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ORIGINAL ARTICLE

Evaluation of musculoskeletal pain and related factors in school-age children (8–12 years)

Okul çağı çocuklarında (8-12 yaş) kas iskelet ağrısı ve ilişkili faktörlerin değerlendirilmesi

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Summary

Objectives: The aim of this study was to evaluate the frequency of pain and related factors in musculoskeletal system in children.

Methods: A total of 313 primary school students were analyzed in this cross-sectional study conducted in the Famagusta city center and surrounding villages. The physical activity musculoskeletal pain (MSP) level, health-related quality of life weight, height, and school bag weights of the students were measured by a blinded researcher.

Results: The study group consisted of 164 (52.40%) boys and 149 (47.6%) girls with a mean age of 9.53±0.82 years. In the present study, MSP frequency was found to be 39.0%. There was no relationship between MSP and the following parameters: Age, sex, body mass index, hours of weekly gym lesson, regular participation in sports, weekly time spent with sports, school bag type, and school bag weight. There was also no relationship between these parameters and region of pain.

Conclusion: Excessive walking and sitting were associated with increased MSP. Contrary to popular opinion, it was found that school bag weight and school bag type were not effective on MSP. Our results show that the quality of life of children can be improved by reducing MSP.

Keywords: Body mass index; child; musculoskeletal pain; physical activity; quality of life.

Özet

Amaç: Bu çalışmanın amacı, çocuklarda kas iskelet sisteminde ağrı sıklığını ve ilişkili faktörleri değerlendirmektir.

Gereç ve Yöntem: Gazimağusa il merkezi ve çevre köylerde gerçekleştirilen bu kesitsel çalışmada 313 ilkokul öğrencisi analiz edildi. Öğrencilerin fiziksel aktiviteleri, kas iskelet sistemi ağrı düzeyleri, sağlıkla ilgili yaşam kaliteleri, beden kitle indeksleri, boyları ve okul çantası ağırlıkları kör bir araştırmacı tarafından ölçüldü.

Bulgular: Çalışma grubunu yaş ortalaması 9,53±0,82 yıl olan 164 (%52,4) erkek ve 149 (%47,6) kız öğrenci oluşturdu. Bu çalışmada, kas iskelet sistemi ağrısı sıklığı %39,0 olarak bulundu. Kas iskelet sistemi ağrısı ile yaş, cinsiyet, beden kitle indeksi, haftalık beden dersi saati, spora düzenli katılım, haftalık spor yapma süresi, okul çantası tipi ve okul çantası ağırlığı parametreleri arasında bir ilişki yoktu. Bu parametreler ile ağrı bölgesi arasında da bir ilişki yoktu.

Sonuç: Aşırı yürüme ve oturma kas iskelet sistemi ağrısı ile ilişkiliydi. Sanılanın aksine okul çantası ağırlığı ve okul çantası tipinin kas iskelet sistemi ağrısı üzerinde etkili olmadığı bulundu.

Anahtar sözcükler: Beden kitle indeksi; çocuk; kas iskelet sistemi ağrısı; fiziksel aktivite; yaşam kalitesi.

Introduction

Pain is a common feature of childhood as demonstrated by numerous community- and school-based studies which have shown that most of the pain in the childhood originates from the musculoskeletal system.[1–4] Musculoskeletal pain (MSP) can affect muscles, ligaments, bones, and joints.[5] The percentage of children and adolescents experiencing MSP at least once a week is around 8–32%, while this percentage increases up to 40% in monthly evaluations.[5,6] The prevalence of MSP in children increases with age, and longitudinal studies have shown that such pain persists over time, making MSP a recurrent finding throughout the childhood.[5]

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The etiology of childhood MSP still remains largely unclear. However, some factors have been shown to have a relationship with MSP development and progression, such as, high levels of physical activity, female sex, psychosocial symptoms, sitting for extended periods of time, obesity, and school bag use and weight.[7–12] Using a school bag (backpack) is a daily routine for school-age children and it has been suggested to be an important cause of MSP in children and adolescents. According to guidelines based on this theory, the safe upper limit for a school bag is often specified as 10–15% of body weight.[7,8]

