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Low Back Pain among Primary School Children: Prevalence and Risk Factors. A Cross-Sectional Study in Ouagadougou (Burkina Faso)

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ABSTRACT

Objective: The aim of this study was to determine the prevalence and associated factors of low back pain among schoolchildren in Ouagadougou.

Patients and methodology: It was a cross-sectional study from the 1st to the 30th of June 2018 involving schoolchildren of 6 to 16 years old from two schools (public and private). We included all consenting schoolchildren. We required a parental consent form duly filled and signed. Two rheumatologists examined all the included schoolchildren. We studied the socio-demographic characteristics, lifestyle, clinical characteristics, weight of the schoolbag and the family history of each school child.

Results: Three hundred and ninety-six schoolchildren were included. One hundred and fifty-three (38.6%) had excess schoolbag weight at 10% of body weight, thus failing to meet international recommendations. The prevalence of low back pain was 9.01% (36 children: 17 boys and 19 girls). Their average age was 9.3 ± 1.87 years with extreme ages of 6 and 14 years. In a multivariate analysis, only the type of house (story building), smoking by a parent and low back pain of a parent were the risk factors for low back pain in schoolchildren with odd ratios at 3.06, 3.52 and 2.69, respectively.

Conclusion: Educating parents about the passive smoking they are exposing their child could reduce the prevalence of low back pain in school settings. These data should also be considered in educational campaigns for reducing school equipment weight.

Keywords: Prevalence, Low back pain, School children, Africa

INTRODUCTION

Low back pain is a real public health problem because of its frequency and impact. Its prevalence has been estimated at 18.3% in adults [1]. It has been shown that in workplace, low back pain affects nearly 50% of hospital staff of a public health facility in Burkina Faso [2]. Epidemiological studies have shown that it is not only an adult pathology but also frequently reported in children and adolescents [3,4]. However, reported prevalence varies widely from one study to another, ranging from 8% to 74% in schools [5]. In Africa, few studies have been published on this subject. The few studies reported a prevalence of low back pain ranging from 12.3% to 37.8% in school settings [6-9].

The risk factors associated with low back pain in schools also vary according to the series [4]. Individual factors (age, sex, weight and height of the schoolchild), exposure factors (heavy load handling, prolonged postures, sitting or not, weight of bag, distance from home to school) and social factors (low back pain in parents, passive smoking) were mentioned. The family history of low back pain, the way of carrying school bag, the time spent walking to school, the

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length of the sitting position and the weight of the bag seem to be associated with low back pain in African series [6-9].

Although the association between schoolbag weight and low back pain is strongly debatable [5], the international recommendations limit the weight of the schoolbag between 10% and 15% of the body weight [10,11]. The purpose of our work was to study the prevalence and factors associated with low back pain in schools of Ouagadougou, Burkina Faso.

PATIENTS AND METHODOLOGY

Sampling

We performed a cross-sectorial, descriptive and analytical study that involved school children of 6 to 16 years old. Two schools (one public and one private) were picked randomly in the city of Ouagadougou.

The minimum size of our sample was calculated according to Schwartz's formula:

$$n_0 \geq [\frac{z_\alpha{}^2 f(1-f)}{l^2}]g(1+t)$$

n_0 is the minimal size of the desired sample;

z_α is a coefficient that measures accuracy. Considering a risk error α=0.05 we will have z_α=1.96;

l is the absolute error margin on the estimate of the proportion. For this study, it is recommended to consider l=0.05;

f is the approximate value of the key variable of the study. The value of f was 12.3 which is the prevalence of low back pain according the study of Ngongang et al. [9] in Cameroon;

g is the cluster effect or survey plan effect, in Africa, it is between 2 and 3;

t is the expected non-response rate. It is better to anticipate a non-response rate of 10%.

$$n \geq \left[\frac{(1,96)^2 \times 0,123(1-0,123)}{(0,05)^2}\right] 2(1+0,1) \quad => n \geq 364$$

The minimum size of our sample=364 school children. **Figure 1** showed algorithm of the selection of the school children.

