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Investigating the prevalence of Musculoskeletal Pain among Iranian Children and Adolescents: a systematic review and meta-analysis

Running title: Investigating the prevalence of Musculoskeletal Pain

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Abstract

Context: Musculoskeletal pain is one of the most important pains among students and adolescents.

Objectives: the aim of the present study is to determine the prevalence of musculoskeletal pain among Iranian Children and adolescents through systematic review and meta-analysis.

Data Sources, Study Selection, and Data Extraction: all articles on prevalence measurement of musculoskeletal disorders in Iranian adolescents were searched in the Google Scholar search engine, four Iranian databases and five international English-language databases using the keywords of Pain, Musculoskeletal disorders, Low back pain, Adolescents, Students, and a combination of these keywords. Data was analyzed by comprehensive meta-analysis (CMA) software.

Results: The findings showed that out of 9 studies included in this systematic review and meta-analysis, 6 article about LBP, 6 article about neck pain, and 3 article about shoulder pain, respectively. According to the findings, 25.4 % (95% CI: 19.0 to 33.0) of the children experienced pain, the prevalence of LBP, knee pain, and the shoulder pain was 26.2(95% CI: 14.3 to 43.0), 22% (95% CI: 14.5 to 32.0), and 29.3% (95% CI: 20.1 to 40.7) in Iranian adolescents, respectively.

Conclusion: Considering the high prevalence of pain among Iranian adolescents, it is necessary to carry out appropriate interventions for pain prevention in this age group.

Keywords :Pain, Musculoskeletal disorders, Systematic review and meta-analysis

1. Context

Pain is defined as an unpleasant experience that may cause tissue damage (1). Musculoskeletal disorders and discomforts are one of the most important pains in students and adolescents (2). Musculoskeletal disorders are also one of the major causes of occupational injury and disability in developing countries and impose high financial and medical costs (3, 4).

If pain is not treated in children, it causes problems such as anxiety, lowered pain threshold, reduced effectiveness of palliatives, absenteeism in school, reduced physical activity, and limited daily activities (5-8). One of the types of skeletal musculoskeletal disorders is Low back pain(LBP), which affects the lower part of the spine and manifests itself in the form of acute and chronic symptoms. This type of pain is one of the most common types of musculoskeletal pain that anyone may experience (9, 10).

The Prevalence and costs of LBP, which have been raised as a general problem, shows an increasing trend in societies (11). LBP epidemiology has been studied in adults more widely, but there are few studies on this problem in children (12). Lower back pain in adolescents is likely to be a major cause of back pain in adolescence, so it is vital to take into account the LBP during adolescence (6).

Various factors are associated with LBP in children and adolescents that include factors related to school (13, 14), physical activity (15), lifestyle (16, 17), and psychosocial factors (18, 19). All of these factors may have an effect on LBP incidence rate. For this reason, pain is one of the important issues that affect children' health status (20) and the incidence of LBP in adolescents is very necessary to study.

Various studies have been conducted in Iran through systematic review and meta-analysis of pain outcomes. But there is no study that specifically deals with the prevalence in children and adolescents. For example, in the study of Azizpour et al(36)., Which aimed at the prevalence of one year LBP in all age groups, as well as in the study of Mohammadi et al(37)., Aimed at the prevalenceof LBP in nurses. Therefore, the necessity of paying attention to the discussion of pain in Iranian adolescents and young people is necessary.

2. Objectives

Pain affects the health of children and adolescents. That is why it is important to pay attention to it. Identifying the prevalence of pain can help healthcare providers to take the necessary measures to prevent and manage pain. Considering that previous studies focused only on the prevalence of back pain in different cities of Iran and there is no accurate statistics on its overall incidence, the aim of the present study is to determine the incidence of Musculoskeletal Pain among Iranian Children and Adolescents through systematic review and meta-analysis.

3. Study protocol

The present study is a systematic and meta-analytic review study that investigates the prevalence of musculoskeletal disorders among Children and Adolescents through systematic review and meta-analysis.

4. Data Sources and Study Selection

All articles on the prevalence of musculoskeletal disorders among Iranian adolescents were searched in the Google Scholar search engine, four Iranian databases (ISC, Magiran, IranMedex, SID, Iran Doc) and five English databases of (Science Direct, Web of Science, Cochrane, Scopus, Embase, and PubMed) using the keywords of Pain, Musculoskeletal disorders, Back pain, Neck pain, Shoulder pain, Elbow pain, Spine pain, Pediatrics, children, Adolescents, Students and a combination of these keywords. The Boolean operators “AND” and “OR” were used to combine search results. For example in pubmed, (Pain AND/OR Musculoskeletal disorders AND/OR Back pain AND/OR Neck pain AND/OR Shoulder pain AND/OR Elbow pain AND Spine pain AND/OR Pediatrics AND/OR children AND/OR Adolescents AND/OR Iran).

