



The Prevalence and Risk Factors of Low Back Pain in Children and Adolescents in Iran: A Systematic Review

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ABSTRACT

Aims: Nowadays, the prevalence of Low Back Pain (LBP) is a growing problem. The prevalence of LBP in Iran is almost as high as in other countries of the world. There are no accurate data on prevalence of LBP in Iran. Thus, the aim of this research was to estimate the prevalence of LBP and risk factors in Iran during a systematic way.

Method and Instruments: *Totally*, 17 studies of internal databases including Iran Doc, Magiran, SID, Iran Medex, Medlib and external databases including Scopus, Pubmed, Science Direct, Web of Science, Embase, Cochrane, Medline through using keywords like "Iran", "LBP", "children," Adolescents, "Associated Factors", "Prevalence" were obtained.

Findings: The prevalence and risk factors of LBP in children and adolescents were obtained from 15 articles with a sample size of 24,175. The lowest and highest prevalence of LBP in children and adolescents were 50% and 7.4%, respectively.

Conclusion: Given the high prevalence of LBP in children and adolescents and the numerous demographic, personal, physical, familial and psychological risk factors, the LBP prevent planning for this age group to prevent and promote health is strongly recommended. LBP has a special place in the community's health education, owing to its' prevalence and its impact on health of people during youth and adulthood period. .

Keywords: Low Back Pain Prevalence, Adolescent, Related Risk Factors, Systematic Review.

Introduction

In today's society, the prevalence of Low Back Pain (LBP) is a growing problem. LBP is a musculoskeletal disorder and a relatively common complaint in health care providers [1-3]. Back pain has limited the activity at young age and is the second leading cause of sick leave [2]. The prevalence of LBP in Iran is similar to that of the rest of the world. The prevalence of LBP in adolescent studies is relatively high and is increases with age. However, it has received less attention in the adolescent group, while its prevalence at this age, similar to that of adults, has been increasing [4]. The prevalence of LBP in 5000 students aged 11-14 years in Iran was estimated to be 17.4% and reported in a study by MohseniBandpi et al [5]. It was initially hypothesized

that LBP among children and adolescents may have important consequences for chronic back pain in adulthood. This theory was validated by identifying the association between LBP in childhood and adulthood [6]. Long-term research shows that children and adolescents with LBP are also more likely to develop back pain during adulthood [7]. As some research has shown, children and adolescents with LBP will suffer from back pain for the next 25 years [6]. Revisions to various studies on the prevalence of LBP have reported different percentages. Therefore, given the high prevalence of LBP among adolescents and its association with adult LBPs, and given that any planning to prevent or treat LBP requires awareness of the prevalence of LBP among the

community and also understanding the risk factors associated with it, there is a need to conduct research in this area in Iran.

Since most previous reports on the prevalence of LBP and related factors among adolescents have been published in Europe and some East Asian countries and there is little systematic information on Iranian adolescents. This systematic review study was designed to evaluate the prevalence of LBP in Iranian children and adolescents and its related risk factors in.

Method and Instruments

In this systematic review, in order to search Persian and English articles related to the prevalence and risk factors associated with LBP in Iranian children and adolescents, internal databases including IranDoc, Magiran, SID, Iran Medex, Medlib and external databases including Scopus, Pubmed, Science Direct, Web of Science, Embase, Cochrane, Medline were assessed. In this research related keywords such as LBP, adolescence, riskfactors, systematic review were independently used by two researchers. These key words were also searched in the Google Scholar search engine for the purpose of finalizing keywords without a time limit until January 20th. It should be noted that keywords were also searched using the AND and OR operators in combination.

Inclusion criteria for the study were as prevalence and riskfactors of LBP, statistical population targeting children and adolescents, and conducting the survey in Iran. Exclusion criteria were as conducting the study in countries other than Iran, non-adolescent study, and lack of quality of articles based on the Strobe Checklist. The standard Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist [8] was used to assess the quality of studies, which has 22 sections covering different parts of a report (sampling method, variables

measurement, study objectives and statistical analysis).