MSP has negative effects on the physical, emotional, and social life of children and adolescents as well as general quality of life. Children with MSP may refrain from participating in activities requiring physical exertion which may limit communication with their peers and could lead to physical/social dysfunction. Furthermore, MSP can reduce school attendance, leisure activities, and participation in family events.[5,6,13]

Given that MSP in children may cause disabilities later on in life, it is important to evaluate the prevalence of MSP in children and factors associated with its development to be able to take appropriate preventive measures for children and adolescents. Although the epidemiology, disease burden, and treatment of MSP in adults have been the subject of extensive research, the same cannot be said for children.

The aim of this study was to evaluate the frequency of MSP and related factors (body mass index [BMI], physical activity, school bag weight, quality of life, etc.) in a group of primary school children in Famagusta.

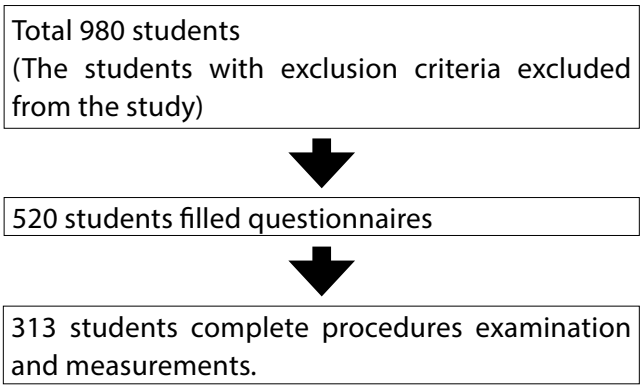
Material and Methods

Participants

The study is a cross-sectional study conducted among students in primary schools in the Famagusta province, between January 2019 and May 2019.

The research was carried out with 313 students aged 8–12 years in primary schools in the Famagusta city center and surrounding villages. The students who had a history of musculoskeletal surgery, those diagnosed with rheumatologic diseases involving the musculoskeletal system, children who were illiterate and could not fill questionnaires, those that did not speak Turkish, and those who refused to participate in the study (parents or child) were excluded from the study.

During this study, we have planned to reach total primary school students in Famagusta province (n=980). We delivered questionnaires to all of these students. Five hundred and twenty of them returned us with filled questionnaires. We grouped these students for examination and measurements. Three hundred and thirteen of these students complete this procedures and measurements.



Instrumentation

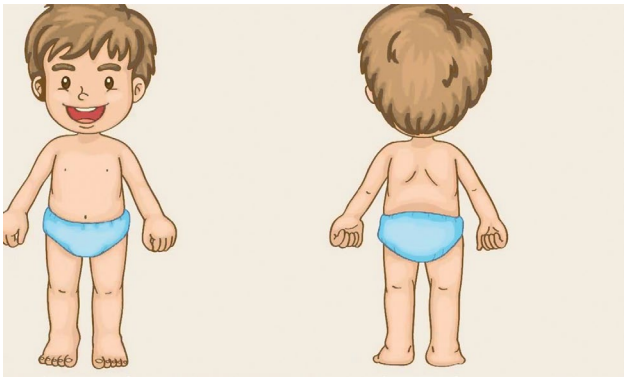
A questionnaire was prepared after reviewing and analyzing appropriate literature (Fig. 1).[14–18] In the first part of the questionnaire, questions were about the sociodemographic characteristics of the students and factors related to MSP, school bag types, and carrying style, pain regions are labeled on a chart. The second part was the International Physical Activity Questionnaire (IPAQ), and the third part was the EQ-5D-3L. A visual analog scale (VAS) was used to determine the subjective MSP level of students. In VAS, 0 indicates no pain, 5 is the moderate severity of pain, and 10 is the worst pain imaginable (sometimes referred to as the worst pain the respondent has ever suffered).[14] Weekly time spent with sports lecture and sports activities time except sports lectures in school (tennis, football, basketball, swimming, and folk dances).