5. Data Extraction

The search carried out in the present study was limited to articles published in foreign and domestic journals up to June 2018, theses, national and international congresses, and organizational reports. First, all the articles that were published on the prevalence of musculoskeletal disorders among Iranian adolescents were collected by the researchers. Then, unrelated, interventional and duplicate case reports, and studies with inadequate data were excluded. To reduce the bias, the articles were searched independently by two researchers, and in case of any disagreement, that article was evaluated by the third author who is an expert of the systematic and meta-analytic review studies.

6. Quality of studies

The methodological quality of the articles was evaluated based on the STROBE checklist(35), which consisted of 22 items, including study design, a comparison group, description of the subjects' characteristics, sample size and tools. In this checklist, each item was assigned a score of 0-2, with higher scores indicating higher methodological quality. The following articles specifications that were related to the research objectives were recorded using a checklist: article title, name of the first author, the year of publication, the city of the study, the geographic area of the study, the type of questionnaire surveyed, the sample size (number of boys and girls), the average age of the subjects, the target population, the sampling method, and the database containing the articles.

7. Data analyses

Data was analyzed by comprehensive meta analyses (CMA) software. Heterogeneity was assessed by Cochran's Q test and I^2 (the heterogeneities of the studies were divided into: less than 25% (low heterogeneity), 25% to 75% (moderate heterogeneity) and more than 75% (high heterogeneity). We used subgroup analysis to assess the prevalence of musculoskeletal pain based on the site of pain and location of the studies. The sensitivity analysis of the studies was done to check the robustness of the data.