Each part was given a rating and some of the parts that were more important to us were given a higher rate. The scores on this checklist are from 0 to 44, of which the scores of less than 15 were excluded. In the first phase of the search 60 articles were found, of which, after reviewing the titles of the articles, eight articles were duplicated and overlapped that were removed. Thirty five other articles were unrelated articles, so they were removed for inconsistency with the criteria of the review, also abstract of 17 potential related articles were reviewed, and 2 of which were deleted due to lack of access to the full text of them. At the end, 15 appropriate articles were selected to enter into the present paper(Fig 1).

Finding

Here is the summary of how the articles were studied in the current systematic review. The prevalence and risk factors of LBP in children and adolescents were studied in 15 articles with a sample size of 24,175. The highest prevalence of LBP in children and adolescents was in Bayat Turk et al study [21] in 2012 and Bagheri et al study [22] in 2004 as reported about 50%. In other hand, Shams al-Din et al in 2009 reported the prevalence rate of this problem as 7.4% [9]. Risk factors for back pain in adolescents included demographic factors (age, sex), individual factors (status and time of watching television, volume/ status and duration of school assignments, type of activity at home, working time with computer, sitting in a classroom chair for more than 45 minutes, physical factors like (lumbar spine exercise), family factors like (family history of LBP), psychological factors like (emotional factors and social behaviors).

A summary of the reviewed articles on the prevalence of LBP and related risk factors in children and adolescents is presented in Table 1. In the study of Shamseddini et al (2009),

Table 1) Characteristics of the reviewed articles on the prevalence of LBP in Iranian children and adolescents

First Author	Characteristics of participant	Year of the study conducting	city	LBP Prevalence	Related factors	Sample size
Alireza Shamsuddin (9)	Junior high school	1388	Tehran	First year (7.4%) Second year (9.3%) Third Year(8.1%)	Weight of the bag	213
Venus Rahmani (10)	Adolescents 18-15 years	1396	Tehran	-	Muscle volume (Multifidus muscle size)	40
Iman Diyanat (11)	Adolescents 15-11 years	1396	Tabriz	40.4% in boys ≤13 years	Gender and age	1611
ImanDiyanat (12)	Adolescents 14-12 years	1392	Tabriz	33%	Weight of bag and sex	586
Mohammad Mohseni Bandpi (13)	Adolescents 14-11 years old	1385	Mazandaran	Instantaneous prevalence(15%) Annual prevalence (17.4%) In girls (14.5%)and in boys (20.5%)	Age, body posture when watching TV and at home	5000
Farshad Arghavani(14)	Adolescents 15-12 years	1396	Sanandaj	(39.7%)	Gender, type of schoolbag, number of hours watching TV Number of hours worked with computer	735
Iman Diyanat (15)	Adolescents 14-11 years old	1395	Tabriz	(34.3%)	Gender, Family History, Duration of School bags, Difficulty in observing blackboard, High sSchool homework Size Psychological factors	1700
Mohammad Aryan (16)	Adolescents with an average age of 15 years	1395	Gorgan	(27.7%)	Psychological factors include social behaviors	255
Iman Diyanat (17)	Kids 12-7 years old	1389	Tabriz	(8.7%)	Weight of bagGender	307
Mohammad Islamfar (18)	Kids 19-6 years old	1389	Khuzestan	(24%)	How to sit down to watch TV, how to do homework at school	300
Fariba Reisi (19)	Junior high school and high school	1396	Tehran	Totally (26%) Girl (29.6%) Boy (21.8%)	Weight of school bag	2000
Campus Nour Mohammadpour (20)	Adolescents with an average age of 15.8%	1396	Tehran	46.2%	Type of school bag, history of LBP Type of physical activity	372
Mohammad Bayat Turk (21)	Teenagers in elementary school and junior high school	1391	Hormozgan	Instantaneous prevalence (50%) Prevalence 1 month later(48%)	AgeType of bagSchool assignment statusTime spent watching TV	1243
Masoumeh Bagheri Nesami (22)	Adolescents 14-11 years old	1383	Mazandaran	Point prevalence (50%) 1-month prevalence (48%)	Sit in the classroom for more than 45 minutes	5000
Mohammad Ali MohseniBandpi (23)	Adolescents 14-11 years old	1384	Mazandaran	1-month prevalence(14.4%) 6-month prevalence: (15.6%) 1-year prevalence: (17.4%)	Age Mechanical factors like heavy lifting Lifestyle like status and duration of watching television, status and duration of school assignments	4813

