Effects Of Back School On Chronic Nonspecific Low Back Pain In Adolescents

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KEYWORDS

Low back pain, BMI, backpack weight, posture, risk factors, prevention

ABSTRACT:

Background: Low back pain (LBP) is a common condition among adolescents, with significant implications for their health and quality of life. This study aimed to assess the prevalence of LBP and examine its associations with age, Body Mass Index (BMI), backpack weight, and posture in adolescent students. ***Methods:*** A cross-sectional study was conducted with 60 adolescent students aged 14-17 years from local schools in Dhaka, Bangladesh. Data were collected through self-reported questionnaires and physical assessments to determine the prevalence of LBP and identify risk factors. Participants were categorized based on age, BMI, backpack weight, and posture type. Descriptive statistics and Chi-square tests were used for analysis, with a p-value of <0.05 considered statistically significant. ***Results:*** The prevalence of LBP was found to be 78.3%, with the highest incidence observed in 15-year-olds (50%) and underweight adolescents (50%). A significant association was found between LBP and heavier backpack weight, with 33.3% of students in the 2.001–3.00 kg category reporting pain. Posture type was also a significant factor, with sitting posture (41.7%) being most strongly associated with LBP. Statistical analysis revealed significant associations between age, BMI, backpack weight, and posture type with the prevalence of LBP ($p<0.05$). ***Conclusions:*** The study highlights the high prevalence of LBP among adolescents, particularly in relation to age, BMI, backpack weight, and posture. These findings suggest that interventions such as Back School programs, aimed at promoting proper posture and reducing backpack weight, could help prevent and manage LBP in this age group. Further longitudinal studies are recommended to explore the long-term effects of these factors on adolescent back health.

INTRODUCTION

Low back pain (LBP) is a widespread health issue with considerable social and economic impact, affecting individuals across all age groups. It is particularly prevalent in younger populations, with studies showing that approximately 12-80% of students experience LBP [1-4]. In adults, the global prevalence of LBP has been well-documented, with point prevalence ranging from 12% to 33% and a 1-year prevalence ranging from 22% to 65% [5]. In adolescents, LBP is equally common and can have lasting effects. A study in Brazil found that 31.6% of adolescents reported experiencing LBP, with girls showing higher prevalence than boys (41.9% vs. 21.4%) [6].

The occurrence of LBP in adolescence is concerning as it is associated with an increased risk of chronic low back pain (CLBP) in adulthood. Adolescents who experience LBP have a fourfold increased risk of developing CLBP later in life [7]. In Europe, the cumulative annual incidence of LBP symptoms in adolescents is 24%, and in the United States, LBP is the fifth most common reason for physician visits

[8,9]. These statistics highlight the need for early intervention to prevent the transition from acute to chronic low back pain.

LBP is not only a common health issue but also the leading cause of disability and work absence worldwide, imposing significant economic costs on individuals, healthcare systems, and economies [10]. Non-specific low back pain (NSLBP), in particular, has gained increasing attention, with recent research indicating that 13%-36% of adolescents will experience recurrent NSLBP, which can affect their physical and psychological well-being [11]. Furthermore, studies suggest that the prevalence of LBP in adolescents is comparable to that of adults, with rates varying between 30% and 70%, depending on the study design and population [12].

One promising approach to addressing LBP, especially in adolescents, is the Back School program. This program focuses on educating individuals about proper posture, ergonomics, and exercises designed to prevent and alleviate LBP. By promoting awareness and offering practical solutions, the Back School aims to reduce the incidence of chronic nonspecific low back pain (NSLBP) and improve the overall well-being of those affected.

In light of the high prevalence of LBP in adolescents and its potential long-term consequences, it is critical to evaluate the effectiveness of interventions like the Back School program. Given the increasing burden of NSLBP, both on individual health and on public health systems, it is essential to explore and promote strategies that can mitigate the impact of this condition, particularly in young populations at risk of developing chronic pain.

METHODOLOGY:

Study Design: This observational, cross-sectional study was conducted to assess the prevalence of low back pain (LBP) among adolescents and examine the potential associations between various factors, including age, Body Mass Index (BMI), backpack weight, and posture types.

Study Site: The study was carried out in a school setting, targeting adolescents from various educational institutions within Dhaka, Bangladesh. The research was conducted in collaboration with local schools to assess the prevalence of LBP and gather data on potential risk factors.

Period of Study: The study was conducted over a six-month period, from January 2014 to June 2014, allowing for adequate data collection and analysis.

Sample Size: A total of 60 adolescent students, aged between 14 and 17 years, participated in this study. The sample was selected through voluntary recruitment, ensuring that participants provided informed consent, along with consent from their guardians. The study aimed for a diverse and representative sample, incorporating variations in age, gender, Body Mass Index (BMI), and other demographic characteristics to enhance the generalizability of the findings within the adolescent population. Inclusion criteria for participation were adolescents aged 14 to 17 years, both male and female, who provided consent, along with their guardians' consent. Exclusion criteria included adolescents with a history of significant spinal deformities or other musculoskeletal disorders unrelated to low back pain, as well as those who had previously undergone back surgery or were diagnosed with chronic low back pain before the study.