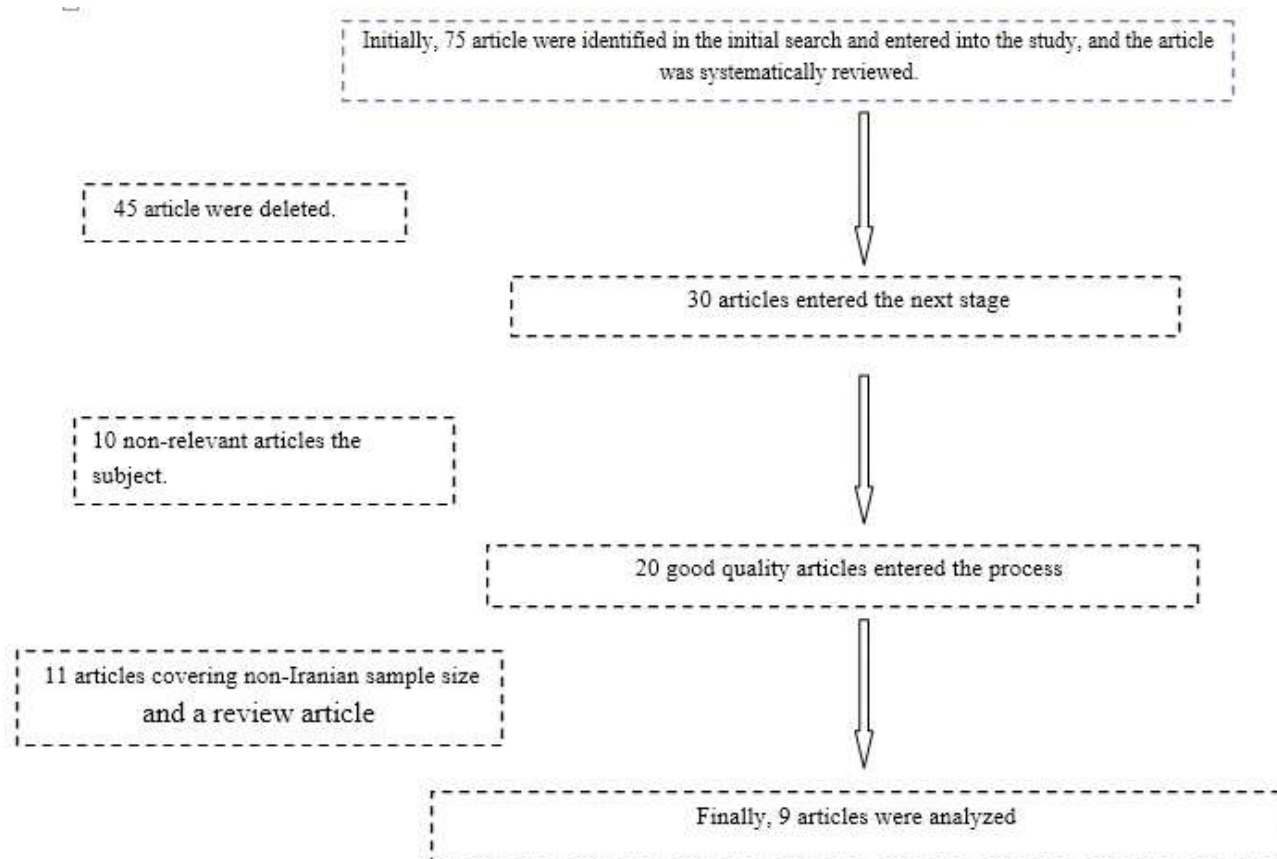


Figure 1: Flowcharts for systematic review and meta-analysis.

8. Results

Table 1 shows the characteristics of the studies entered into the meta-analysis phase. According to the findings, 9 studies that met the inclusion criteria were entered into the analysis. Of these 9 studies, 6, 6, and 3 studies focused on LBP, neck pain, and shoulder pain, respectively. The findings of Figure 2 show the overall prevalence of pain among Iranian adolescents. The findings of this study in Figure 2 showed that 25.4 % (95% CI: 19.0 to 33.0) of the children experienced pain. According to the findings of Figure 3, the prevalence of LBP, knee pain, and the shoulder pain was 26.2 (95% CI: 14.3 to 43.0), 22% (95% CI: 14.5 to 32.0), and 29.3% (95% CI: 20.1 to 40.7) in Iranian adolescents, respectively. Figure 4 shows the prevalence of musculoskeletal pain based on the location of the studies, in which the north-east has more prevalence (39%). The Kendal's tau in Begg and Manzumdar test showed no publication bias ($z=1.77$, $P=0.07$) and the figure 5 shows the funnel plot of the studies. Figure 6 shows the sensitive analysis of the studies and the results indicate no difference with main results. The results of the quality assessment of the articles showed that the studies entering the meta-analysis stage had the necessary criteria for entry into the study.

Author	Place	geographical location	Population studied	Mean (SD)	N	Pain area	prevalence
Ilbeigi (2018)(14)(	birjand	North-east	Elementary male students	-	60	Back	40
						Neck	38.33
Jafari(2014)(2)	Babol	North	-	15.96(1.13)	998	Neck	34.3
Zamanian (2014)	Shiraz	South	Students aged 5 to 12 years	5-12	800	Shoulders	27.2
Bayat(2012)(21)(	Hormozgan	South	Children and teenagers	13.1(0.85)	1648	Back	48
Shamsedini(2010)(22)(	Tehran	Center	Elementary and guidance students	13.4(-)	340	Shoulders	18.46
						Neck	13.42
						Back	17.4
Mohseni-Bandpay(2007)(21)	Mazandaran	North	Students aged 11 to 14 years old	13.1(0.85)	4813	Back	14.4
Amani(2013)	Ardabil	North-west	Middle school and high school students	-	158	Spine	51.21
						Neck	23.41
Poornajaf(2016)(22)	Ilam	the West	Elementary schools for girls	-	244	Back	5.3
						Neck	4.5
						Elbow	0.8
						Dropping shoulder	50
Dianat(2013)(23)	Tabriz	North-west	Schoolchildren aged 12-14 years	12.8(1.27)	586	Neck	35.3
						Shoulder	26.1
						low back	33