IPAQ

The IPAQ (short) was used to determine the physical activity level of students. IPAQ was developed by Craig et al.[16] and the Turkish validity and reliability study was conducted by Öztürk et al.[15] It consists of seven questions that question time spent with sitting, walking, moderate-vigorous activity, and vigorous activities. In the short form of the IPAQ, the score is calculated as the sum of time (minutes) and frequency

Age:
Gender:
Weight (kg):
Length (cm):
BMI:
Sports lecture (lecture hour in a week):
Are there any sport activity except sports lecture in school?
(football, tennis, volleyball, basketball, and folk dances):
If your answer to the above question is yes;
How many hours do you do in total per week?
Carrying school bag: 1. On the back by crossing over both shoulders
2. Side hanging 3. Pulling on floor 4. Hugging
Walking distance: (in average daily min)
Sitting time: (longest sitting time in a day in minutes)
Do you currently have pain in the musculoskeletal system: Yes/no
If you have pain, mark in which part of your body it is.

If you have pain, please mark its severity from the table below in the most appropriate one for you.



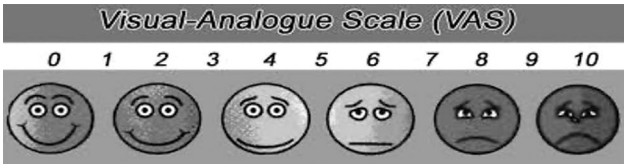


Figure 1. "Investigation of the frequency of musculoskeletal pain in childhood and affecting factors" questionnaire.

(days) in parameters other than sitting. Time spent in sitting constitutes a separate score. The evaluation of all activities is based on the fact that each activity is carried out for at least 10 min at once.

EQ-5D-3L

The EQ-5D-3L was used to evaluate health-related quality of life. The EQ-5D-3L was introduced in 1990 by EuroQol. The validity and reliability of the scale in the Turkish language was reported by Eser et al.[18] The questionnaire consists of two parts: Questions and visual analog scale (VAS). The EQ-5D-3L questions consist of five dimensions; mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension is answered by the selection of one of three levels by the respondent: No problems, some problems, and extreme problems. The respondent is asked to indicate his/her health state by ticking in the box against the most appropriate statement in each of the five dimensions. The VAS section is used to assess the respondent's self-assessment of their general health on a VAS where the endpoints are labeled "Best imaginable health state" and "Worst imaginable health state." The results are utilized as a quantitative measure of self-assessed health outcome.[17,18]

Procedure

To conduct the study, appointments were made with school administrations and a schedule was put forth. At the scheduled date and under the supervision of teachers, the students were informed about the purpose and scope of the research. Written consent was obtained from the students and their parents who agreed to participate in the study. Survey forms were distributed to the students who accepted to participate in the study and the surveys were completed under observation. The height, weight, and backpack weights of the students were measured by a blinded researcher. These procedures took about 25–30 min.

Statistical analysis

All analyses were performed on SPSS v21 (IBM, Armonk, NY, USA). For the normality check, the Shapiro-Wilk test was used. Assessment of differences between continuous variables was performed through the Mann-Whitney U or Kruskal–Wallis tests depending on the number of groups compared. Categorical variables were analyzed using Chi-square tests or the Fisher's exact test. Relationships between continuous variables were evaluated by calculating the Spearman correlation coefficient. Statistical significance was set according to a type 1 error of 5% ($p<0.05$).

Results

The study group consisted of 164 (52.40%) boys and 149 (47.6%) girls with a mean age of 9.53±0.82

Table 1. Individuals' characteristics regarding presence of MSP

	MSP						p
	Absent (n=191)		Present (n=122)		Total		
	n	%	n	%	n	%	
Age	9 (8–11)		9 (8–12)		9 (8–12)		0.087
Gender							
Female	96	50.26	53	43.44	149	47.60	0.288
Male	95	49.74	69	56.56	164	52.40	
BMI (kg/m^2)	16.89 (11.40–32)		16.50 (10.5–25.2)		16.57 (10.5–32)		0.978
Gym lesson hour (weekly)							
1	0	0.00	2	1.64	2	0.64	0.151
2	191	100	120	98.36	311	99.36	
Regular participation in sports	113	59.16	78	63.93	191	61.02	0.468
Weekly sport (hours)	1 (0–4)		1 (0–5)		1 (0–5)		0.382
School bag type							
Both shoulders	96	50.26	71	58.20	167	53.35	0.307
One shoulder	11	5.76	10	8.20	21	6.71	
Handcart	77	40.31	37	30.33	114	36.42	
Handbag	7	3.66	4	3.28	11	3.51	
School bag weight (kg)	10 (1–29)		10.5 (2–30)		10 (1–30)		0.996

