Prevalence of Self-Reported Musculoskeletal Pain, Perceived Risk Factors And Quality of Life Among School Going Students

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Abstract

Introduction: Reports from WHO states low back pain and neck pain as top musculoskeletal disorders that has brought enormous global burden among school children. This study aimed to determine and understand prevalence, pattern of musculoskeletal pain and quality of life in population sample under the age of 18 years. **Methods:** This study was conducted on 500 school students in age group of 10-17 years. Self-reported musculoskeletal symptoms of students and region of body involved were obtained. Common factors which students perceived as responsible for musculoskeletal pain were included as part of the questionnaire along with hours of physical activity at and after school. Most commonly performed recreational activities at home was included to obtain details on sedentary lifestyle behavior of students. Health related Quality of Life (HRQoL) was assessed by 23 item-four multidimensional scale, the Pediatrics Quality of Life Inventory (PedsQL) 4.0 Generic Core scales for students and teens. It included four dimensions-Physical functioning, Emotional functioning, Social functioning and School functioning. **Results:** Prevalence of musculoskeletal pain was found to be 23.4%. Shoulder was commonly involved followed by neck and lower back. 46.2% students felt inappropriate bag weight followed by prolonged sitting to be the common factors for pain. Watching television and playing mobile games as sedentary activities, occupied most of the time after school. Weak associations were observed between gender and presence of symptoms. Analysis of PedsQL showed better quality of life among students in total scores and sub scores. **Discussion:** Higher prevalence of musculoskeletal pain symptoms observed in school students and adolescents and risk factors analysis, as observed in this study highlights the importance to device appropriate measures to prevent these symptoms.

Keywords: Health Related Quality of Life, Musculoskeletal Pain, Pediatric Quality of Life Inventory, School Students

1. Introduction

School students need an ideal atmosphere for learning. They need to provide undivided attention and focus on what the teacher is explaining without any distractions but nowadays, musculoskeletal symptoms are not only seen in older people but also in young school going students. This not only distracts them from their studies, thereby reducing their quality of education but also causes musculoskeletal discomfort and if not addressed, can lead to permanent musculoskeletal changes.

All over the world, there has been an outcry by parents, school officials and health professionals concerning the carrying of backpack loads beyond the recommended

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safe limit of 10% to 15% of body weight by school going students[1]. It is believed that heavy weight of students's backpack causes excess load into spine, and this is causing some concern for parents and the students who have to carry them. There is a particular concern for junior students in secondary schools as the spine is at a critical stage of development between 12-14 years of age[1,2].

Many school students reported of having some or the other pain. Moreover, recently it is well noticed that large number of students visit physicians to get treated for their musculoskeletal problems and spinal pain seems to be the most common reason. Studies reveal that musculoskeletal discomforts experienced by growing students are significantly connected to backpack loads and have reported that heavy backpack loads can actually result in changes in posture. However, anatomical sites other than back has been least explored and review of literature by the authors suggested that the number of these studies are few[2-8].

Although many factors can lead to musculoskeletal symptoms in school students- increased participation in sports/exercise, poor posture while sitting and long periods of inactivity, and carriage of heavy backpack is manifestly a suspected factor. Carrying too much weight in a schoolbag, or wearing it incorrectly can cause long term musculoskeletal problems in all students. Significant relationship was found between the carriage of school bags and posture and gait of students, and suggested that it might lead to a variety of musculoskeletal problems such as muscle soreness, numbness, back pain and complains of aching shoulders[5]. Musculoskeletal discomforts, especially in shoulder prevalence, was seen in secondary students[9].

After a lot of researching, it was found that not many researches were done on pain concerning the entire musculoskeletal system, but single pain sites were addressed like back or shoulder. The fact that no research was done in India considering pain in the entire musculoskeletal system became a motivation to conduct this research in local schools and find out about the prevalence of such symptoms in this social setup and also the site that is more commonly symptomatic.

The study also tried to find out the commonly perceived cause of pain as several factors could be responsible for causing pain like weight of bag, mode of travel, level of physical activity, way of carrying the bag, number of stairs to climb with the bag, prolonged sitting for lectures in class, improper sitting position, incorrect back ergonomics, improper way of bag lifting, improper bench structure, inconvenient method of carrying books and other scholastic materials including food items, etc.