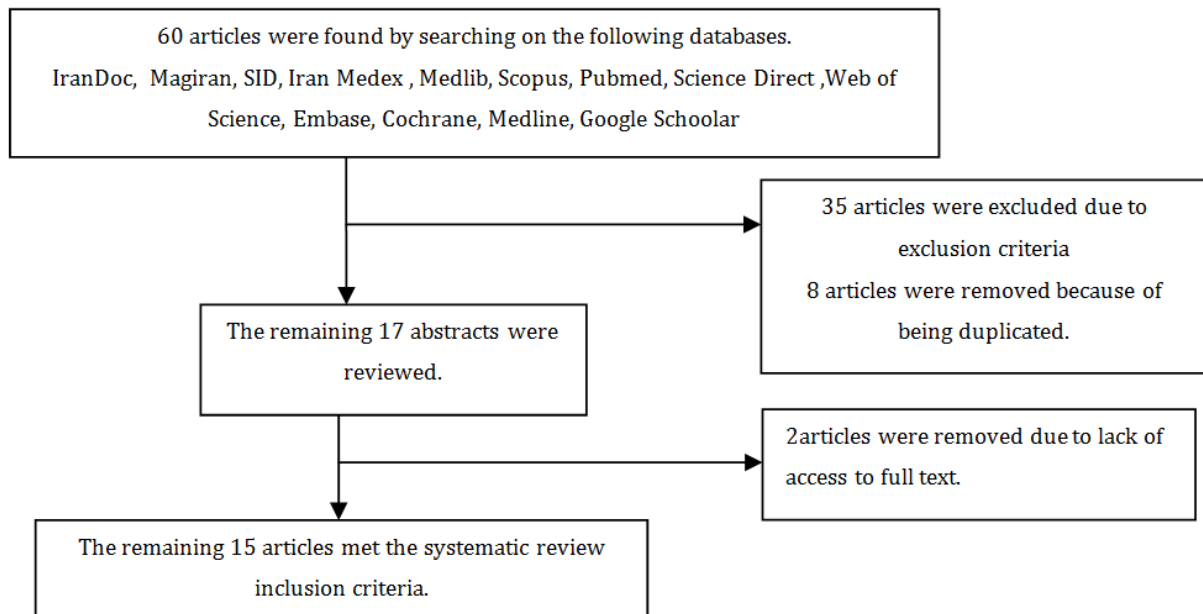


Fig 1) Stages of entering articles into the Systematic Review study

Nardic musculoskeletal questionnaire was used to assess the relation between weight of the school bag and musculoskeletal symptoms. This study reported the rate of musculoskeletal discomfort in the lumbar region as 16.7%. Furthermore this study revealed backpack weight was strongly associated with discomfort in the lumbar region among studied children [9].

Rahmani et al. (2018) survey measured muscle size by ultrasound measurement in 40 boys LBP suffering from LBP. According to the results, the size of the multifidus muscles decreased and the male adolescents with LBP suffered from a decrease in muscle size compared to their healthy peers [10].

A research by Dianet et al (2018) on the identification of high-risk sex and age groups for LBPLBP, it was found that the lowest and highest prevalence of shoulder and back pain was 14.2% (shoulder pain in 14-year-old boys) and 40.4% (Back pain was in boys 13 - year-old) respectively. Boys were more likely to develop shoulder and back pain than girls. The results of this mentioned highlighted the importance to a more accurate understanding of gender and

age-specific data [11].

Another study by Dianet et al. (2014) found the relation between high school students' LBPLBP with school bag and gender. This study showed that the average carrying weight of high school students' bags was 2.8 kg. Complaints of neck pain, shoulder pain and LBP were reported at 35.3%, 26.1%, and 33% for one month, respectively. Gender was an independent factor in predicting musculoskeletal symptoms in school students. Girls were more likely than boys to complain of neck, shoulder, and LBPLBP, although there were no significant differences between sexes regarding school bag variables. The findings showed that the recommended weight limits for school bags may differ between boys and girls [12].