Data given as median (minimum-maximum) or frequency (percentage), the Shapiro-Wilk test was used. MSP: Musculoskeletal pain; BMI: Body mass index.

years. The overall frequency of pain in the musculoskeletal system was 39.0%. There was no relationship between MSP presence and age, sex, BMI, hours of weekly gym lesson, regular participation in sports, weekly time spent with sports, school bag type, and school bag weight. Table 1 presents individuals' characteristics with regard to the presence/absence of MSP.

No relationship was found between the region of pain in those with MSP and age, sex, BMI, hours of weekly gym lesson, regular participation in sports, weekly time spent with sports, school bag type, and school bag weight. Individuals' characteristics regarding area of pain are given in Table 2.

No correlation was found between MSP and the weekly number of days with vigorous and moderate physical activity and daily time spent on vigorous and moderate physical activity. Weekly days with walking and sitting and daily time spent on walking and sitting were higher in patients with MSP compared to those without. Individuals' answers to the IPAQ (short) regarding presence of MSP are given in Table 3.

No relationship was found between MSP and the mobility and self-care subsections of the EQ-5D-3L. However, in regard to the usual activities, pain/discomfort, and anxiety/depression subsections, the number of children without complaints in these sections was higher in those without MSP. The VAS score of the EQ-5D-3L scale was higher in patients without MSP. Individuals' answers to the EQ-5D-3L scale with regard to the presence/absence of MSP are given in Table 4.

There were no correlations between pain VAS scores and BMI, weekly time spent with sports, and school bag weight. There was a moderate negative correlation between MSP VAS score and EQ-5D-3L VAS score ($r=-0.534$, $p<0.001$). As the MSP VAS score decreased, quality of life VAS score increased.

MSP VAS scores did not change according to school bag type. Summary of VAS scores regarding school bag type is given in Table 5.

Table 2. Individuals' characteristics with regard to the region of pain

	Spine (n=51)		Upper extremities (n=22)		Lower extremities (n=49)		p
	n	%	n	%	n	%	
Age	10 (8–11)		10 (9–11)		9 (8–12)		0.051
Gender							
Female	26	50.98	6	27.27	21	42.86	0.171
Male	25	49.02	16	72.73	28	57.14	
BMI (kg/m^2)	16.44 (12.50–22.10)		15.67 (12.35–25.00)		16.75 (10.50–25.20)		0.309
Gym lesson hour (weekly)							
1	0	0.00	0	0.00	2	4.08	0.220
2	51	100.00	22	100.00	47	95.92	
Regular participation in sports	30	58.82	16	72.73	32	65.31	0.508
Weekly sport (hours)	1 (0–5)		1 (0–3)		1 (0–4)		0.603
School bag type							
Both shoulders	35	68.63	13	59.09	23	46.94	0.083
One shoulder	2	3.92	4	18.18	4	8.16	
Handcart	14	27.45	4	18.18	19	38.78	
Handbag	0	0.00	1	4.55	3	6.12	
School bag weight (kg)	10 (2–25)		10 (4–25)		12 (3–30)		0.212

Data given as median (minimum-maximum) or frequency (percentage). Assessment of differences between continuous variables was performed through the Mann-Whitney U or Kruskal-Wallis tests. BMI: Body mass index.

