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Prevalence and Associated Factors of Low Back Pain among Adolescent Athletes from an Athletics Club: A Cross-Sectional Study

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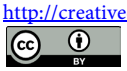

Abstract

Low back pain (LBP) in adolescent athletes may lead to a significant lost playing time and thus reduce their performance and compromise their career. The aim of our study was to determine the one-year prevalence of LBP and its associated factors in adolescent athletes. Methods: A cross-sectional study including adolescent athletes from a Tunisian athletics club. LBP prevalence and circumstances were noticed. Training characteristics and flexibility of the lumbar spine and lower extremities were studied. Results: We included 141 young athletes with a mean age of 16.42 ± 1.76 years. The sex ratio was 1.23. Athletes practiced 3 types of sports: running (n = 67), throwing (n = 42) and jumping (n = 32). The average length of sport practice was 4 ± 2 years. The one-year prevalence of LBP was 60.2%. Athletes with LBP history were older (p = 0.004) and had a higher BMI (p = 0.003) and poorer spinal flexibility (p = 0.008) than athletes with no LBP. The practice duration was not significantly different between the two groups. Athletes practicing throwing sports had higher prevalence of LBP (73.8%) than those practicing running (56.7%) and jumping (50%) without statistical significance (p = 0.083). The main circumstance of LBP onset was "an intense training session". Quadriceps tightness was an associated factor with LBP only for adolescents practicing jumping (p = 0.026). In conclusion, prevalence of LBP in adolescent athletes remains high. Older age, high BMI, high practicing years and poor spine flexibility seem to be associated with the onset of LBP. Further high-quality studies assessing more epidemiological, anatomical and sports characteristics are still needed.

Subject Areas

Kinesiology

Keywords

Back Pain, Athletes, Adolescents, Prevalence, Sports Medicine

1. Introduction

Low back pain (LBP) is common among the general population [1] and in workers [2] [3]. In general adolescent population its one-year prevalence varies from 17% to 50% [4] [5]. The one-year pooled prevalence among adolescent athletes is 42% [6]. LBP is one of principal causes of lost playing time among athletes [7]. It may reduce their performance and compromise their career. Thus, seeking LBP and studying its risk factors are crucial in order to implement adequate treatment and advocate preventive measures among a vulnerable population such as adolescents [8].

The aim of the study was to determine the prevalence and the associated factors of LBP in adolescent athletes belonging to an athletics club.

2. Methods

We conducted a cross-sectional study among adolescents belonged to a Tunisian athletics club during December 2021.

Athletes aged between 10 and 19 years [9] and practicing sports for at least one year were included in the study.

The agreement of the club directors' board was obtained. A formal consent was obtained from the athletes and their parents.

The main outcome measure was LBP prevalence obtained when questioning the athletes if they have had at least one episode of LBP during the past year. Secondary outcomes were demographic data (age, gender, BMI), practicing years, training hours per week, LBP onset circumstances (1) due to a false move, 2) a lack of warm-up, 3) after an intense training session, 4) after participating in a competition) and physical examination (Schober's index, popliteal angle and the heel buttock distance).

The data collected was analysed by SPSS (Statistical Package for the Social Sciences) software version 23.0. We calculated the number and the percentage for qualitative parameters and the mean and the standard deviation (SD) for the quantitative parameters. According to the variable type, the chi-square or the t student tests were used for the comparison between LBP and no LBP populations. The significance threshold was fixed at 0.05.

3. Results

We included in our study 141 adolescent athletes. The mean age was 16.42 ± 1.76 years. Sex-ratio was 1.23. The majority (47.5%) of athletes were practicing running (**Table 1**).

The one-year prevalence of LBP in our population was 60.2%. It increased with age (Figure 1). The main reported circumstance of LBP onset was an intense training session.

LBP athletes were older and had a higher BMI than other athletes with a statistical significance. They also had higher practicing years and training hours per week with a higher proportion of individuals practicing throwing sports, without statistical significance. Moreover, all flexibility tests were poorer in LBP athletes without statistical significance except the Schober's index (Table 2).

Schober's index was poorer in LBP athletes compared to other athletes in the three categories of sport. Heel-buttock distance was significantly higher in LBP jumping athletes (Table 3).

Table 1. Characteristics of the total population.

Variable	Value
Number of athletes	141
Male (n/%)	78/55.3
Female (n/%)	63/44.7
Age (years), (Mean ± SD)	16.42 ± 1.76
BMI (Mean ± SD)	22.41 ± 3.1
Sports' categories	
Running (n/%)	67/47.5
Throwing (n/%)	42/29.8
Jumping (n/%)	32/22.7
Practicing years (Mean ± SD)	4 ± 2
Training hours per week (Mean ± SD)	11.4 ± 4.7

SD: Standard Deviation.

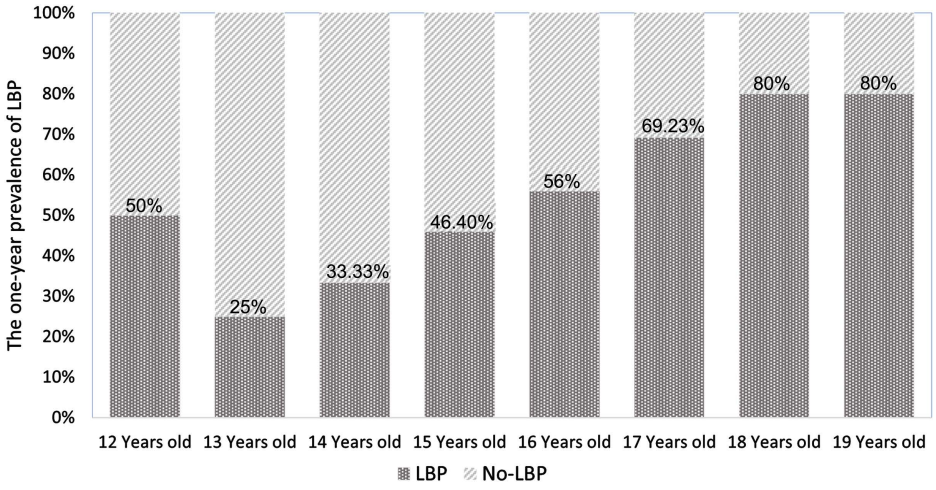

Figure 1. Percentage of LBP athletes according to the age.

