Adolescent low back pain among secondary school students in Ibadan, Nigeria

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Abstract

Background: Adolescent low back pain (ALBP) can be considered a signal or precursor of a serious organic disease or tell-tale sign of future incidence of low back pain in adulthood. Published articles on ALBP in Nigeria are not readily available.

Objectives: The study's objectives were to investigate the prevalence of Adolescent Low Back Pain (ALBP) among secondary school students in Ibadan, Nigeria and the prevalence's association with some socio-demographic variables.

Methods: Participants were adolescent students from 15 secondary schools in Ibadan. Data was collected using a respondent-administered, validated questionnaire on low back pain in adolescents. Participants (Female: 298; Male: 273) aged 14.23 ±2.27 years (range 10-19) were recruited through multi-stage random sampling. Five hundred and seventy-one (83.97%) of the 680 copies of the questionnaire administered were returned. Data was analysed using mean, standard deviation, frequency, percentages, and Chi-square test with alpha level at 0.05.

Result: Lifetime, twelve-month, one-month and point prevalence rates of ALBP were 58.0%, 43.8%, 25.6% and 14.7% respectively. Age at first experience of ALBP was 11.86 ± 2.36 years. Gender was not significantly associated with any rate ($p \geq 0.317$). Age ($p \leq 0.043$) and engagement in commercial activities ($p \leq 0.025$) were significantly associated with all period prevalence rates while injury to the back was significantly associated with all period prevalence rates except point prevalence ($p = 0.087$).

Conclusion: Adolescent low back pain is common among secondary school students in Ibadan and its prevalence is significantly associated with age and engagement in commercial activities, but not with gender.

Key Words: Adolescent, low back pain, school children

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Background

Low back pain (LBP) is pain or discomfort in the lumbo-sacral region of the back. It is referred to as Adolescent Low Back Pain (ALBP) when it occurs in individuals between the ages of 10 and 19 years[1]. The presence of LBP in adolescence is seen by some as a signal for or a precursor of a serious organic disease, while others see it as a tell-tale sign for future incidence of low back pain in adulthood[2,3]. A scientific interest in ALBP is of importance as it is believed by some to be unusual and rare for that age group[1,4,5].

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In the industrialized world, it has been estimated that about 80% of the general population will report low back pain at one point or the other in their life[5,6,7]. LBP has been described as a common phenomenon that affects public health[6,8] and it is now being increasingly recognized that LBP in childhood and adolescence is becoming almost as common a complaint as that observed in adults[8,9,10]. It has also been described as a public health problem in children, although as a less globally recognized problem[5,8]. Probably based on the premise that LBP is unique to adults[4] and rare in adolescents, the volume of research on ALBP had in the past been small and hence the limited data on the prevalence of LBP in adolescents[1,5]. Since the 1980s, there has been an increasing appreciation of the prevalence of ALBP in the community, and in recent times there has been a significant increase in the number of studies on it[1]. This shift in awareness appears to have resulted from a series of international epidemiological studies which identified a significant prevalence of reported spinal pain in otherwise "healthy" adolescents[1,4].

Recent epidemiologic data has suggested a relatively high prevalence of LBP during school age[9]. However, estimates of LBP prevalence in children and adolescents reported in studies vary widely between studies depending on the age of study participants, and methodological differences - particularly in terms of LBP definition[1,7]. Prevalence rates of LBP among children and adolescents of various ages have been reported in terms of period prevalence; one-month prevalence, 12-month prevalence and lifetime prevalence being the common period prevalence rates reported by authors[4,5,6,8,11,12]. Jeffries et al[13], in a systematic review, reported that the prevalence of low back pain (LBP) during school years ranges from 7% to 70% in developed countries, depending on the definition of pain and the study design and that the lifetime prevalence increases with age, reaching 67.9% to 74% by late adolescence. Ayanniyi et al[11] reported a 25% lifetime prevalence of back pain among school-age adolescents in Nigeria[11] but failed to report other period prevalence rates. Louw et al[14] reported the mean LBP point prevalence, 12-month prevalence and lifetime prevalence among African adolescents to be 12%, 33% and 36% respectively.

A large percentage of the data available on ALBP is from Europe and America, though a few studies on the epidemiology of ALBP in Africa exist. There is a dearth of data on the prevalence of ALBP in Africa generally[13] and specifically in Nigeria[11]. The only article on LBP among adolescents in Nigeria that is available for referencing[11] is limited in its utility in that only lifetime prevalence of ALBP was reported as part of a general investigation of back pain among adolescents, a standardized questionnaire on low back pain was not used and there was no working definition for low back pain or ALBP. This study was hence designed to investigate the prevalence of ALBP among secondary school students in Ibadan north local government area of Oyo state, Nigeria.