MohseniBandpi et al. (2007) in their study examined non-specific LBP in the student population. In this study, a demographic/lifestyle questionnaire as well as questionnaire regarding prevalence and characteristics of LBPLBP were used. The point prevalence in one month, the last 6 months and the annual prevalence were 15%, 14.4%, 15.6% and 17.4%, respectively. No

relationship was found between school bag weight and LBPLBP prevalence ($p = 0.824$). Back pain was significantly associated with age, location, and duration of television viewing. There was no relationship between LBPLBP and Body Mass Index (BMI) and sex. Finally, this study showed the prevalence of LBPLBP was relatively high among students [13].

Arghavani et al. (2013) examined the prevalence and causes of musculoskeletal pain in high school students in Sanandaj. The study was conducted on male and female high school students and obtained information on school bags, seat type, and the number of hours of watching television or computer working using a questionnaire. Students' weight, height, and BMI were measured. The prevalence of musculoskeletal pain in school students was 67%. The prevalence of musculoskeletal pain was significantly correlated with gender, type of school bag, the hours of watching television, and computer work. The prevalence of musculoskeletal pain was not significantly correlated with the type of school chair. This study showed that musculoskeletal pain is very prevalent among college students [14].

Dianet et al. (2017) used a self-administered questionnaire to assess the prevalence and risk factors of LBP among school-aged LBP. The results showed that the prevalence of LBPLBP was 34.3%. Female gender, history of LBPLBP in a family member, difficulty in viewing the blackboard in the classroom, excessive housework, time spent carrying a school bag (emotional symptoms) were psychological factors independently associated with LBPLBP. Physical activity, work, watching television, using a computer, playing, and weighing schoolbags had no effect on LBPLBP [15]. Ariayi et al. (2017) in their study examined the psychological factors associated with musculoskeletal disorders in adolescents. A self-administered

questionnaire and a Nordic Musculoskeletal and Skeletal Questionnaire were used to assess psychological symptoms. The prevalence of LBPLBP was 27.7%. Moreover, social behaviors are associated with LBPLBP and in the multivariate regression model, musculoskeletal symptoms were only related to social behaviors [16].

A study by Diannet et al. (2011) on school bag weight and symptoms of LBP showed that the average carrying weight of schoolbags was 2.9 kg. Approximately 86% of the samples reported some kind of musculoskeletal disorder. The symptoms of LBP among students was 8.7%. Girls reported more LBP than boys [17].

Eslamfar et al. (2007) investigated the prevalence of LBP in Khuzestan students. The findings showed that the prevalence of LBP in children and adolescents was relatively high (24%). There was a significant relationship between the way to watch TV and the way to do homework with LBP. This study recommended parents, school administrators and authorities should think of a solution to this problem [18].

Raisi et al. (2018) examined the prevalence of LBP and its relationship with backpack weight among Iranian students. The weight of their backpack or bag was measured over a week and their mean weight was recorded. Pain intensity was measured using a visual analogue Scale (VAS). According to the findings, 26% of students had LBP (29.6% girls and 21.8% boys). There was a significant correlation between backpack weight and back pain severity in both boys and girls [19].

Nourmohammad Pour et al (2018) investigated the risk factors of LBP in high school girls. In a prospective cross-sectional study, demographic characteristics including age, BMI, weight and the way of using a backpack, family history of LBP, and smoking status were recorded. The instantaneous

prevalence, prevalence after 3 months and after 6 months were 46.2%, 11.6% and 31.2%, respectively. History of LBP in first degree relatives was significantly associated with LBP among students. The prevalence of passive smoking was significantly higher. The prevalence of joint deficiency was significantly higher in patients with the disease, but no other relationship was reported [20].

Bayat Turk et al. (2012) investigated the prevalence of LBP in Iranian children and adolescents and their associated risk factors. A researcher-made questionnaire was used for data collection. The results showed that the prevalence of LBP among students was 50% and 48% in the previous month. The present study showed that age, type of bag, the way of doing homework, and duration of watching television were risk factors for LBP in children [21].