Other factors like less sleeping hours, less recreational activities beyond school hours, screening activities affect the students's mental and physical well-being can also play a major role in predisposing to musculoskeletal symptoms directly or indirectly.

Moreover keeping the social setup in mind, mode of transportation, time of travel from home to school and vice versa, etc were also included as a part of the questionnaire as roads in India are not well maintained and hence the ride can also be a pain causing factor among the individuals.

Also, High Physical Activity (HPA) levels seem to protect against future LBP and appear to actually "treat" and reduce the odds of future mild back pain[10] and among sedentary activities, television watching and reading books were associated with neck or occipital pain and mild shoulder pain in girls whereas playing/working with computer was associated with neck or occipital pain in boys[11]. Hence, physical activities in school hours and beyond school hours as well as sedentary activities (watching television, using computer etc) were included as a part of questionnaire.

As an extended form of the present research, Peds QL 4.0 questionnaire was included to determine whether physical well-being affected the mental well-being.

2. Methodology

This cross sectional study design was conducted in the city of Surat, Gujarat state, India. Five schools were randomly selected from a list of 23 schools from the city. Prior permission from the school and administrative authorities were obtained from three schools. Due to lack of permission from the authorities, the authors had to exclude two schools. Students in the age group of 10 years to 17 years and both genders, were included in the study after obtaining the register of date of birth from the school authorities. Students with history of injuries in the past three months which might affect the outcome of the variables tested were excluded. 500 students from these schools participated in the study based on the criterion explained above. Informed consent was obtained from the students and parents/guardians before the commencement of the study by explaining the details of the study in accordance with the institutional

ethical standards of the ethics committee on human experimentation and the Helsinki declaration of 1975.

A self administered questionnaire was prepared keeping in mind, the factors that may influence the pain in any way like region affected, mode of transport, time to reach school from home and back home from school, activity level, type of activity, activity hours, etc. The purpose of the study was explained to the students before commencing the study.

Self-administered questionnaires were distributed among the school students. All the questions were explained to the students and students were required to fill the questionnaire, which included their demographic information and questions related to their musculoskeletal symptoms, associated factors and quality of life. Once questionnaire was filled, it was thoroughly checked and if found incomplete, was asked to be filled by the students.

Preliminary measurements were taken prior to the beginning of the study, in which subject's height and weight were measured objectively and BMI was calculated accordingly.

The questionnaire consisted of three components: The first component included demographic data of the students (Name, age, gender, height and weight), type of bag and way of carrying the bag. In Indian setup, school students carry three different kinds of bags:

 i. Hand Held Bag which is carried in the hand.
 ii Shoulder Bag which has a single strap to carry it on the shoulders.
 iii Backpack which has two straps on shoulders to carry the bag.

The Second component titled Musculoskeletal Symptoms included a Nordic questionnaire (modified as per the requirement for school students), absenteeism in school due to the symptoms and perceived risk factors. Several factors considering their everyday routine were included, for example: sitting for long mainly for attending classes, inappropriate bag weight from home to school and back, sports or physical activity involved during school hours or after school hours, mode of travelling to and from school.

The third component titled 'Physical and Sedentary Activities' included number of hours spent in physical activity within and beyond the school hours and also recreational activities beyond school hours like watching TV, use of mobile or computer for entertainment or educational purposes.

PedsQL 4.0 Generic Core scales for students and teens was used to assess the quality of life of students participating in this study. It included four dimensions- Physical functioning, Emotional functioning, Social functioning and School functioning.

