

Review Article:

Investigating the Prevalence of Musculoskeletal Pain Among Iranian Children and Adolescents: A Systematic Review and Meta-Analysis



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ABSTRACT

Context: Musculoskeletal pain is very common among students and adolescents.

Objectives: The present systematic review and meta-analysis study aimed to determine the prevalence of musculoskeletal pain among Iranian children and adolescents.

Data Sources, Study Selection, and Data Extraction: All articles on the prevalence of musculoskeletal disorders in Iranian adolescents were searched in the Google Scholar, 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. The obtained data were analyzed by Comprehensive Meta-Analysis (CMA) software.

Results: The findings showed that out of 9 studies found in this systematic review and meta-analysis, 6 articles were about low back pain, 6 articles about neck pain, and 3 articles about shoulder pain, respectively. According to the findings, 25.4% (95% CI: 19.0 to 33.0) of the children experienced pain; the prevalence rates of low back pain, knee pain, and the shoulder pain were 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 among this age group.

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1. Context

Pain is defined as an unpleasant experience that may cause tissue damage (1). Musculoskeletal disorders and discomforts are among the most important causes of pain 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, school absenteeism, 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 aches that anyone may experience it (9, 10).

The prevalence and cost of LBP, which has been turned into 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 including school issues, physical activity, lifestyle, and psychosocial factors (13, 19). All of these factors may affect the LBP incidence rate that influences children's health status (20). So it is necessary to study the incidence of LBP in adolescents.

Various studies have been conducted in Iran through systematic review and meta-analysis of pain outcomes. However, no study deals explicitly with the prevalence of pain in children and adolescents. For example, Azizpour et al. study (21) aimed at determining the prevalence of one year LBP in all age groups, and Mohammadi et al. study (22) assessed the prevalence of LBP in nurses. Therefore, it is necessary to pay attention to the pain in Iranian adolescents and young people.

2. Objective

Pain affects the health status of children and adolescents. That is why it is essential to pay attention to it. Identifying the prevalence of pain can help healthcare providers to take the necessary measures to prevent

and manage it. Considering that previous studies have focused only on the prevalence of back pain in different cities of Iran and there is no accurate statistics on its overall incidence, the present study aims to determine the prevalence of musculoskeletal pain among Iranian children and adolescents through systematic review and meta-analysis.

2.1. Study protocol

The present study is a systematic and meta-analytic review study that investigates the prevalence of musculoskeletal disorders among children and adolescents.

3. Data Sources and Study Selection

All articles on the prevalence of musculoskeletal disorders among Iranian adolescents were searched in the Google Scholar, four Iranian databases (ISC, Magiran, IranMedex, SID, Iran Doc), and five English databases (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/or a combination of these words and expressions. The Boolean operators of "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).

4. Data Extraction

The present study research was limited to articles published in foreign and domestic journals up to June 2018, also theses, national and international congresses, and organizational reports. First, all articles that were published on the prevalence of musculoskeletal disorders among Iranian adolescents were collected by the researchers. Then, the unrelated, interventional, and duplicate case reports and studies with incomplete 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. The flowchart of the study is presented in Figure 1.

4.1. Quality of studies

The methodological quality of the articles was evaluated based on the STROBE (The strengthening the reporting