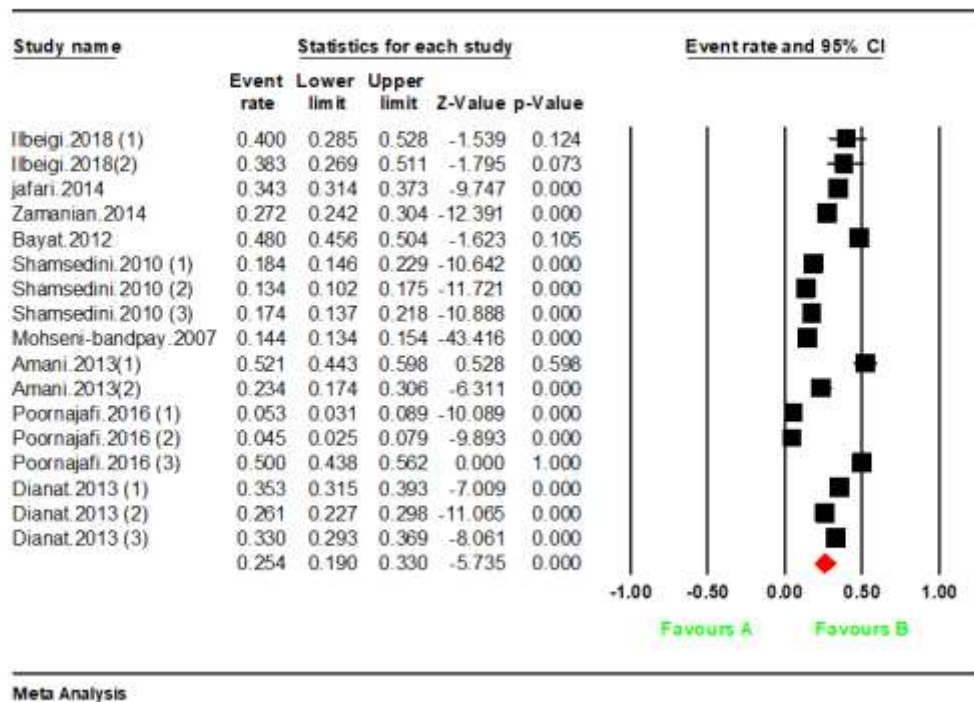
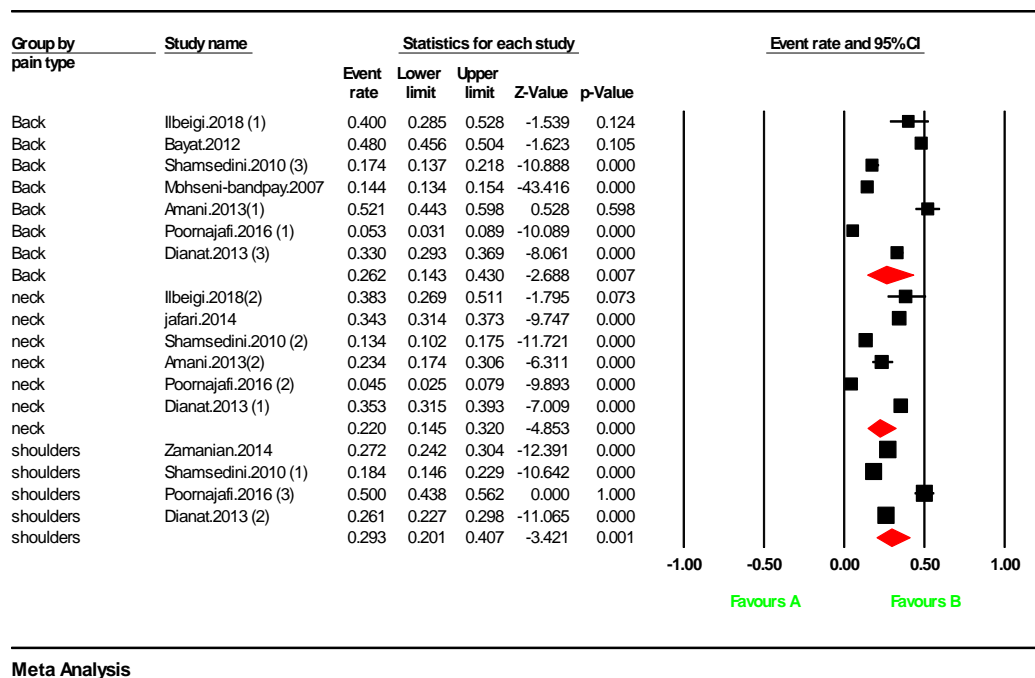