Since interpretation of peds QL mentions higher values indicating better quality of life which doesn't give a clear description, the authors calculated 1/3rd of the QOL scores (Total score, psychosocial sub-scores and individual sub scores) to create categories namely good, fair and poor. The higher 1/3rd range represented good quality of life, middle 1/3rd range fair quality of life and the lower 1/3rd range for each score subcategory represented poor quality of life. The total score of peds QL is 2300, hence score less than 767 indicated poor quality of life; scores in the range of 768-1534 indicated fair quality of life and scores above 1534 indicated good quality of life. The maximum score under physical domain is 800. A score below 267 is considered as poor quality of life; scores in the range of 268-534 is considered as fair and scores above 534 are considered as good quality of life in the physical functioning domain. The maximum score under emotional, social and school function domains of peds QL is 500. A score below 167 is considered as poor quality of life; scores in the range of 168-334 is considered as fair and scores above 334 are considered as good quality of life in the respective domains. Psychosocial domain consisted of the sum of emotional, social and school function domains. The maximum score is 1500. A score below 500 is considered as poor quality of life; sores in the range of 501-1000 is considered as fair quality of life and scores above 1001 are considered as good quality of life.

3. Results and Analysis

Descriptive statisitcs of mean and standard deviation were used to analyse continous variables and frequencies were used to analyse nominal and categorical variables. Chi square analysis was done to determine the associaton between presence of symptoms, gender, body region commonly affected, quality of life total scores and sub scores. Level of significance was set at less than 0.05. All statistical analyses were performed using SPSS v 20.0.

The mean and frequency values of physical and demographic characteristics of students like age, gender, height, weight, calculated BMI and its category are represented in (Table 1).

Table 1. Demographic characteristics of students

Variables	Mean (SD), n=500
Age (in Years)	13.58 (1.35)
Height (in Cms)	155.27 (10.81)
Weight (in Kgs)	46.37 (12.03)
BMI (kg/m²)	19.08 (4.03)
Variables	**n (%), (n=500)**
Gender	
Male	293(58.6)
Female	207 (41.4)
BMI Category	
Underweight	99 (19.8)
Normal	323 (64.6)
Overweight	51 (10.2)
Obese	27 (5.4)

The mean and frequency values of factors related to school like type of bag used for school, mode of transport, time taken to travel to and from school, time spent in physical activity at school are represented in (Table 2), along with time spent on activities after school and time spent on sedentary activities. 117 out of 500 students participated in this study had musculoskeletal symptoms (Figure 1).

Anatomical sites most commonly affected are represented in (Figure 2).

Frequency of negative impact of musculoskeletal symptoms like its effect on daily routines of work, absenteeism from school and enforcing doctor's visit are represented in (Table 3).
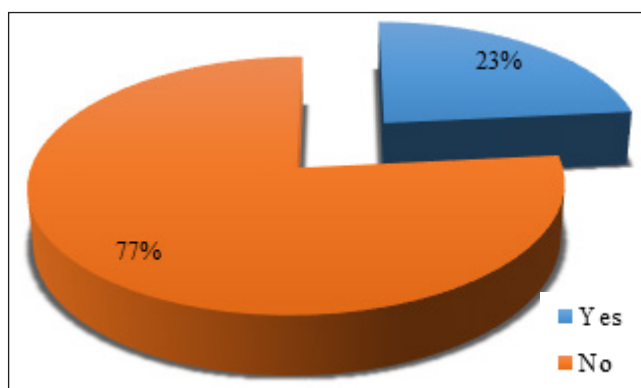
Figure 1. Percentage distribution of students with musculoskeletal symptoms.

Table 2. School related and recreational activities of students

Variables	Mean (SD), n=500
Time to reach school (in mins)	17.34 (13.24)
Time to reach home (in mins)	20.16 (15.68)
Total time of travel (in mins)	37.49 (28.03)
No. of stairs	63.49 (11.31)
Climbing up/down	5.04 (1.66)
Activity hr in school (in mins)	113.97 (58.49)
Activity hr after school (in mins)	52.41 (65.13)
Hrs of watching TV (in mins)	69.78 (59.25)
Hrs spent on Mobile games (in mins)	40.23 (49.01)
Hrs spent on PC games (in mins)	19.11 (41.19)
Hrs spent doing HW (in mins)	20.68 (36.74)
Variables	n (%), (n=500)
Type of bag used	
Shoulder	2 (0.4)
Handheld	3 (0.6)
Backpack	495 (99.0)
Mode of transport	
School Bus or Van	205 (41.0)
Bicycle	130 (26.0)
Motorcycle	67 (13.4)
Auto Rickshaw	53 (10.6)
Walk	45 (9.0)
Physical activity after school	
Yes	271 (54.2)
*Recreational (Sedentary) activities**	
Watching TV	424 (84.8)
Playing in mobile/tablet	369 (73.8)
Playing in computer	165 (33)
Homework using computer	193 (38.6)

* Multiple responses

Table 4, represents the risk factors reported by the students as commonly perceived to be the reason for the musculoskeletal symptoms.