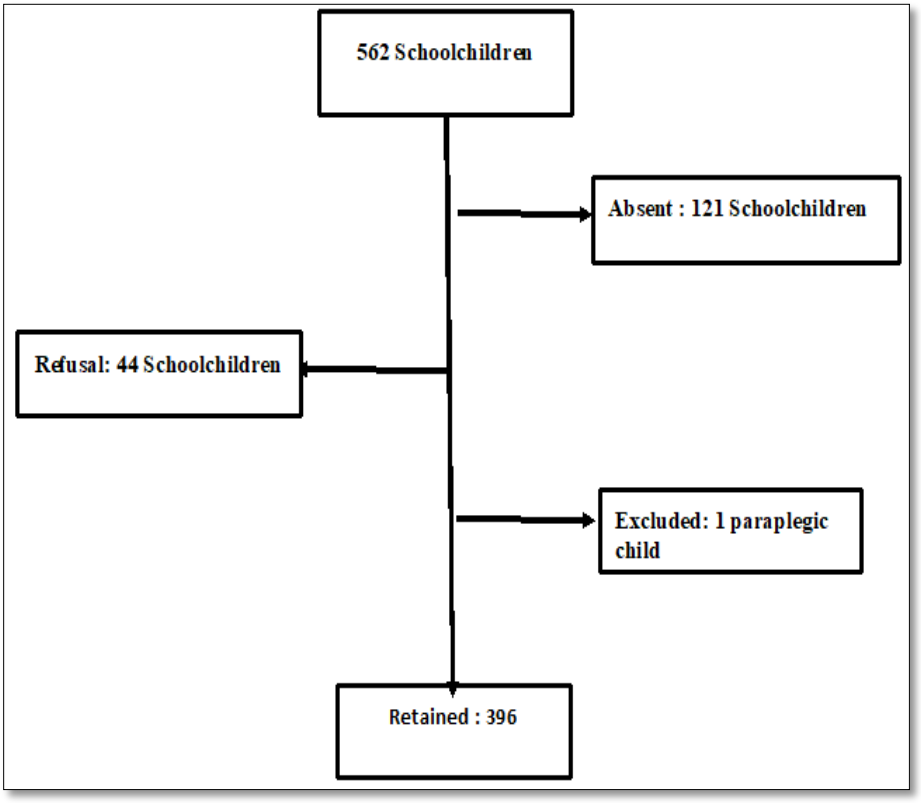

Figure 1. Algorithm of the selection of the school children.

Criteria

Our study included: all school children of both genders, attending the designated institutions, in 2nd, 3rd, 4th and 5th grades, carrying a school bag.

The following have been excluded: any consenting school child but for whom we have not received parental permission, any non-consenting child, any paraplegic school child. School children having difficulty to answer questions due to drug treatment or brain disease, school children

absent and those who refused to participate, were also excluded.

Study variables and tools

The following variables were studied:

- Socio-demographic characteristics: age, sex, class, means of transportation, type of school (private or public), residence, type of house (flat or story building);

- The way of life: availability of running water, domestic work, concept of field work, concept of smoking, notion of alcoholism, practice of competitive sports, the regular way of moving from home to school, distance from home to school, the time spent between home and school;

- The clinical characteristics: weight, height, body mass index (BMI), pain intensity assessed by a visual analogue scale (VAS) (mild pain: EVA=1, 2, 3; moderate pain: EVA=4, 5, 6; Severe pain: EVA=7, 8, 9, 10);

- The weight of the bag and the percentage of the weight of the schoolbag relative to the schoolchild's body weight $(\frac{\text{weight of schoolbag}}{\text{weight of schoolchild}} * 100)$.

- Family antecedents: notion of low back pain of a parent, alcoholism in a parent, smoking by one of the parents.

Data collection

A letter was sent to the managers of the selected institutions in order to first explain the study and to have their authorizations to contact students and their parents. Following that, we conducted an interview with the managers and teachers of the institutions on the objectives and the progress of the study. Thirdly, we sent the parents of the school children a letter and a request for consent and assent. The school children from whom we have received the parents' consent received a copy of the questionnaire that was appropriate for their level of understanding, helped by emoticons and diagrams to facilitate understanding, with clear explanations given for each question to the school children. A questionnaire was also administered to theirs parents. The school children were then individually led by the teachers to the selected place of examination and set up for this purpose within the school;

The physical examination was performed individually by senior rheumatologists in the presence of the teachers of each student respecting the privacy of each child.

STATISTICAL ANALYSES

All the data from each schoolchild were collected on a survey sheet.

The data was recorded and processed using the Epi Info 7 software. The data was then analyzed using the XLSTAT 2007 software. The quantitative variables were presented according to the central tendency and dispersion parameters and the qualitative variables in numbers and percentages. In a bivariate analysis, the qualitative variables were compared using the Chi^2 test and Fisher's exact probability. Quantitative variables were compared using the Student's T-test. The multivariate logistic regression test was used to determine factors associated with low back pain based on socio-demographic and clinical data. The odd ratio and its confidence interval made it possible to quantify the association. Differences were considered significant for ($p<0.05$).