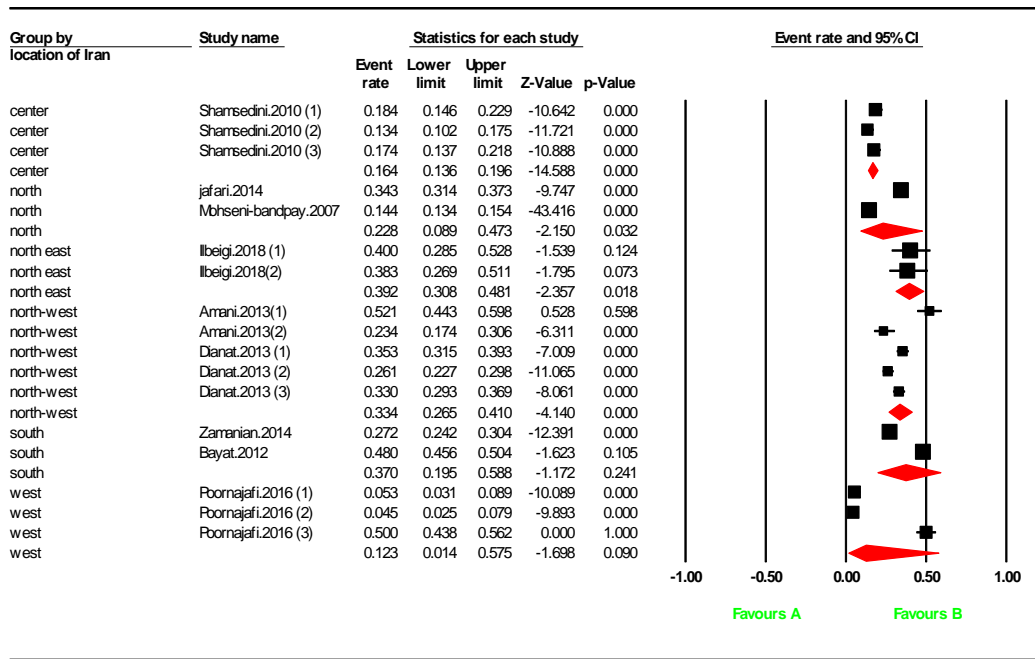
Fig.2: prevalence of musculoskeletal pain in students in Iran



Meta Analysis

Fig 3: Prevalence of musculoskeletal pain based on the site of pain (neck, shoulders, back)

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Meta Analysis

Fig 4: Prevalence of musculoskeletal pain based on life location in Iran

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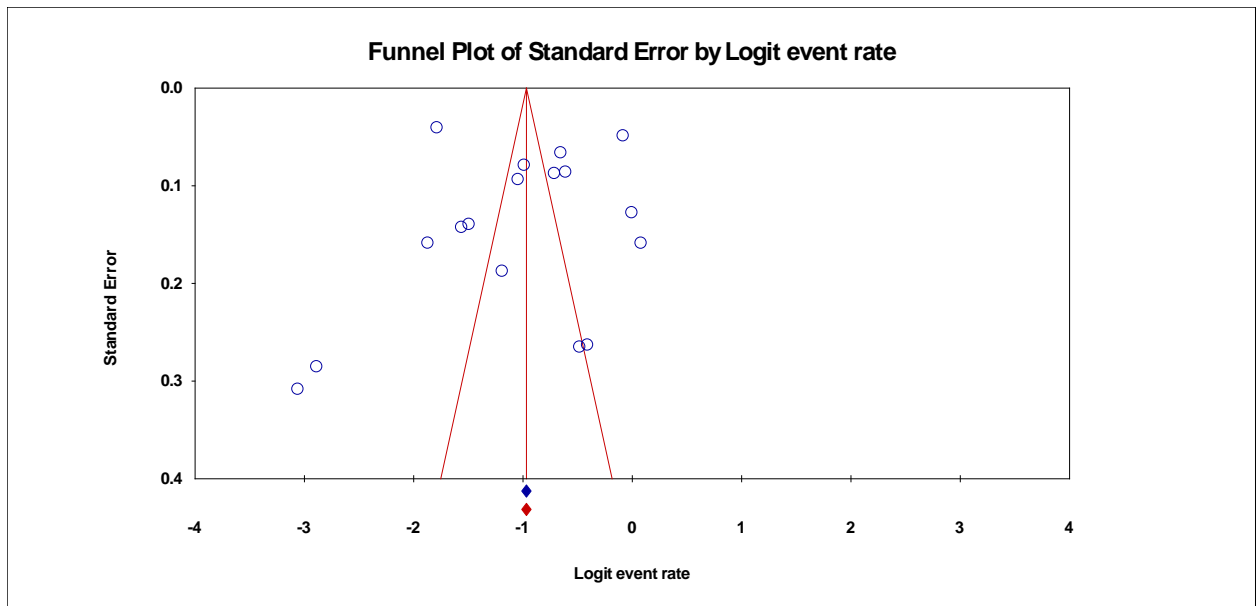