Table 3. Individuals' answers to IPAQ (short) regarding presence of MSP

	MSP		Total	p
	Absent (n=191)	Present (n=122)		
Vigorous physical activities				
Days	1 (0–7)	1 (0–7)	1 (0–7)	0.090
Hours (daily)	1 (0–4)	1 (0–2)	1 (0–4)	0.508
Moderate physical activities				
Days	1 (0–7)	1 (0–5)	1 (0–7)	0.068
Hours (daily)	1 (0–3)	1 (0–5)	1 (0–5)	0.114
Walking				
Days	1 (0–7)	2 (0–5)	2 (0–7)	**0.032**
Hours (daily)	1 (0–2)	1 (0–5)	1 (0–5)	**0.039**
Sitting				
Hours (daily)	2 (1–5)	2 (0–10)	2 (0–10)	**0.049**

Data given as median (minimum-maximum), categorical variables were analyzed using Chi-square tests or the Fisher's exact test. IPAQ: International Physical Activity Questionnaire; MSP: Musculoskeletal pain.

Discussion

MSP is one of the most common causes of pain in childhood and can sometimes result in disability.[19] Although MSP has significant personal and social impacts on children in addition to its physical effects, studies aimed at elucidating the frequency of and factors con-

Table 4. Individuals' answers to the EQ-5D-3L scale regarding MSP presence

	MSP						p
	Absent (n=191)		Present (n=122)		Total		
	n	%	n	%	n	%	
Mobility							
I have no problems in walking about	174	93.7	109	89.3	288	92.0	0.110
I have some problems in walking about	10	5.2	13	10.7	23	7.4	
I am confined to bed	2	1.0	0	0.0	2	0.6	
Self-care							
I have no problems with self-care	177	92.7	111	91.0	288	92.0	0.207
I have some problems washing or dressing myself	14	7.3	9	7.4	23	7.4	
I am unable to wash or dress myself	0	0.00	2	1.6	2	0.6	
Usual activities							
I have no problems with performing my usual activities	164	85.9	65	53.3	229	73.2	**<0.001**
I have some problems with performing my usual activities	23	12.0	55	45.1	78	24.9	
I am unable to perform my usual activities	4	2.1	2	1.6	6	1.9	
Pain/discomfort							
I have no pain or discomfort	163	85.3	49	40.2	212	67.7	**<0.001**
I have moderate pain or discomfort	24	12.6	71	58.2	95	30.4	
I have extreme pain or discomfort	4	2.1	2	1.6	6	1.9	
Anxiety/depression							
I am not anxious or depressed	139	72.8	54	44.3	193	61.6	**<0.001**
I am moderately anxious or depressed	48	25.1	64	52.5	112	35.8	
I am extremely anxious or depressed	4	2.1	4	3.3	8	2.6	
Health state	100 (50–100)		80 (30–100)		90 (30–100)		**<0.001**

Data given as median (minimum-maximum) or frequency (percentage), assessment of differences between continuous variables was performed through the Mann-Whitney U or Kruskal-Wallis tests. MSP: Musculoskeletal pain.

tributing to MSP in children are insufficient. The aim of the present study was to evaluate the prevalence of MSP in children and to determine related factors.

The frequency of pain in the musculoskeletal system was 39.0% in this study. There are various studies that have reported prevalence rates of MSP in children who range from 21.5% up to 54.3%.[19–22] In a systematic review by King et al.,[23] the frequency of pain in the musculoskeletal system in children was reported to range from 4 to 40%. The frequency found in the study is within the expected range but it is also close to the upper limits reported previously.

Table 5. Summary of MSP VAS scores regarding school bag type

	Mean	SD	Median	Min	Max	p
Both shoulders	1.68	2.25	0	0	10	0.488
One shoulder	2.05	2.80	0	0	10	
Handcart	1.54	2.72	0	0	10	
Handbag	1.18	1.94	0	0	6	

Assessment of differences between continuous variables was performed through the Mann-Whitney U or Kruskal-Wallis tests. Relationships between continuous variables were evaluated by calculating the Spearman correlation coefficient. Statistical significance was set according to a type 1 error of 5% ($p<0.05$). MSP: Musculoskeletal pain; VAS: Visual analog scale; SD: Standard deviation; Min: Minimum; Max: Maximum.