ETHICAL CONSIDERATION

The study was approved by the ethics committee of establishment of the Bogodogo teaching hospital. The authorizations of the managers of the various institutions as well as those of the parents of the students chosen for our study were obtained. Only consenting students were examined. Cases of low back pain needing treatment and any other rheumatologic infection needing treatment were taken care at the Rheumatology ward of the Bogodogo teaching hospital. An explanation was given to each schoolchild about his/her pathology. Confidentiality of data was respected during data collection. The anonymity of the data has been respected.

RESULTS

General characteristics of school children

Three hundred and ninety-six (396) schoolchildren were included in the study. **Figure 1** shows the algorithm of the selection for our sample. There were 202 (51%) boys and 194 (49%) girls, a sex ratio of 1.04. The average age of schoolchildren was 10 ± 2.07 years with extremes at 6 and 16 years. Two hundred and ninety-eight (75.25%) had a normal BMI, 45 (11.36%) were overweight and 53 (13.38%) were underweight. Low back pain in one parent was reported in 129 (32.58%) school children.

School bag weight

The average weight of the backpack was 3 ± 1.48 kg. 153 (38.6%) had a bag weighing 10% or more of their body weight and 41 (10.35%) had their bags weighing more than 15% of their body weight.

Lifestyle

Household chores were carried out by 293 (73.99%) of the school children. **Table 1** shows the distribution of school children by lifestyle.

Table 1. Distribution of school children according to lifestyle.

	Number	Percentage
Presence of running water	343	86.62
Household chores	293	73.99
Concept of field work	25	6.31
Smoking parents	90	22.73
Alcoholism at parents level	40	10.10
Competition Sports	77	19.44

Characteristics of school children with low back pain

Prevalence and characteristics of school children with low back pain: 36(9.1%) school children had low back pain. Their average age was 9.3 ± 1.87 years with extreme ages at 6 and 14 years. In among them, 10 (28.78%) school children's low back pain had already required a medical consultation. 18 school children (50%) complained of low intensity lumbago. **Figure 2** shows the distribution of children by pain intensity.

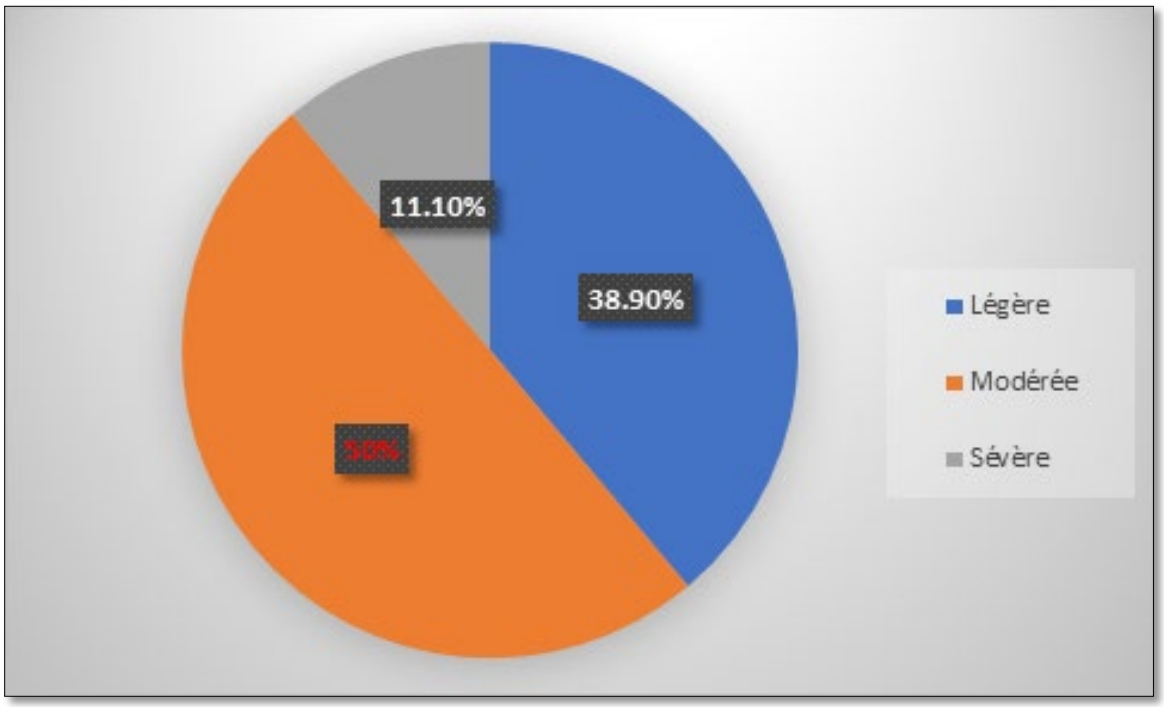

Figure 2. Distribution according to the intensity of low back pain.