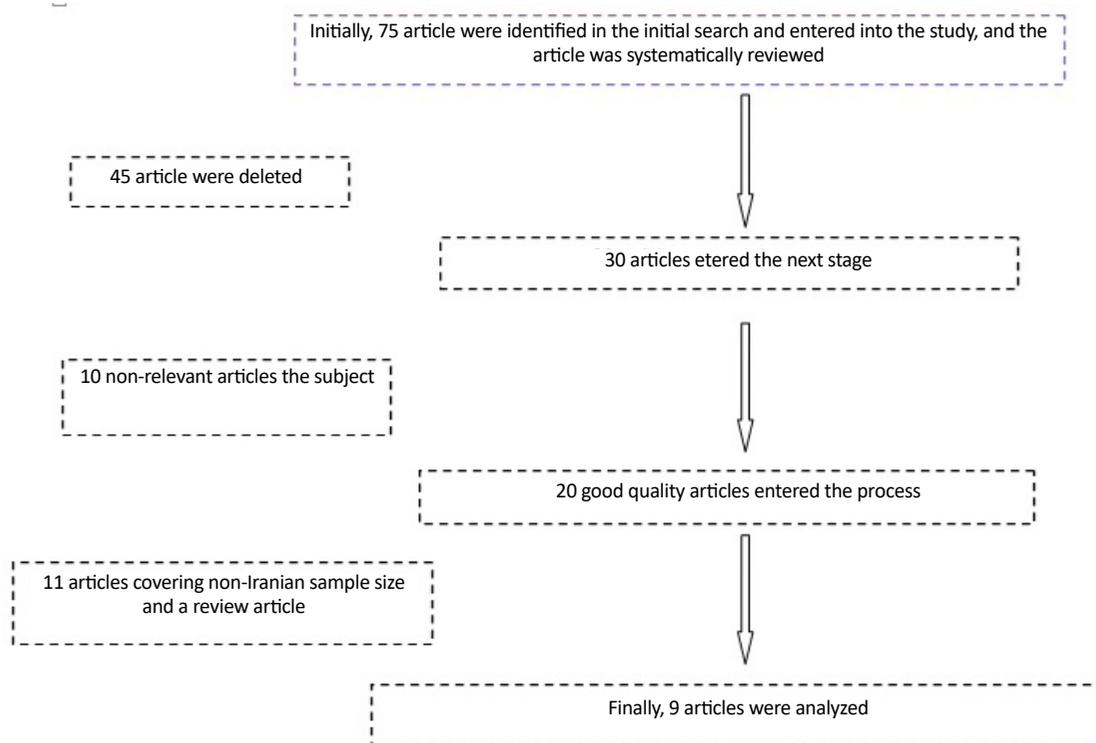


Figure 1. Flowchart for systematic review and meta-analysis

of observational studies in epidemiology) checklist (23), which consisted of 22 items, including study design, comparison groups, the subjects' characteristics, sample size, and study tools. In this checklist, each item is assigned a score of 0 to 2, with higher scores indicating higher methodological quality. The following specifications related to the research objectives were recorded: article title, name of the first author, the year of publication, city of the study, geographic area of the study, type of questionnaire surveyed, sample size (number of the boys and girls), average age of the subjects, target population, sampling method, and database containing the articles.

4.2. Data analyses

The obtained data were 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), 25-75% (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.

5. 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. Figure 2 shows the overall prevalence of pain among Iranian adolescents. Apparently, 25.4% (95% CI: 19.0% to 33.0%) of the Iranian children experience pain. According to 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 the highest prevalence (39%).

The Kendall's tau in Begg and Mazumdar test showed no publication bias ($z=1.77$, $P=0.07$). And Figure 5 shows the funnel plot of the studies. Figure 6 shows the sensitive analysis of the studies indicating no difference with the main results. The quality assessment of the articles indicates that the entered studies into the meta-analysis had the necessary criteria.

Table 1. Specifications of studies entered into the meta-analysis

Author	Place	Geographical Location	Population Studied	Mean±SD	N	Pain Area	Prevalence
Ilbeigi (14)	Birjand	North-east	Elementary male students	-	60	Back	40
						Neck	38.33
Jafari (2)	Babol	North	-	15.96±1.13	998	Neck	34.3
Bayat (35)	Hormozgan	South	Children and teenagers	13.1±0.85	1648	Back	48
Shamsedini (36)	Tehran	Center	Elementary and guidance students	13.4(-)	340	Shoulders	18.46
						Neck	13.42
						Back	17.4
Mohseni-Bandpay (35)	Mazandaran	North	Students aged 11 to 14 years old	13.1±0.85	4813	Back	14.4
Poornajaf (36)	Ilam	The west	Elementary schools for girls	-	244	Back	5.3
						Neck	4.5
						Elbow	0.8
						Dropping shoulder	50
						Neck	35.3
Dianat (37)	Tabriz	North-west	Schoolchildren aged 12-14 years	12.8±1.27	586	Shoulder	26.1
						Low back	33