Before advancing into the breakdown of the evaluations performed in this study, we would like to state that there are various factors that may contribute to MSP development in children, which may be the cause of the significant differences and conflicts that are observed in the literature. These factors may be

distributed into larger groups such as schooling system and practices (lesson types, schedules, homework, and book/notebook requirements), school access and transportation (distance to school, means, and route of transport), factors associated with the parent and child (awareness, socioeconomic status, child participation, physical activity, and anthropomorphic features), the design and measurement tools utilized in studies (study type, scoring systems, and questionnaires), and regional and geographic characteristics including social and cultural norms. Therefore, many specific factors have to be considered in each study for the determination of the cause(s) of MSP in children and to identify preventive measures.

MSP increases with age and a sharper increase is seen during the transition from childhood to adolescence.[12] In this study, no significant relationship was found between age and presence of pain or area of pain. Other studies have reported that the frequency of pain in the musculoskeletal system increases with age.[20,22–26] In another study, it was reported that the average age of those with back pain was higher than those without back pain.[8] The literature on this relationship also seems to suggest that the prevalence of MSP is higher in children in puberty compared to prepubertal children,[19] which may actually be a confounding factor for the age-MSP relationship shown in other studies. In contrast to most published studies, Skaggs et al.[27] reported that younger age was associated with increased back pain. The lack of age-related differences in our study is most likely due to the evaluation and comparison of children in a narrow age group (8–12 years).

MSP is reported to be more common in women than in men. This is thought to be due to differences in the timing and nature of pubertal development between the sexes, but this theory has not been confirmed.[12] No significant relationship was found between sex and presence of MSP and area of pain in this study, similar to the results of another study which reported no association between sex and MSP presence.[25] This is in addition to the fact that, in our study, we observed a higher (but statistically insignificant) percentage of pain-reporting boys compared to girls. However, the large majority of studies in this field have reported that the frequency of pain in the musculoskeletal system is more common in girls than in boys.[8,12,19,20,23,26–28] Therefore, ours is an interesting finding that may have many partial explanations that cannot be listed here (such as puberty-associated differences); however, the most compelling explanation may be inferred from the localization of pain; while the percentage of boys and girls reporting spine pain was similar, upper and lower extremity pain was observed to be reported more frequently by boys. We believe that this difference may have been caused by the higher participation of boys in physically demanding contact sports that increase the likelihood of hitting and bumping extremities, such as football. However, we did not assess the type of sports played by the children, and therefore, this conclusion is merely based on the very low number of Turkish girls who play contact sports.

Weight gain in children is positively associated with MSP development. Pain in the musculoskeletal system has been shown to increase as body weight (and therefore BMI) increases.[10] In this study, no relationship was found between BMI and presence of pain and area of pain. No correlation was found between students' pain VAS scores and BMI. Similarly, another study reported no association between BMI and MSP.[25] Stovitz et al.[29] reported that pain increased as BMI increased. de Sá Pinto et al.[30] reported that lower extremity and back pain are more common in obese children than in normal weight children. In a systematic review by Paulis et al.,[10] being obese or overweight was reported to be associated with MSP. In another study, BMI was also found to be higher in patients that had back pain compared to those without back pain.[8] Although no relationship was found between MSP and BMI in the present study, it is crucial to state that being overweight or obese may cause pain and can increase the likelihood of injury and fractures in the musculoskeletal system.[10] The lack of difference in our study is most likely to be associated with the fact that the majority of children included in the study had lean body type, and median BMI values were at the lower end of the normal spectrum for children.

High levels of physical activity have been suggested to be a risk factor for MSP in children and adolescents.[9] In our study, the number of days of walking and daily walking was found to be higher in patients with pain than those without pain. In addition, weekly sitting days and daily sitting time were found to be higher in patients with pain than those without pain.

In a study by Diepenmaat et al.,[11] no association was found between physical activity and MSP. Spiteri et al.[8] and Dianat et al.[31] reported no association between physical activity and back pain. Pereira et al.[25] reported that increased physical activity increased MSP. According to Auvinen et al.,[9] the increase in the duration of physical activity was associated with low back pain. They also reported that a sitting time of 4 h or more in girls was associated with low back pain. Moderate daily physical activity of 60 min or more is recommended for school-age children.[32] However, to prevent physical activity from increasing MSP frequency, it would be more appropriate to focus on the intensity and timing of physical activity instead of inhibiting physical activity in children. Because our results have shown that MSP may increase with the increase of time spent immobilized.