Methods

Participants

Participants were secondary school students of ages 10-19 years with no obvious spinal deformity as revealed by visual inspection by one of the authors at the point of questionnaire administration. The visual inspection comprised essentially of an assessment of participants' posture for anterior/posterior and lateral symmetries to rule out excessive lumbar or cervical lordosis, increased thoracic kyphosis and scoliosis.

Sampling and sample size

Fifteen of the 60 secondary schools in the local government area were randomly selected and 95 participants who met the inclusion criteria were purposively recruited into the study from each school. Proportional sampling was used to ensure adequate representation of the two sexes and different schools. Sample size calculation using the following formula[15]: $n = Z^2 p(1-p)/e^2$ where n= sample size, Z = z-value at 95% confidence interval, p= estimated lifetime prevalence of adolescent low back pain and e= desired level of precision, indicated a minimum sample size of 288 was required for this study but 680 copies of the questionnaire were administered to ensure a good representation of the different subgroups considered in the study. Male and female students were sampled based on the proportion of male and female students in the selected classes and the various age groups were proportionally represented.

Procedure

The study's protocol was approved by the University of Ibadan/University College Hospital Research Ethics Committee while participants gave informed consent/assent before being recruited into the study. Prior to the administration of the questionnaires, a letter of introduction explaining the purpose of the study and assuring participants and their parents of the confidentiality of the data obtained was sent to parents of participants younger than 16 years to obtain their consent for their children's participation. A total of 680 copies of a respondent–administered, validated questionnaire were distributed among participants, but only 571 copies (83.97%) were returned. Copies of the questionnaire were distributed to the students by hand while one of the researchers waited to collect them on completion.

The questionnaire (Appendix 1) for this study was compiled based on questions from previously published surveys[5,6,11,16,17], but adapted and validated for use among Nigerian adolescents. The questionnaire had two sections and contained 22 questions. Section A of the questionnaire sought information on the demographic characteristics of sex, age, height and weight of participants. Its section B contained 16 items that helped to ascertain the presence and history of low back pain. The questionnaire was assessed for face and content validity by clinical physiotherapists and academic physiotherapists who are knowledgeable in questionnaire development, using a checklist for developing a questionnaire by Boynton and Greenhalgh[18]. The questionnaire was also pilot-tested among 72 students for its comprehensibility and clarity and among 22 students for its reliability. Its valid response rate was 95.8%, while Cronbach's alpha for its test-retest reliability ranged from 0.49-0.99. The students involved in the questionnaire's comprehension and reliability tests were excluded from the main study to forestall the effect of testing/learning on the study's outcome. The questionnaire was used to collect data on lifetime, 12-month, one-month and point prevalence of adolescent low back pain among the participants. It was also used to identify some contributory factors to low back pain.

Respondents were asked whether they had experienced LBP at their lower back region as was depicted by a diagram on the questionnaire. LBP was defined as pain or discomfort felt in the lumbo-sacral region of the back that is not related to menstrual periods or feverish illness such as the 'common cold or flu'. The data from this study were analysed using SPSS version 15. Statistical analyses were conducted using descriptive statistics of mean, standard deviation, frequency and percentages and inferential statistic of Chi-square, with level of significance (α) set at 0.05.

Results

Six hundred and eighty (680) copies of the questionnaire were distributed, but only 571 (83.97%) was returned and analysed. Participants (298 females (52.2%); 273 males (47.8%)) were aged 14.23±2.27years (range = 10-19 years). The participants' mean weight and height were 44.68 ± 10.46 kg and 1.55 ± 0.01m respectively (Table 1). Male participants (14.29 ± 2.37 years) were significantly older than female participants (14.18 ± 2.16 years). Boys were significantly taller (p = 0.000) but weighed significantly lesser than the girls (p = 0.027). The BMI of boys and girls were not significantly different while participants first experienced low back pain at 11.86 ± 2.36 years.