Risk factors

Factors related to the school child: 11 (24.44%) overweight children had low back pain compared to 25 (7.12%) children with normal weight (p=0.0008). The breakdown by student factors is shown in **Table 2**.

Table 2. Factors related to the pupil.

Low Back Pain					
	Yes		No		Probability (p)
	N	%	N	%	
Age					
≤ 10 years	26	10.24	228	89.76	0.36
>10 years	10	07.04	132	92.96	
Gender					
Masculine	17	8.42	185	91.58	0.72
Feminine	19	9.8	175	90.2	
Overweight					
Yes	11	24.44	34	75.56	0.0008
No	25	7.12	326	92.88	
Competition sport					
Yes	10	3.3	293	96.7	0.18
No	26	27.96	67	72.04	
Smoking					
Yes	13	14.44	77	85.5	0.04
No	23	7.52	283	92.48	
Alcoholism					
Yes	5	12.5	35	87.5	0.38
No	31	8.71	325	91.29	
Concept of trauma					
Yes	16	100	0	0	0.00
No	20	5.26	360	90.91	

School factors: The prevalence of low back pain was significantly higher in the private school (14.09%) than in the public school (6.07%) (p=0.01). **Table 3** summarizes the school risk factors for low back pain.

Table 3. School risk factors.

Low Back Pain					
	Yes		No		Probability (p)
	N	%	N	%	
Type of School					
Private	21	14.09	128	85.91	0.01
Public	15	06.07	232	93.93	
Grade					
2nd and 3rd	25	10.29	218	89.71	0.37
4th and 5th	11	07.19	142	92.81	
Way of carrying school bag					
Normal	27	9.68	252	90.32	0.70
Abnormal	9	7.69	108	92.31	
% of school bag weight					
<10%	19	7.82	224	92.18	0.13
≥ 10%	17	11.11	136	88.89	
<15%	31	08.73	324	91.27	0.23
≥ 15%	05	12.2	36	87.8	
Time taken					
<30 min	28	9.46	268	90.54	0.84
≥ 30 min	8	8.00	92	92.00	
Concept of trauma					
Yes	16	100	0	0	0.00
No	20	5.26	360	90.91	

** **Time taken:** Time taken to get to school, regardless of the transportation mean*

Family factors: Among children with a family history of low back pain, 21 (16.28%) had low back pain compared to 15 (5.62%) in among those with no family history of low back pain (p=0.001).

The distribution of children with low back pain according to family risk factors for low back pain is shown in **Table 4**.

Table 4. Family risk factors for low back pain in schools.

Low Back Pain					
	Yes		No		Probability(p)
	N	%	N	%	
Concept of low back pain in parents					
Yes	21	16.28	108	83.72	0.001
No	15	05.62	252	94.38	
Household chores					
Yes	25	08.53	268	91.47	0.55
No	11	10.68	92	89.32	
Presence of running water					
Yes	33	9.62	310	90.38	0.18
No	3	5.66	50	94.34	
Field work					
Yes	3	12	22	88	0.48
No	33	8.89	338	91.11	
Type of house					
Flat	24	7.16	311	92.84	0.005
One story building	12	19.67	49	80.33	
Distance travelled					
<1000 m	12	9.09	120	90.91	1.00
>1000 m	24	9.09	240	90.91	

Multivariate analysis of risk factors: In a multivariate analysis, children who lived in one-story homes and had parents smoking with low back pain had significantly higher risks of having low back pain than other children **(Table 5)**.

Table 5. Multivariate analysis of risk factors for low back pain.

Low back pain			Multivariate	
	Oui	Non	OR 95%	Probability
	n=36(%)	n=360 (%)	(Gross)	
Type of house				
Flat	24 (66.7)	311 (86.4)	Reference	0.01
One story building	12 (33.3)	49 (13.6)	3.06 (1.19-8.41)	
Smoking				
No	23 (63.9)	283 (78.6)	Reference	0.004
Yes	13 (36.1)	77 (21.4)	3.52 (1.47-8.4)	
Low back pain at parents level				
No	15 (41.7)	252 (70)	Reference	0.01
Yes	21 (58.3)	108 (30)	2.69 (1.26-5.71)	

DISCUSSION

The prevalence of low back pain was 9.1% in our series. In a univariate analysis, overweight, family history of smoking, school type (private), low back pain of a parent and type of home (one story house) were the factors associated with low back pain in schools. In a multivariate analysis, only the type of house (one story house), smoking by a parent and low back pain of a parent were the risk factors for low back pain in school children with odd ratios of 3.06, 3.52 and 2.69, respectively.

