12/914) from the Health Research and Ethics Committee, Institute of Public Health, Obafemi Awolowo University, Ile-Ife. Letters of introduction from the Department of Medical Rehabilitation was taken to the management of selected schools in the study area (Ile-Ife), seeking for permission from the principals to conduct the study in such schools. Informed consent and assent were obtained from the parents and participants, respectively. Participants were fully informed about the study before data

collection. Participants were given a copy of the questionnaire to fill. The questionnaire was explained to each of the participants. The questionnaire was collected as soon as participant completed it. The children provided information about the parents' level of education, occupation and family history of LBP.

Data analysis

The data were analyzed using Statistical Packages for Social Sciences (SPSS) version 17 (Illinois, Chicago). Descriptive and inferential statistics were used to summarise the data. Chi-square test was used to evaluate the association between the occurrence of LBP and each of the following: occurrence of back pain in the family, educational level of the parent and occupation of the parent. Logistic regression was used to examine the degree of prediction of the prevalence of LBP by the variables. Alpha level of 0.05 was set as level of significance.

RESULTS

Sociodemographic parameters of the participants and their parents

Table I presents the sociodemographic parameters of the participants and their parents. The study showed that 358 (50.4%) of the participants were male. A large number (432, 60.8%) of the participants' father attained the tertiary level of education. It was observed that 350 (49.3%) of the participant's father were civil servant and 299 (42.1%) of the participant's mother were business women. Further, 412 (58%) of the participant's mother had tertiary education.

Prevalence of low back pain among participants and family members

Table II presents the prevalence of LBP among participants and family members. It was observed that 292 (41.1%) of the participants had LBP. In addition, it was observed that 325 (45.8%) of the participant's family members had LBP with the mother accounting for more than 141 (19%).

Table III summarises the Chi-square analysis of the association between parental occupation and prevalence of LBP. There was significant association between the prevalence of LBP and each of father's ($\chi^2 = 14.353$, $P = 0.000$) and mother's ($\chi^2 = 12.257$, $P = 0.000$) occupation.

Table IV summarises the Chi-square analysis of the association between parental educational level and prevalence of LBP. There was significant association between prevalence of LBP and each of father's ($\chi^2 = 11.357$, $P = 0.000$) and mother's ($\chi^2 = 10.358$ $P = 0.000$) education and prevalence of LBP among adolescents of 10–14 years' old.

Table V summarises the Chi-square analysis of the association between family history of LBP and prevalence of LBP. There was significant association between the family history and prevalence of LBP among the participants.

Table VI presents the logistic regression for the prediction of prevalence of LBP with parental sociodemographic variables. Tables reveal that mother's occupation, education and history

Table I: Sociodemographic parameters of the participants and parents ($n = 710$)

Variables	Frequency (%)
Gender	
Male	358 (50.4)
Female	352 (49.6)
Parents occupation	
Father	
Business	178 (25.1)
Civil servant	350 (49.3)
Nil	36 (5.1)
Mother	
Artisan	117 (16.5)
Business	299 (42.1)
Civil servant	262 (42.1)
Nil	32 (4.5)
Parents' education level	
Father	
Nil	171 (24.1)
Primary	10 (1.4)
Secondary	97 (13.7)
Tertiary	432 (60.8)
Mother	
Nil	172 (24.2)
Primary	12 (1.7)
Secondary	114 (16.1)
Tertiary	412 (58)

Table II: Prevalence of low back pain among participants and family members ($n = 710$)

Variables	Frequency (%)
Pain in 1 day	
Yes	292 (41.1)
No	418 (58.8)
Pain in the family	
Yes	325 (45.8)
No	385 (54.2)
Which member of the family had pain	
Father and mother	18 (2.5)
Father only	94 (13.2)
Mother only	141 (19.9)
Siblings	28 (3.9)
Nil	382 (53.8)

of pain in the family were more significant contributors to the prevalence of LBP. The r^2 value from the analysis was 0.473, showing that the percentage contribution to the prediction was close to 50%. Prediction equation for the occurrence of LBP using parental sociodemographic variables was: Y = K + B (Occupation) + C (Education) + D (Pain in the family). K = Constant; B, C, and D are categorical variables [Table VI].

DISCUSSION

The primary objectives of the study were to determine the prevalence of LBP and the association of parental

Table III: Association between parental occupation and prevalence of low back pain (*n*=292)

Variables	Frequency (%)	χ^2	*P*
Occupation			
Father			
Artisan	68 (23.3)	14.353	0.000
Business	59 (20.0)		
Nil	16 (5.5)		
Mother			
Artisan	75 (25.6)	12.257	0.000
Business	94 (32.2)		
Nil	13 (4.5)		

Table IV: Association between parental education and prevalence of low back pain (*n*=292)

Variables	Frequency (%)	χ^2	*P*
Parental education			
Father			
Nil	60 (20.5)	13.357	0.000
Primary	7 (2.4)		
Secondary	47 (16.1)		
Tertiary	178 (61.0)		
Mother			
Nil	58 (19.9)	10.358	0.000
Primary	8 (2.9)		
Secondary	57 (19.5)		
Tertiary	169 (57.9)		

χ^2: Chi-square, significant at 0.05 α-level

Table V: Association between family history of low back pain and prevalence of low back pain (*n*=292)