Table 1: Participants' socio-demographic characteristics

Variable	Boys (n=273)	Girls (n=298)	p	All (n=571)	Range
Age (yrs)	14.29± 2.37	14.18 ±2.16	0.022	14.23± 2.27	10-19
Height (m)	1.55± 0.12	1.54 ±0.09	0.000	1.55± 0.10	1.27-1.83
Weight (kg)	44.13± 11.01	45.18± 9.92	0.027	44.68 ±10.46	24-79
BMI (kg/m^2)	18.07± 2.61	18.75± 2.90	0 .068	18.43 ±2.79	11.71-28.16
Age at first pain experience (yrs)	11.56± 2.61	12.13± 2.07		11.86± 2.36	5-18
Duration of last episode				< One day - 54.5% < One week - 31.2% < One month - 7.9% < Three months- 3.0% > Three months – 3.3%	

The period prevalence rates among participants are presented in Table 2. Three hundred and thirty-one (58.0%) participants reported ever experiencing low back pain in their life time, while 250 (43.8%) and 146 (25.6%) reported to have experienced pain in the lower part of their back (as depicted in the diagram on the questionnaire) in the twelve months and one month preceding the study respectively. Further, 84 (14.7%) participants reported the presence of pain in the lower part of their back as at the time of the study (point prevalence). Thus the lifetime, twelve-month, one-month and point prevalence of LBP were found to be 58.0%, 43.8%, 25.6% and 14.7% respectively.

Table 2: Period prevalence rates and characteristics of adolescent low back pain among participants

Variable	Boys (n = 273)	Girls (n = 298)	p	All (n = 571)
Period prevalence (n / %)				
Lifetime	160/58.6	171/57.4	0.767	331/58.0
12-month	120/44.0	130/43.6	0.936	250/43.8
One-month	68/24.9	78/26.8	0.729	146/25.6
Point	36/13.2	48/16.2	0.317	84/14.7
Recurrence	130/43.6	102/37.4	0.030*	232/40.6
School absenteeism (n/ %)	32/11.7	43/14.4	0.289	75/13.1
Perceived risk factors (n/%)				
Sitting most of the time	29/10.6	33/11.1		62/10.9
Standing most of the time	21/7.7	19/6.4		40/7.0
Walking most of the time	21/7.7	22/19.6		43/7.5
Depression/anger	2/0.7	7/2.3		9/1.6
Activities requiring bending	44/16.7	49/16.4		93/16.3
School bag weight	41/15.0	39/13.1		80/14.0
Others	5/1.8	6/2.0	0.790	11/1.9
After school activity (n/%)				
Leisure	113/41.4	82/27.5		195/34.2
Commercial	26/9.5	39/13.1		65/11.4
Others	8/2.9	5/1.7	0.036*	13/2.3

***=Significant difference at α = 0.05 (two tailed)**

The lifetime, 12-month, one-month and point prevalence rates among girls were 57.4%, 43.6%, 26.2%, and 16.2% respectively compared to 58.6%, 44.0%, 24.9% and 13.2% respectively among boys. About 41.0% of the participants reported recurrence of their LBP and 13.1% had been absent from school due to LBP. The most perceived risk factor for LBP among participants was activities requiring bending (16.7%) and only 11.4% of participants engaged in commercial activities after school. Significant gender differences were however found for recurrence of low back pain and after school activity. Period prevalence rates according to age groups are presented on Table 3.

Table 3: Period prevalence rates of participants by age group

	Boys (n = 273)			Girls (n = 298)			All (n= 571)		
Age group (years)	**10-13**	**14-16**	**17 -19**	**10-13**	**14 -16**	**17-19**	**10-13**	**14-16**	**17-19**
Period prevalence (%)									
Lifetime	55.5	60.7	60.7	48.2	60.6	70.2	51.8	60.7	64.8
12-month	39.1	44.1	52.5	37.7	43.1	59.6	38.4	43.5	55.6
One-month	22.7	24.5	29.5	21.9	23.4	44.7	22.3	23.8	36.1
Point	6.4	15.6	21.3	14.1	13.1	27.7	10.7	14.1	24.1

All period prevalence rates increased with increasing age while boys had higher lifetime, 12-month and one–month prevalence rates until age group 17-19 when the prevalence was higher in girls. However, point prevalence was higher in girls except in 14-16 years age group. Association of period prevalence rates with age group, sex, history of back injury and engagement in after-school commercial activities is presented in Table 4.