Data Collection: Data were collected through a combination of self-reported questionnaires and physical assessments. The questionnaires included questions about participants' medical history, lifestyle, and risk factors for LBP, such as BMI, backpack weight, and posture. Physical assessments were conducted to evaluate the presence and severity of LBP, and participants were categorized based on their BMI, posture type, and backpack weight.

Statistical Analysis: Descriptive statistics were used to summarize the data. The prevalence of LBP was calculated by age group, BMI category, backpack weight, and posture type. Chi-square tests were

performed to examine the associations between LBP and the different categorical variables. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: The study adhered to ethical guidelines and was approved by the institutional review board of the Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. Written informed consent was obtained from all participants and their guardians before data collection.

RESULT:

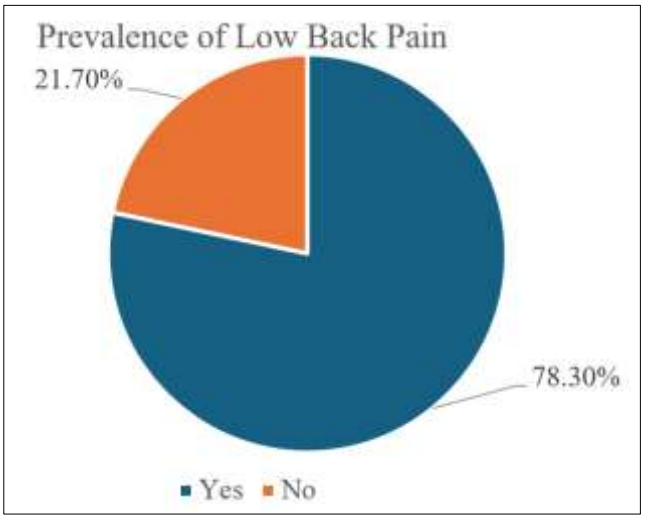

Figure 1: Prevalence of Low Back Pain

The pie chart in Figure 1 illustrates the prevalence of low back pain (LBP) among the study participants. The results show that a significant proportion of participants, 78.3%, reported experiencing LBP, while 21.7% indicated they did not suffer from this condition.

Table 1 presents the prevalence of low back pain (LBP) across different age groups within the study population. The data shows that LBP prevalence was highest among 15-year-olds, with 50.0% (n=30) of participants reporting the condition. This was followed by 16-year-olds at 25.0% (n=15) and 17-year-olds at 15.0% (n=9). The lowest prevalence was observed in the 14-year-old age group, with 10.0% (n=6) reporting LBP.

Table 1: Prevalence of Low Backpain by Age group (with p-value)

Age Group	Frequency (n=60)	Percentage (%)	p-value
14 years	6	10.0%	$p < 0.05$
15 years	30	50.0%	
16 years	15	25.0%	
17 years	9	15.0%	

Table 2 presents the prevalence of low back pain (LBP) across different Body Mass Index (BMI) categories within the study population. The highest prevalence was observed in the underweight category, with 50.0% (n=30) of participants reporting LBP. This was followed by the normal BMI category with 33.3% (n=20) prevalence. The prevalence was lower in the overweight category (13.3%, n=8) and the lowest in the obese category (3.3%, n=2). Statistical analysis reveals a significant association between BMI and the prevalence of LBP, with a p-value of less than 0.05. This suggests that BMI may be a significant factor influencing the likelihood of experiencing low back pain.

Table 2: Prevalence of LBP by BMI Category (with p-value)

BMI Category	Frequency (n=60)	Percentage (%)	p-value
Underweight	30	50.0%	$p < 0.05$
Normal	20	33.3%	
Overweight	8	13.3%	
Obese	2	3.3%	

Table 3 illustrates the prevalence of low back pain (LBP) across different weight categories of backpacks among the study participants. The highest prevalence was observed in the 2.001–3.00 kg backpack weight category, with 33.3% (n=20) of participants reporting LBP. This was followed by the 3.001–4.00 kg category, with 30.0% (n=18) of participants experiencing LBP. The prevalence decreased in the 4.001–5.00 kg category, with 25.0% (n=15), and was lowest in the 5.001–6.00 kg category, with 11.7% (n=7) reporting LBP. The statistical analysis indicates a significant relationship between backpack weight and the prevalence of LBP, with a p-value of less than 0.05.