Fig 5: Funnel plot for publication bias

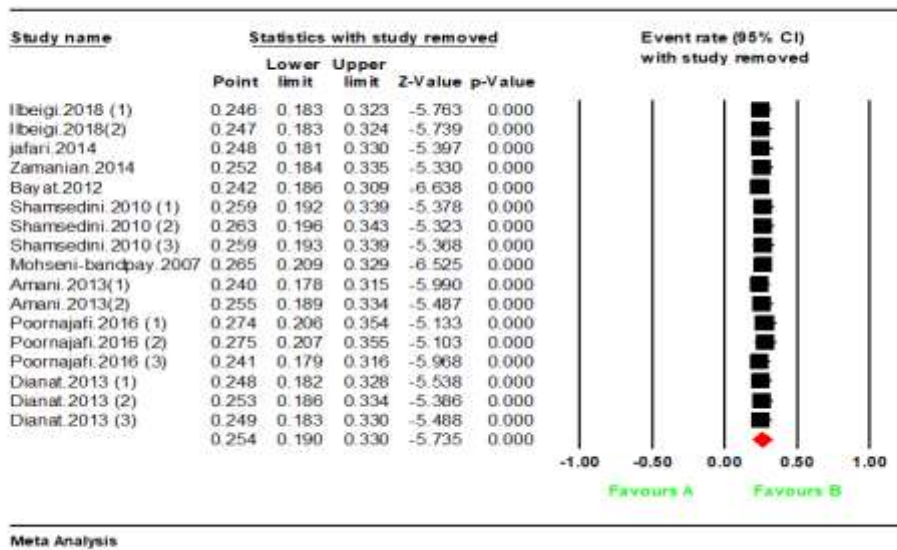


Fig. 6: the sensitive analysis of the studies

9. Discussion

Pain is one of the most important issues affecting children's health status in such way that there is a significant relationship between the amount of pain and quality of life in adolescents, which itself is a cause of concern among adolescent or even adult populations (24, 25). Therefore, this study was conducted as the first systematic review and meta-analysis on the musculoskeletal pain among Iranian adolescents.

The findings of the present study showed that the prevalence of musculoskeletal pain was 25.4%. Algarni et al. showed in a study that a total of 85.3% is prevalent among medical students at University Hospitals at any time (26), which is higher than the results of the present study.

The findings of the present study showed that the prevalence of LBP in adolescents was 26.2%, which was higher than the results of Louw et al.'s systematic review in Africa (12%) (27). However, these results are consistent with the results of King et al.'s review study, which was conducted to determine the prevalence of pain in children and adolescents and reported an incidence rate of 14-24% (28). In fact, LBP is one of the problems of adolescents and causes problems for them, thus they need to be prevented (29). Steffens et al. showed in their review study that exercise can prevent LBP, but back belts and shoe insoles have no effect on LBP reduction (30).

According to the findings of the present study, the incidence of neck pain in the subjects was 22%. Hoy et al. carried out a review study to determine the burden of pain in patients with neck pain and the findings showed that the global prevalence of neck pain was 4.9% and this type of pain caused disability in patients (31). The reported pain in the present study is higher than that of Hoy et al., which may be due to the fact that the present study was carried out only on Iranian adolescents, while Hoy's study is a global study with its special inclusion criteria (31). Kanchanomai et al. carried out a study on the incidence of neck pain and the findings showed that 33% of the subjects experienced persistent neck pain (32), which is more than the results of the present study.

The findings of this systematic review and meta-analysis indicated that 29.3% of Iranian adolescents had shoulder pain. Alshagga et al. showed in a study on medical students in Malaysia that the shoulder pain was prevalent among 8.6% and 22.8% of them during the last week and the last month, respectively (33), which is lower than the results of the present study. Auvinen et al., reported that half of the girls and one third of boys experienced pain in the shoulders, occipital or neck regions (34), which is consistent with the results of the present study.

The results of this study can provide various information to researchers. For example, in general, it can provide useful information to the general public. Also, the outbreak of pain in the health care sector can provide useful information for managing pain, which will provide the necessary grounds for it to be reduced. In the context of future studies, it is suggested that interventions are needed to reduce the pain of children.

One limitation of this study can be noted that there have been no studies have investigated all the variables. Or, in some studies, complete information is not provided.

10. Conclusion

Considering the high prevalence of pain among Iranian adolescents, it is necessary to carry out appropriate interventions for pain prevention in this age group.

Conflict of Interest: The authors declare no conflict of interest.

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