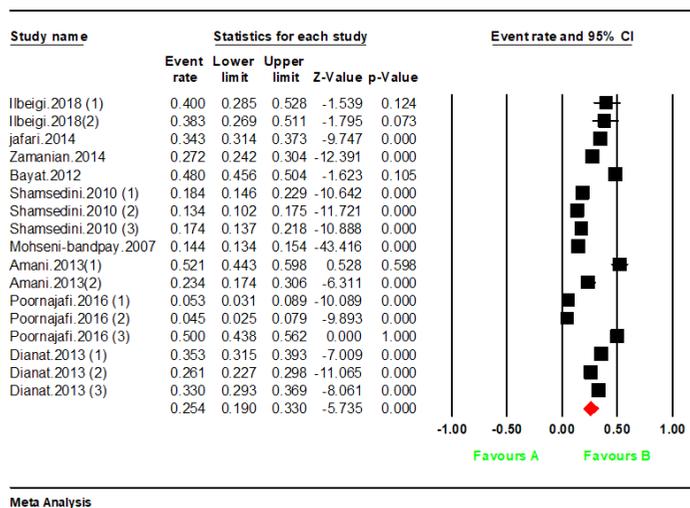
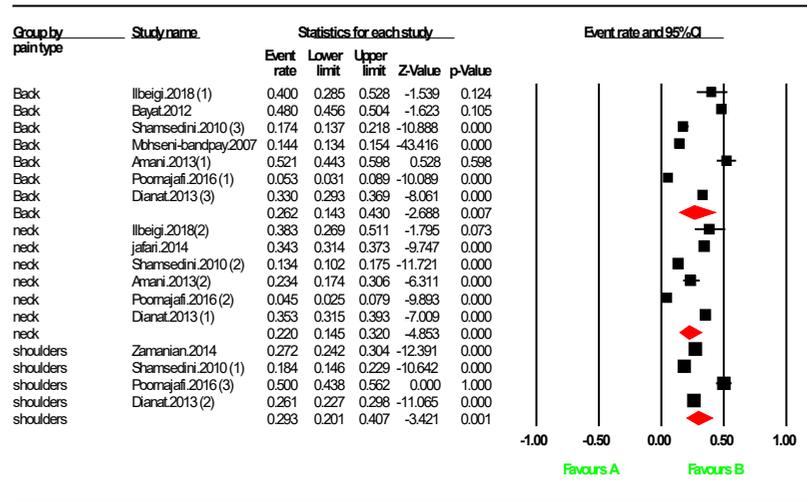


Figure 2. The prevalence of musculoskeletal pain in students in Iran



Meta Analysis

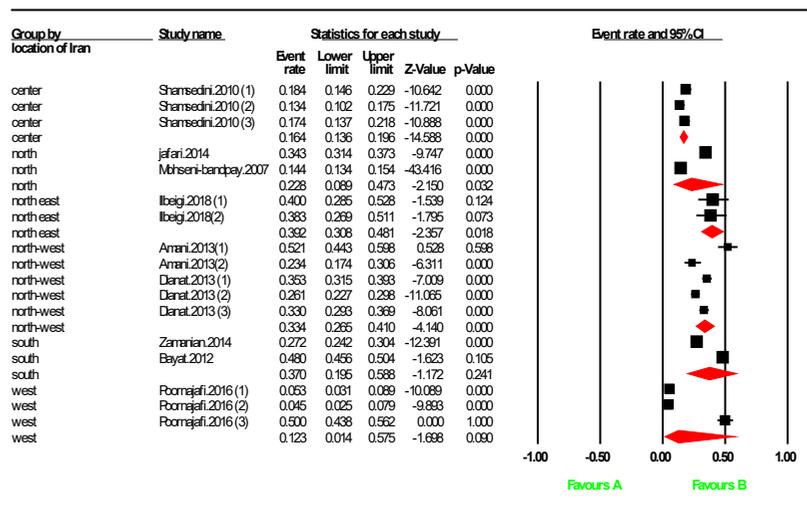
Figure 3. The prevalence of musculoskeletal pain based on the site of pain (neck, shoulders, back)

6. Discussion

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

The findings of the present study showed that the prevalence of musculoskeletal pain among Iranian children is 25.4%. Algarni et al. reported a prevalence rate of 85.3% 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. systematic review in Africa (12%) (27). However, these results are consistent with the results of King et al. review study, which was conducted to determine the prevalence of pain in children and adolescents and reported a prevalence rate of 14% to 24% (28). LBP is one of the significant problems of adolescents and should be prevented (29). Steffens et al. showed in their review study that exercise could prevent LBP, but back belts and shoe insoles did not affect LBP reduction (30).