No significant differences were found for the area of pain, the presence of severe pain, and VAS scores with regard to school bag weight and type. Various studies have reported that school bag weight is associated with MSP.[33–35] In a study by Spiteri et al.,[8] it was reported that back pain was more frequent in backpack-type school bags and in those carrying the school bag on one shoulder. In the same study, it was reported that the ratio of school bag weight to body weight was higher in patients with back pain. Increased backpack weight has also been associated with back pain severity,[27] MSP frequency (also associated with carrying time),[36] and pain presence in the shoulder, neck,[37] and middle back,[38] in various studies. According to Dianat et al.,[31] time spent using a school bag was associated with back pain, but no correlation was found between school bag weight and back pain. On the other hand, several studies have not found any kind of relationship between MSP and backpack use[25] and backpack weight.[39] Furthermore, according to a systematic review of 64 studies evaluating the relationship between school bag weight and back pain, there was no evidence that school bag use or type increased back pain. In this systematic review, it was concluded that guidelines for safe weight limits for children's school bags that suggest limits in the range of 10–15% (of body weight) are not based on reliable evidence.[7] The reasons for these results and conflicting reports may be associated with the aforementioned factors affecting backpack use and its effects on MSP. Therefore, in these types of studies, it is crucial to remember the inherent differences between countries in terms of backpack use and requirements of the education system.

In children, ongoing MSP has a negative impact on quality of life.[13] In the present study, it was found that while MSP VAS score decreased, quality of life VAS score increased. Although Holley et al.[40] have reported that there is no relationship between quality of life and MSP, high pain scores have also been associated with low quality of life scores.[41] This result of the study can be considered to be remarkable as it shows that quality of life can be improved by reducing MSP in school-aged children.

Limitations

The main limitation of our study is that it is a cross-sectional study. The cross-sectional research design does not allow precise definition of causal relationships. Another limitation was that pain perception was evaluated according to the children's own perceptions. Besides the individual differences in pain thresholds, it is also very difficult to determine pain levels safely with high accuracy, and considering that children's perception of the VAS scoring system may be different or insufficient, it is apparent that VAS score assessments may be particularly limited in children. To reduce this possibility, children were provided detailed information of the VAS system (supported by examples appropriate for age) before measurement and they were supervised when marking the VAS sheet. Another limitation is that the study was conducted in schools with a limited number of students. If we could have performed a community-based research, we could have obtained stronger evidence.

Conclusion

The prevalence of MSP was found to be quite high in our study group. No relationship was found between age, sex, BMI, and presence of MSP; whereas, increased walking and sitting were associated with higher frequency of MSP. It was found that school bag weight and school bag type were not effective on MSP. In the usual activities, pain/discomfort, and anxiety/depression subscales of the EQ-5D-3L, the number of those without any complaints was higher in children without MSP. In addition, VAS scores of the health status subscale of the EQ-5D-3L scale were higher in patients without MSP. It was found that, as the MSP VAS score decreased, the quality of life score increased in the students.

Community-based research is needed to determine risk factors associated with MSP in children with stronger evidence in the Turkish population. According to the results obtained from these studies, interventions aimed at reducing and preventing MSP may be adopted. In the light of our findings, it can be said that quality of life can be improved by reducing MSP in children.

Implications for school health

According to the present study, there was no significant relationship between MSP and bag weights. In general opinion, increased bag weights can lead to back pain, and decreasing bag weights can be inferred to reduce back pain. Conversely, we found that the more important associated factors with back pain were the time spent with sitting and walking. It can be suggested that schoolchildren should walk more frequently and should sit less.

As in many areas of medicine practice, lifestyle changes that have long-term effects rather than interventions with short-term effects are more effective for both reducing low back pain and improving health-related quality of life.

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