The prevalence of low back pain in schools ranges from (8% to 74%) depending on the age group and the weight of the school bag [5-7,12]. The prevalence reported in our series appears to be the lowest in sub-Saharan Africa; indeed, in Cameroon, Chiedjio [9] reported a prevalence of 12.3% in a population of 1,075 school children with an average age of 11 years; in Uganda, Mwaba et al. [8] reported a prevalence of 37.8% of low back pain in a population of 532 school children with an average age of 13.6 years; Ayanniyi et al. [6] found a prevalence of 25% of low back pain in 3185 school children with an average age of 15 years and predominantly adolescents (64% between 14 and 16 years) in Nigeria. The difference observed in terms of prevalence with our series (9.1%) could be due to the profile of the study populations (elementary and average courses, average age of 10 years ± 2.07 years) but also to the specific risk factors. children, their environment and the weight of the schoolbag. According to the literature, the intensity of low back pain was mild to moderate [6].

Risk factors for low back pain in school children are controversial [4,12-15]. Single-story home, passive smoking and low back pain of a parent were the risk factors associated with low back pain in our series after logistic regression and multivariate analysis; the weight of the school bag was not statistically associated with low back pain.

The role of the weight of the school bag is very controversial in the occurrence of low back pain in school [5]. 153 school children (38.6%) had excess bag weight at (10%) of body weight, thus failing to meet international guidelines [10,11]; this frequency varies from (30.8% to 70%) in some African, European and American series [6-9]. In a recently published systematic review, Yamato et al. [5] did not find evidence of the role of the weight of the school bag in the occurrence of low back pain in children and adolescents. The diversity of methodologies used, the age groups studied and especially the scarcity of randomized and controlled studies or longitudinal studies have been the limits of this review and cannot lead to definitive conclusions [5]. Also, the hypothesis of excess weight of the school bag (WESM) in the onset of low back pain in schools imposes a weight limitation of the school bag to (10% or 15%) of the body weight by health professionals [10].

Interestingly, the prevalence of low back pain was higher in private schools than in public ones. Giutsi et al. [15] also reported a higher prevalence of low back pain (68.5%) in private schools than in public schools (9.3%). This association between low back pain and type of school disappears in our series after a multivariate analysis. However, further studies are needed to investigate the risk factors that may explain this high prevalence of low back pain in the private sector.

Tobacco is known to be a risk factor for the development of low back pain in adults [16]. Passive smoking has been a risk factor (OR) in our series and in that of Cameroon [9] justifying awareness rising of parents about passive smoking of children. Although the mechanism is not well known, the association Between current smoking and the incidence of low back pain was stronger in adolescents (OR 1.82, 95% CI, 1.42-2.33) than in adults (OR 1.16, 95% CI, 1.02-1.32) [17].

Our study focused on low back pain in schools. Some publications have shown that musculoskeletal disorders (63.4%) associated with wearing a backpack predominate more on the shoulders (27.3%) than on the back (15%) [18]. For other authors, the weight of the bag would be associated with pain in the shoulders and wrists [11]. Other studies are needed in our context to understand the psycho-social factors [4,19], all musculoskeletal disorders, their impact on school results and their association with the weight of the schoolbag for better management [20]. Our study, which aimed to assess the prevalence and risk factors of low back pain in schools, has limitations; in spite of a rigorous clinical examination, it is possible that rough forms of juvenile ankylosing spondylitis are disregarded. Ankylosing spondylitis is, however, a rare condition in our context because of the low prevalence of carriage of HLA B27 [21].

CONCLUSION

Despite the international recommendations, over a third of school children had schoolbag with excess weight. Low back pain seems to be more common in the private schools than in public ones. Factors such as the type of home, smoking by a parent and low back pain of a parent were associated with a risk of developing low back pain in schools. These data should be considered in educational campaigns for reducing school equipment weight.

COMPLIANCE OF ETHICAL STANDARDS

Conflict of interest

None of the authors have any potential conflict of interest.

Informed consent

We declare that all school children and their parents gave informed consent prior to inclusion in this study.

Ethical approval

This cross-sectional study was approved by an institutional research ethics board.

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