Table 4: Association of period prevalence rates of adolescent low back pain with age group, sex, history of injury and engagement in commercial activities

Variable	PERIOD PREVALENCE							
	Life time		12-month		One-month		Point	
	χ^2	p	χ^2	p	χ^2	p	χ^2	p
Age group	6.31	0.043*	8.73	0.013*	7.92	0.019*	10.35	0.006*
Sex	0.09	0.767	0.03	0.872	0.12	0.727	1.00	0.317
History of back injury	12.02	0.001*	7.12	0.008*	8.59	0.003*	2.92	0.087
Engagement in commercial activities	8.72	0.003*	6.51	0.011*	7.15	0.007*	5.02	0.025*

Age group ($p \leq 0.043$) and engagement in after-school commercial activities ($p \leq 0.003$) were significantly associated with all period prevalence rates, history of back injury was significantly associated with lifetime ($p = 0.001$), 12-month ($p = 0.008$) and one-month ($p = 0.003$) while sex had no significant association ($p \geq 0.317$) with any of the period prevalence rates. Period prevalence rates of adolescent low back pain from five similar studies and a systematic review are presented in Table 5.

Table 5: Comparison of period prevalence rates on adolescent low back pain from different studies

STUDY POINT	YEAR	COUNTRY	N	PERIOD PREVALENCE (%) LIFE TIME	12-MONTH	1-MONTH	
Our study	2013	Nigeria	571	58.0	43.8	25.6	14.7
Ayanniyi et al	2011	Nigeria	1863	25.0%	-	-	-
Onofrio et al	2012	Brazil	1233	-	-	-	13.7
Sato et al	2008	Japan	43,630	28.8	-	-	10.2
Bejia et al	2005	Tunisia	622	28.4	-	-	13.0
Prista et al	2004	Mozambique	204	28.0	13.5	12.0	-
Louw et al (systematic review)	2007			36.0	33.0	-	12.0
Calvo-Munoz et al (systematic review)	2013			39.9	33.6	18.3	12.0

Rates from the present study were higher than those from previous studies but followed the same trend.

There was no significant association between engagement in commercial activities after school and age (Table 6).

Table 6: Association between engagement in commercial activities and age

Age Group (years)	Engagement in Commercial Activities Yes	No	Pearson χ	p
10-13	24	200	1.084	0.582
14-16	32	207		
17-19	11	97		

Discussion

Participants in this study were aged 10 to 19 years which conforms with the WHO's definition of adolescence[19] and age range of participants in previous studies on adolescent low back pain[4,5,6,8,11,12] The mean age of participants at first episode of back pain was 11.86 ± 2.36 years (range: 5- 18 years).

The lifetime, twelve-month, one-month and point prevalence rates of adolescent low back pain were 58.0%, 43.8%, 25.6% and 14.7% respectively. These values though higher than values from most of the previous studies[4,5,6,8,11,12] fall within the range reported by Jeffries et al[13] for the prevalence of low back pain during school years in developed countries (i.e. 7 to 70%)[13]. The point prevalence from this study was however similar to values from other studies[6,12,20] and the mean values reported in systematic reviews[14,21]. Two reasons that have been majorly adduced for differences in prevalence rates of ALBP across studies are the definition of low back pain and the study's design.[13]

In this study, back pain was defined as pain or discomfort felt in the lumbo-sacral region of the back that is not related to menstrual period or feverish illness such as common cold or flu. Participants were also assisted by a pictorial representation of the reference area. Common problems in recall prevalence rates are recall decay and forward telescoping. The extent to which participants are affected by these twin factors will determine the accuracy of all recall prevalent rates except point prevalence which will not be subjected to the influence of such factors. It is not surprising therefore that there was less variation in the point prevalence rates from the different studies in comparison to other recall rates as the longer the time period the greater the influence of memory decay. Memory decay is also affected by the significance of the incidence (back pain) and the innate ability of participants to recall events which could have affected participants in the different studies differently. Also, while point prevalence in this study was defined as pain at the time of the study, another study defined point prevalence as pain in the last 30 days[12] which could have been somehow affected by recall. As reported in previous studies, period and lifetime prevalence rates were higher than point prevalence rates with the rate being higher with longer period of recall[14,19,21,22] .

It is however instructive that the back pain suffered by 85.7% of participants lasted less than one week and 93.6 % for less than one month. This is considerably higher than the 66.7% and 86.1% for less than one week and less than one month respectively reported by Sato et al[16]. It seems therefore that back pain in majority of the participants can be described as transient and mild.