Meta Analysis

Figure 4. The prevalence of musculoskeletal pain based on study location in Iran

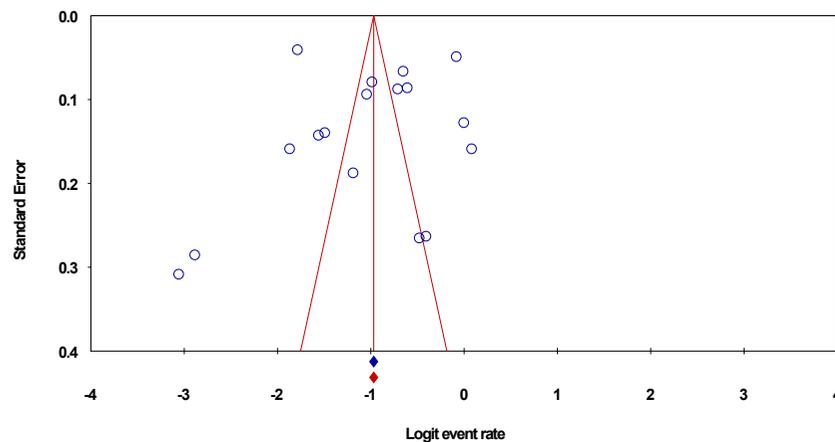


Figure 5: Funnel plot for publication bias

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 their findings showed that the global prevalence of neck pain was 4.9% and this type of pain would cause disability in patients (31). The reported pain in the present study was higher than that of Hoy et al., which might be because 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 their findings showed that 33% of the subjects experienced persistent neck pain (32), which was more than the results of the present study.

last week and the previous month, respectively, which was lower than the results of the present study (33). Auvinen et al. reported that half of the girls and one-third of the boys experienced pain in the shoulders, occipital, or neck regions (34), which was consistent with 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. in a study on medical students in Malaysia reported that the shoulder pain was prevalent among 8.6% and 22.8% of them during the

The results of this study can provide various information to researchers. Also, it can provide useful information to the general public. Besides, the information on the prevalence of pain in the health care sector can provide helpful insight for managing anxiety, which will provide the necessary grounds for taking preventive measures. About future studies, it is suggested that interventions are needed to reduce the pain of children.

One limitation of this study was that no study had investigated all of the variables. Also, in some studies, complete information is not provided.

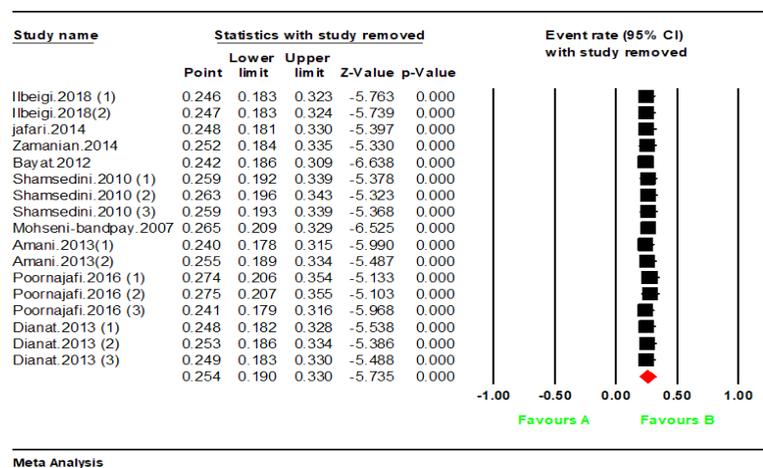


Figure 6. The sensitive analysis of the studies

7. Conclusion

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

Ethical Considerations

Compliance with ethical guidelines

All ethical principles were considered in this article. The participants were informed about the purpose of the research and its implementation stages; they were also assured about the confidentiality of their information; moreover, they were allowed to leave the study whenever they wish, and if desired, the results of the research would be available to them. (Ethical Code: IR. KUMS. REC. 1397. 838).

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Authors' contributions

All authors contributed in designing, running, and writing all parts of the research.

Conflicts of interest

The authors declared no conflict of interest.

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