Quality of life of students with musculoskeletal symptoms was assessed using Peds QL 4.0 and (table 5), represents the mean values of scores of four dimensions of the questionnaire and total scores among students with msuculoskeletal symptoms.

Based on the categorization of Peds QL (Poor, Fair and Good) as mentioned in the methodology section,
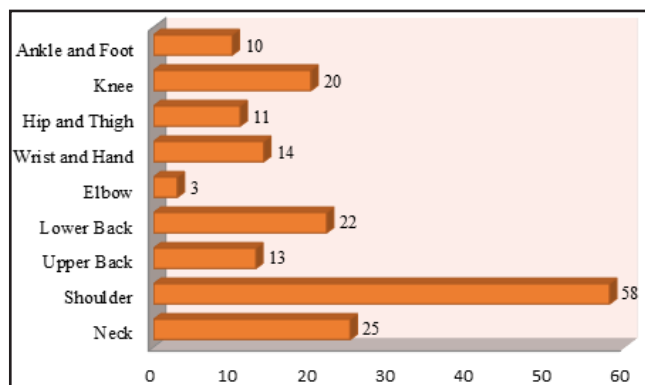
Figure 2. Region wise distribution of musculoskeletal symptoms in students.

Table 3. Impact of musculoskeletal symptoms in students

Variables	n (%), n=117
Daily routine affected	29 (24.8)
Doc visit	18 (15.4)
Absent	17 (14.5)

Table 4. Perceived risk factors for musculoskeletal symptoms

Risk factor	n (%), (n=117)
Sitting for long	32 (27.4)
Walking for long	9 (7.7)
Inappropriate bag weight	54 (46.2)
Carrying bag	30 (25.6)
Sports	23 (19.7)
House work	1 (0.9)
Travelling	14 (12)

table 6, represents the distribution of students based on their report on quality of life.

Chi square analysis was performed to determine the association between the type of bag used by students, time taken to travel to and from school, activity levels of students at school, outside school and sedentary activities with musculoskeletal symptoms. Table 7 represents the chi square analysis to associate gender and BMI category with presence of symptoms.

Table 8 shows the chi squared results of association of type of bag used, time taken to travel to and from school, activity levels and sedentary activities with musculoskeletal symptoms

Table 5. Mean of Peds QL total scores and its four dimensions

Variables	Mean (SD), n=117
Physical	670.94 (120.07)
Emotional	355.56 (104.38)
Social	417.09 (101)
School Function	356.84 (96.52)
Psychosocial	1129.49 (235.22)
Total score	1800.43 (330.96)

Table 6. Descriptive statistics of categorised Peds QL score

Peds QL Category	n (%), (n=117)
Poor	2 (1.7)
Fair	14 (12.0)
Good	101 (86.3)

Table 7. Association of gender and BMI category with musculoskeletal symptoms

Association variables	Pearson Chi-Square Value	df	Sig.
Gender*Symptoms	4.097[a]	1	0.043[*]
Phi/Cramer's V	0.091		
BMI Category*Symptoms	.905	3	0.824
Phi/Cramer's V	0.043		

[*]Significance at 0.05

Table 8. Association of type of bag used, time taken to travel to and from school, activity levels and sedentary activities with musculoskeletal symptoms

Association variables	Pearson Chi-Square Value	df	Sig.
Type of Bag*Symptoms	3.960[a]	2	0.138
Phi/Cramer's V	0.089		
Travel Hours*Symptoms	1.034[a]	2	0.596
Phi/Cramer's V	0.045		
Activity Level*Symptoms	.390	2	0.823
Phi/Cramer's V	0.028		
Sedentary Level*Symptoms	0.816	2	0.665
Phi/Cramer's V	0.043		

4. Discussion and Conclusion

The present study aimed to determine the prevalence of musculoskeletal symptoms, most affected anatomical sites of the body among school going children in the age group of 10-17 years and also focused on the commonly perceived risk factors that might contribute to these symptoms.