Variables	Frequency (%)	χ^2	*P*
Father and mother	12 (4.1)	11.357	0.000
Father	65 (22.2)		
Mother	90 (30.8)		
Siblings	46 (15.8)		
Nil	47 (16.1)		

χ^2: Chi-square, *P*, significant at 0.05 α-level

Table VI: Logistic regression for the prediction of prevalence of low back pain form parental sociodemographic variables

Variables	*B*	SE	Significant
Father's Occu			
Father Occu (1)	−1.127	0.699	0.113
Father Occu (2)	−0.646	0.641	0.012
Father Occu (3)	−0.713	0.630	0.440
Mother's Occu			
Mother Occu 1	21.570	4335.641	0.000
Mother Occu (2)	−20.759	5800.843	0.000
Mother Occu (3)	−0.417	0.630	0.000
Mother Occu (4)	0.166	0.654	0.722
Fathers Edu			
Father Edu 1	0.042	0.725	0.042
Father Edu 2	1.970	1.242	0.065
Father Edu 3	0.040	0.419	0.062
Mother Edu			
Mother Edu 1	−0.417	0.729	0.023
Mother Edu 2	0.947	1.118	0.076
Mother Edu 3	0.253	0.410	0.013
Pain in fam			
Pain in fam 1	−0.214	40609.414	0.403
Pain in fam 2	−1.874	0.197	0.000
Constant	1.237	0.492	0.000

Occu: Occupation, Edu: Education, Fam: Family. Occu 1: Artisan, 2: Business/trading, 3: Civil servant or salary job. Edu 1: No former and primary, 2: Secondary, 3: Tertiary education. Pain in fam 1: No pain in any members of the family, 2: Yes for pain in any members of the family prediction equation for the occurrence of low back pain using parental sociodemographic variables are: Y: K + B (occupation) + C (education) + D (pain in the family). K: Constant; B, C, and D are categorical variables SE: Standard error

sociodemographic factors with the prevalence. The results of the study showed a LBP prevalence rate of more than 40% among school-aged adolescents. This was more than the prevalence rate of 18.5%, being 15.5% in boys and 21.6% in girls among students in Brazil, aged 10–14 years reported by Okamoto *et al*.[26] In addition, the results of the study by Fernandes *et al*.,[27] in adolescents aged 11–14 years in the Northwest of England, revealed a prevalence of LBP of 24%. The differences may be due to that factors which may be associated to Nigeria as a country. In Nigeria, children are made to do strenuous activities such as hawking on the street, farm work and bending down for long hour to do house chores; cleaning of school compound which may include cutting of grasses. They were involved in manual carrying of some loads at home which may result in to twisting of the spine. These may be some factors that may make the prevalence in our study more than other sited researchers. Other predisposing factors including chairs in the school which may not be ergonomically compliance, long hours of sitting and bad sitting posture have been linked to the development of back pain. The study reported that long sitting has significant effect on the low back due to unnecessary stress on the spine which when occurs repeatedly can cause micro-trauma to the spine.[28] Prolonged sitting in bad position leads to slackening of the abdominal muscles and curvature of the spine. In bad sitting posture, the lumbar lordosis tends to flatten and the pelvis rotates

posteriorly. This kyphotic posture places increased stress on the posterior elements of the spine and raises intra-discal pressure.[29]

The study observed further that more than 60% of the participants' parents with LBP had tertiary education. This was in support of the report by Hestbaek *et al*.[30] that parental education status, which is an indicator of socioeconomic status of the family, is considered as a factor that has been associated with LBP in adolescents. Parents with tertiary education probably may be a civil servant with car and a good home amenity. In this case, such a parent will endeavour to carry his/her child to school and bring such child from the school.

Even at home, such children will be busy doing assignments. All this activity involved sitting posture. Couple with the long sitting hour in the school, such child is highly prone to LBP. As a rider to this, the only time for exercise or increase physical activity may be on weekend which may be grossly inadequate for the strengthening of the back muscles. In addition, the type of food and this sedentary life style by these children will most likely result in overweight, another factor that may likely promote the development of or initiate LBP. The study noticed a significant association between family history of LBP and occurrence of LBP. This supports the research result conducted by Masiero *et al.*,[31] which reported a positive association between the presence of LBP among adolescents and family history of LBP. Further, Leboeuf-Yde[32] noted that there is evidence of a relatively strong genetic component in the development of LBP, both in the young and in adult. From the results, the predictability of prevalence of LBP by parental socioeconomic parameters was about 47%, which was shown in the r^2 to be 0.47. It can be understood from this that there are other factors that have their contributions to the prevalence. Researches established that there is association between LBP and the link between school bag weight in adolescents.[33,34] Onofrio *et al*. documented a significant association between backpack weight and adolescent LBP prevalence.[35] On the other hand, neither satchel weight nor the mode of its carriage was found to be associated with adolescent LBP among Tunisian adolescents.[24]

CONCLUSION

There was high prevalence of LBP among adolescents aged between 10 and 14 years, and parental occupation, education and family history of pain were found to be associated with the prevalence of back pain among adolescents.

Limitation of the study

There were some limitations from the study. One of them was that the education, family history of LBP and occupation of the parents were reported from the children (participants). It is assumed that this information was true and correct for each family. Further, pain is highly subjective; it was assumed that the pain reported by the participants was the true picture of their feelings.

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Conflicts of interest

There are no conflicts of interest.

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