Table 2. Comparison of epidemiological and flexibility parameters between LBP and other athletes.

Parameters	LBP athletes (n = 85)	Other athletes (n = 56)	p
Age (years), (Mean ± SD)	16.78 ± 1.61	15.88 ± 1.85	0.004
BMI (Mean ± SD)	23.01 ± 3.22	21.5 ± 2.67	0.003
Practicing years (Mean ± SD)	4.16 ± 2.12	3.58 ± 2.02	0.107
Training hours per week (Mean ± SD)	11.51 ± 4.8	11.3 ± 4.56	0.803
Sport categories			
Throwing (n/%)	31/73.8	11/26.2	
Running (n/%)	38/56.7	29/43.3	0.083
Jumping (n/%)	16/50	16/50	
Flexibility tests			
Schober's index (cm) (Mean ± SD)	15.24 ± 0.98	16.02 ± 0.77	0.008
Popliteal angle (˚) (Mean ± SD)	7.96 ± 6.80	6.07 ± 5.93	0.084
heel-buttock distance (cm) (Mean ± SD)	1.83 ± 1.60	1.4 ± 1.12	0.139

SD: Standard Deviation.

Table 3. Lower limb flexibility in LBP and other athletes according to the sports category.

	Sports category	LBP athletes (n = 85)	Other athletes (n = 56)	p
Schober's index (cm)	Throwing	4.97 ± 1.19	5.55 ± 0.52	0.048
	Running	5.72 ± 1.2	6.14 ± 0.69	0.003
	Jumping	5 ± 1.29	6.13 ± 0.95	0.002
Popliteal angle (˚)	Throwing	9.19 ± 5.57	5.45 ± 2.32	0.061
	Running	6.68 ± 4.12	6.21 ± 2.46	0.697
	Jumping	6.88 ± 3.86	6.25 ± 3.01	0.584
Heel-buttock distance (cm)	Throwing	1.89 ± 0.58	1.73 ± 0.90	0.806
	Running	1.38 ± 0.61	1.45 ± 0.82	0.872
	Jumping	2.31 ± 0.73	0.95 ± 0.75	0.026

4. Discussion

In our study, we found a one-year prevalence of LBP of 60.2% among adolescent athletes. Epidemiological parameters associated with LBP were older age and higher BMI. However, the two significant clinical abnormalities found in our LBP population were a limited lumbar flexibility whatever the sport category, and quadriceps muscle tightness for athletes practicing jumping.

The prevalence of LBP in our study is close to figures reported by Skoffer and Foldspang [10] and Schmidt *et al.* [11] (Respectively 60.3% and 57%). Kato [12],

Sundell [13] and Schachne [14] reported lower prevalence; respectively 49.7%, 42.4% and 51%. This divergence with our results may be explained by a different age interval and sports category of the adolescent samples included in these studies (baseball players [12] and non-specific athlete's speciality [10] [11]). As we noticed in our study, Schachne *et al.* [14] found that older age was an associated factor with LBP in adolescent athletes. This association may be explained by the fact that progress in age would be accompanied by an increase in training intensity and hours of practice per week. These latter factors are associated with LBP occurrence in adolescents [15] [16]. BMI is an associated factor with LBP in our study concordantly with the results of Romero *et al.* [17] and Onan D and Ulger O [18]. These authors did not give an explanation for this association however; we may suggest mechanical loading and hormonal metabolic activity as possible mechanisms [18]. Decrease in lumbar flexibility was reported as a biomechanical factor associated with LBP [4] [8] [19] [20]. Indeed, reduced lumbar flexibility would be associated with a higher level of stress exerted on vertebrae and an excessive exposure to micro-trauma [19] [21]. Quadriceps muscle tightness was significantly prominent in jumping sport athletes in our study. The contrary finding was reported in young floorball and basketball players [22]. This discrepancy with our results may be due to the type of sport and age differences. However, similar findings regarding the quadriceps tightness were noticed in non-athlete's school adolescents [23] and university students [24]. Globally a recent meta-analysis found as potential risk factors for LBP in adolescent athletes; intense training, high BMI, older adolescent age, female sex and family history of LBP [6].

Study limitations: Our study comprises some limitations, essentially the small size of the studied sample, the lack of muscle strength assessment and the absence of LBP pathogenesis information.

5. Conclusion

This cross-sectional study aimed to study the prevalence and the associated factors of LBP in adolescent athletes. It found a higher one-year prevalence of LBP in this population. Associated factors with LBP were older age, higher BMI, limited of lumbar flexibility. Quadriceps muscle tightness was an associated factor in the sub-group of athletes practicing jumping. However, higher practicing years and training hours per week and practicing throwing were not significantly associated with LBP. More high-quality prospective studies are needed to understand better factors leading to the onset of LBP in adolescent athletes.

Conflicts of Interest

The authors declare no conflicts of interest.

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