MohseniBandpi et al (2005) investigated the prevalence of LBP and its related factors in junior school students. Questionnaires were used to assess individual factors, mechanical factors, lifestyle, prevalence and characteristics of LBP. Results showed that 15% of students complained of LBP at the time of study, 14.4% during the past month, 15.6% during the last 6 months and 17.4% during the past year. Back pain was associated with age and some mechanical factors such as heavy lifting. The results showed a significant relationship between LBP and lifestyle factors such as status and duration of watching television, status and duration of doing school homework [22].

BagheriNesami et al (2007) investigated the characteristics of LBP and its disabilities in junior school students. In this study, 100 mm VAS instrument and modified Hanover standard questionnaire were used. The results showed that the point prevalence in school students was 15%, of which 60.4% had LBP for 1-12 hours and 19.3% had LBP

at least once in their lifetime. The severity of LBP in VAS was 32.8 ± 20.48 mm. All students reported some degree of disabilities, of which sitting in the classroom for 45 minutes in the classroom was the most significant factor for these disabilities (33%).

DiscussionIn this review study, articles with different prevalence and risk factors in children and adolescents in Iran were summarized. Given the importance of the issue, the results are discussed in two separate areas of prevalence and related risk factors.

Prevalence of LBP in children and adolescents

In this study, the prevalence of LBP in children and adolescents ranged from 7%-50% in the age range of 7-19 years. Although different types of prevalence (point prevalence, 1 month, 6 months, and yearly prevalence) were used and the type of studies did not match, the results showed that the LBP prevalence was relatively high in children and adolescents. Most studies (8 studies) reported a prevalence of between 10-40% (15-19, 16, 12-23, 18). Three studies reported a prevalence of LBP above 40% [20-22] and only two studies had a prevalence of less than 10% [9,17]. Worldwide studies show that the prevalence of LBP in children and adolescents was limited [24] but overall prevalence ranged from less than 10% in the age group below 7 years to over 50% in the age group of 16 years [25]. As a result, there was a need for meta-analysis and the use of homogeneous studies to accurately determine the prevalence of LBP in children and adolescents.

Risk factors associated with LBP in children and adolescents

Although it is believed that musculoskeletal dissatisfaction is multifactorial in origin, the heavy backpack is definitely a common

factor in school-age children and adolescents and may represent daily physical stress for high-school students. Nine studies of the weight and type of school bags for children and adolescents identified a key risk factor for LBP [19-14,17,21-9,15]. In five studies, the role of gender as a risk factor for LBP was mentioned [14,17-11,15-21]. Although this study did not clearly identify which girls or boys were most at risk, only 2 studies reported a higher prevalence of LBP for boys [11,13] and one study reported a higher rate of LBP for girls [19].

But many studies around the world have shown that in addition to gender roles, girls have been more likely to have LBP [25-28]. As a result, more research is needed to determine the role of gender in Iran. In eight studies of physical activity, including how and how to watch television, the amount of homework done, and computer work was listed as risk factors associated with LBP [20-13,18, 23-15]. Numerous studies abroad show that inappropriate body positioning during school homework, television watching, and home activities are effective factors in LBP [29-30]. In four studies age was mentioned as one of the effective risk factors for LBP [11,13,21,23]. Other studies also showed that the rate of LBP varied from less than 10% in age group under 7 years to more than 50% in 16-year-old group [25]. Family history was also reported in 2 studies [15,20] and psychological factors in 2 studies [15-16] as risk factors associated with LBP. The history of LBP in the family, especially parents, is one of the effective risk factors for back pain in adolescents [31], which further specifies the role of genetics and genomes in the development of LBP [33-32]. Other studies have also mentioned the role of psychological factors in the development of LBP, although the issue is controversial that whether LBP produces psychological symptoms or the rate of LBP improves

with the disappearance of psychological symptoms [35-34].

At the end, the results of this review showed that the prevalence of LBP among children and adolescents was and might be resulted in significant disability. Given the high prevalence of LBP in children and adolescents in this study and the various risk factors such as demographic, personal, physical, familial and psychological risk factors, the necessity of planning in this issue to prevent the problem and promote the health of this age group is felt. Ergonomic training and lifestyle modification of students, control of individual and environmental factors, and awareness of teachers and parents can play an important role in reducing the incidence of LBP.

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