Table 3: Prevalence of LBP by Backpack Weight (with p-value)

Weight of Backpack	Frequency (n=60)	Percentage (%)	p-value
2.001-3.00 kg	20	33.3%	$p < 0.05$
3.001-4.00 kg	18	30.0%	
4.001-5.00 kg	15	25.0%	
5.001-6.00 kg	7	11.7%	

Table 4 presents the prevalence of low back pain (LBP) according to different posture types among the study participants. The highest prevalence was observed in the sitting posture category, with 41.7% (n=25) of participants reporting LBP. This was followed by the half-lying sitting posture category, where 33.3% (n=20) of participants experienced LBP. The prevalence was lower in the slouch posture category (16.7%, n=10), and the lowest prevalence was found in the “other posture” category (8.3%, n=5). The statistical analysis indicates a significant association between posture type and the prevalence of LBP, with a p-value of less than 0.05. This suggests that certain postures, particularly sitting and half-lying sitting, are significantly associated with an increased risk of low back pain.

Table 4: Prevalence of LBP by Posture Type (with p-value)

Posture Type	Frequency (n=60)	Percentage (%)	p-value
Sitting Posture	25	41.7%	$p < 0.05$
Half-Lying Sitting Posture	20	33.3%	
Slouch Posture	10	16.7%	
Other Posture	5	8.3%	

DISCUSSION:

The findings of this study underscore the significant prevalence of low back pain (LBP) among adolescents, with key associations identified between age, Body Mass Index (BMI), backpack weight, and posture type. A large proportion of participants (78.3%) reported experiencing LBP, consistent with global trends that indicate a high prevalence of this condition in adolescent populations [13,14]. The results of this study emphasize the importance of identifying risk factors contributing to the high incidence of low back pain in adolescents, with particular focus on factors such as age, BMI, backpack weight, and posture.

The study revealed a significant variation in the prevalence of LBP by age group, with 15-year-olds showing the highest prevalence (50%), followed by 16-year-olds (25%), 17-year-olds (15%), and 14-year-olds (10%). These findings align with previous studies suggesting that adolescents in the age range of 15-16 years are at higher risk of experiencing LBP [15,6]. The increasing prevalence with age could be attributed to the physiological and lifestyle changes that occur during adolescence, including increased schoolwork, sedentary behavior, and physical growth. Additionally, as adolescents progress

through school, their exposure to risk factors such as poor posture and excessive backpack weight increases, further elevating the likelihood of LBP.

The association between BMI and LBP in this study was significant, with the highest prevalence observed among underweight adolescents (50%), followed by those with normal BMI (33.3%), overweight (13.3%), and obese (3.3%) adolescents. This finding is contrary to some previous research suggesting that obesity is a primary risk factor for LBP [16]. However, it aligns with studies like those by Chiwaridzo & Naidoo (2014), which found that both underweight and overweight adolescents could experience a higher prevalence of LBP [11]. Underweight adolescents may experience higher stress on their musculoskeletal system due to poor posture or lack of muscle support, while overweight adolescents may have additional strain on their lower back. The findings suggest that both ends of the BMI spectrum should be addressed when designing preventive measures for LBP in adolescents.

Backpack weight was found to have a significant effect on the prevalence of LBP, with the heaviest prevalence in the 2.001-3.00 kg category (33.3%), followed by 3.001-4.00 kg (30%), 4.001-5.00 kg (25%), and 5.001-6.00 kg (11.7%). This finding corroborates previous studies indicating that carrying heavy backpacks is associated with an increased risk of musculoskeletal issues, particularly LBP [17,12]. As backpack weight increases, the stress on the spine and muscles of the back also intensifies, potentially leading to posture-related issues and the development of chronic pain. The results suggest that interventions aimed at reducing backpack weight or promoting ergonomically designed backpacks could help alleviate LBP in adolescents.

The type of posture adopted by adolescents was also significantly associated with LBP prevalence. Sitting posture was most commonly associated with LBP (41.7%), followed by half-lying sitting posture (33.3%), slouch posture (16.7%), and other postures (8.3%). This finding is in line with previous studies that highlight the role of poor posture, particularly sitting and slouching, in the development of LBP in adolescents [18,19]. Poor posture, especially while sitting for prolonged periods, can strain the muscles and ligaments of the lower back, contributing to discomfort and pain. These results underscore the importance of educating adolescents about proper posture and the risks of prolonged sitting, particularly in the context of schoolwork and screen time.

Limitations

This study provides important insights into the prevalence and risk factors of low back pain (LBP) in adolescents; however, its cross-sectional design limits the ability to establish causal relationships between the identified risk factors and LBP. Future longitudinal studies are needed to assess how these factors contribute to the development of chronic low back pain over time. Additionally, the sample size and geographical scope of this study may limit the generalizability of the findings. Expanding the research to include larger and more diverse populations would enhance the applicability of the results.

CONCLUSION:

This study highlights the high prevalence of low back pain (LBP) among adolescents and identifies significant risk factors such as age, BMI, backpack weight, and posture. The findings underscore the importance of addressing these factors in the prevention and management of chronic nonspecific low back pain (NSLBP). Interventions like Back School programs, which promote proper posture, reduce backpack weight, and encourage physical activity, could be effective in mitigating the burden of LBP in adolescents. Future studies are needed to further explore these associations and the long-term impact of such interventions.

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