Although there was no significant association between gender and recall prevalence rates, boys had higher lifetime and twelve-month prevalence rates while girls had higher one-month and point prevalence rates. Our finding is contrary to that of Sato et al[16] who reported higher point prevalence among boys and higher lifetime prevalence among girls. However, Onofrio et al[12] found higher point prevalence (defined as low back pain in the last 30 days) in girls. Like in this study, Ayanniyi et al[11] found no significant association between low back pain prevalence and gender. Also, lifetime, twelve-month and one-month prevalence rates for boys were higher for the 10-13 and 14-16 age groups while at age group 17-19, all prevalence rates were higher in girls. Differences in growth rates between boys and girls could have accounted for the observed differences as high growth rate has been identified as a risk factor for the development of low back pain in adolescents.

Age and engagement in commercial activities after school were significantly associated with all period prevalence rates while history of back injury was significantly associated with all period prevalence rates except point prevalence. Ayanniyi et al[11] reported significant association between age and prevalence of adolescent back pain while point and lifetime prevalence rates have been found to increase with age by Sato et al[16]. Indeed, all period prevalence rates increased with increasing age in this study. Our finding of significant association between engagements in commercial activities after school hours agrees with that of Feldman et al[13] and Ayanniyi et al[11].

For economic reasons, a sizeable proportion of adolescent Nigerian students are forced to engage in after-school commercial activities in order to complement the lean family purse. It is therefore not unusual especially in big cities to find such children engaging in street hawking and sometimes acting as bus boys; activities that involve covering long distances by foot while pounding the roads and lifting loads for passengers respectively. Such activities may expose the adolescents to back injuries that may culminate in low back pain. This is especially so since walking more than 30 minutes per day has been found to be associated with an increased risk of low back pain among adolescents in Mozambique[22].

However, despite the expected interdependence between commercial activities and students' age as well as the significant associations between the period prevalence rates and engagement in commercial activities after school, there was no significant association between engagement in commercial activities and participants' age. This may be because children of varying ages are forced by their parents or guardians to engage in commercial activities before or after school hours. Point prevalence of adolescent low back pain was probably not associated with back injury because such injuries may not be serious enough to cause immediate low back pain but are repetitive in nature. The finding of significant associations between both engagement in after-school commercial activities and previous back injury suggest that both may be contributory or risk factors for the development of low back pain among adolescents. .

Activities requiring bending (16.3%), school bag weight (14%) and sitting most of the time (10.9%) were the most common perceived risk factors for low back pain

among participants. This finding is similar to that from Ayanniyi et al[11] and Onofrio et al[12]. The association between both prolonged/repeated bending and prolonged sitting and low back pain among adults are well established in literature hence it is not surprising that both activities have been identified as leading risk factors in this study. However, the link between school bag weight and adolescent low back pain has been anything but univocal. Thus, while Onofrio et al[12] found significant association between backpack weight and adolescent low back pain prevalence, neither satchel weight nor the mode of its carriage was found to be associated with adolescent low back pain among Tunisian adolescents[20].

Low back pain was responsible for absence from school in 13.1 percent of participants (boys = 11.7%; girls = 14.4%) while 40.6 % (boys = 43.6%; girls = 37.6%) of participants with low back pain had recurrent pain. Absenteeism resulting from low back pain in this study was lower than the 23% recorded among Tunisian school children[20] and the recurrence rate lower than the 60.5% among school children in Japan. The higher recurrence and lower absenteeism among boys may suggest that boys may be going to school despite their pain thus not allowing for complete or adequate recovery and thereby increasing the chances of recurrence. Absence from school among adolescents cannot however be explained exclusively by low back pain as there are other likely reasons that were not considered in this study and truancy is quite common among students of this age category. For instance, it is likely that back pain merely served as a good excuse for some of the participants to be absent from school while pain culture in the family and peer influence might have influenced the response of some to back pain.

Limitations: A major limitation to this study is its cross-sectional nature which does not permit cause and effect interpretation of its findings. Indeed, aetiology of adolescent low back pain was not investigated in this study. Also worthy of note are the usual limitations associated with recall prevalence studies- memory decay and forward telescoping. Finally, other variables beside low back pain that may precipitate school absenteeism among adolescents were not considered in this study. Conclusions from this study should hence be drawn cautiously.

Conclusion and recommendation

This study revealed that ALBP is common among secondary school students in Ibadan, Nigeria and that the prevalence of ALBP is significantly associated with age and engagement in commercial activities, but not with gender. There is a need for the introduction of health education strategies within the school setting to stem the tide of ALBP and hence LBP among adults.

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