Prevalence of musculoskeletal symptoms in this study population was found to be 23.4%. Shoulder was found to be the most commonly affected body site (49.6%), followed by neck (20.5%) and low back (18.8%).

Although scanty literature was available that focused on musculoskeletal symptoms as a whole, higher prevalence rates in students were observed in a study conducted on Ugandan pupils[12] with low back affected more than neck, shoulder and upper back. Study by Shamsoddini[13] on prevalence of musculoskeletal symptoms in secondary school students from Tehran showed a higher prevalence (38.1%) in shoulder followed by neck and back. Prevalence rate observed in the present study was significantly high in comparison to some previous studies,[11,14–16] and was found to be comparatively low as compared to studies by Dianat et al.[17] who reported 86% of children complaining of some kind of musculoskeletal pain.

Back especially, low back had been the region of interest in most of the literature[10,12,15,17–19] and the focus was on the use of heavy back packs by school children. In the present study, the authors aimed to add other factors that are perceived by the children to be possibly responsible for their musculoskeletal symptoms. A lot of factors may be responsible for the symptoms experienced by students, hence some common perceived risk factors were incorporated in our questionnaire and results highlighted that 54 out of 117 students (46.2%) felt that inappropriate bag weight was the reason for their symptoms, 32 students (27.4%) felt sitting for long, 30 students (25.6%) felt their way of carrying their bag were responsible for their symptoms.

Musculoskeletal symptoms in students affected their daily life and were so severe in some that they had to visit a doctor and take leave from school due to their symptoms. These negative effects were included in the questionnaire and results showed that among 117 students, who had pain, daily work of 29 students (24.8%) was affected, 18 students (15.4%) had to visit a doctor and 17 students (14.5%) had to take leave from school for the same.

As recreational activities nowadays are mostly screen based, they play an important role in determining the student's sedentary practices. Hence, students from this study were asked to state the time they spend in such activities which were multiple responses. The results stated that out of 500 students, 424 students (84.8%) watched television, 369 students (73.8%) played games in their mobile phones or tablets, 165 students (33%) played games in their computer or laptops and 193 students (38.6%) used computers for their homework. There was no significant correlation between the presence of symptoms and hours of sedentary activity. Similar results were observed from the study by Auvinen et al.[11,15], who studied the common sedentary lifestyle habits of children and associated physical and sedentary activity with neck and shoulder symptoms in adolescents.

Peds QL 4.0 was used in this study to determine the quality of life of school children with musculoskeletal symptoms. The mean and standard deviation values for physical domain was 670.94±120.07, emotional domain was 355.56±104.38, social domain was 417.09±101, school function domain was 356.84±96.52, psychosocial domain was 1129.49±235.22 and the mean total score was 1800.43±330.96. Analysis of these scores of Peds QL indicated that presence of musculoskeletal symptoms didn't have any significant effect on the quality of life of the students. These results suggest that physical symptoms due to musculoskeletal disorder has no significant effect on the quality of life of the students and that it is only limited to causing hindrance to the daily physical work.

Various factors can be associated and correlated to the musculoskeletal symptoms observed in school children. The authors chose to associate gender and BMI category with the presence of symptoms as these two were considered to be strong factors. Chi-Square analysis for association showed weak association between gender and the presence of symptoms whereas no significant association was found between BMI categories and the musculoskeletal symptoms. Study by Taimela[19] found no significant gender specificity to musculoskeletal symptoms but they focused only on low back pain. Surprisingly, other factors like the type of bag used by students, time taken to travel to and from school, hours spent on physical activity at school and outside school, hours of sedentary activity in the form of screen activities including homework did not show statistically significant association with musculoskeletal symptoms.

Prevalence and risk factor perceptions of school children as reported in this study can be of significance in understanding and addressing these factors and can be used to device means to prevent and overcome them by employing appropriate measures. Although musculoskeletal discomforts in school going children are multifactorial in nature, result from this study highlights the need to initiate more longitudinal and wider studies.

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