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Article

Prevalence of low back pain in a sample of primary school students

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Abstract: It is well known that low back pain (LBP) prevalence is high during the course of school age children's lives. However, literature concerning the initial onset of back pain between ages of 3 and 11 years remains scarce. The present study aimed to analyze the prevalence of LBP in kindergarten and primary school students. 278 (9.9±2.1 years old; 52.2% girls) students from two public kindergarten and primary schools in Valencia, Spain participated in this cross-sectional study. The Nordic questionnaire on LBP was used to ask questions related to the duration of LBP symptoms over time. The lifetime prevalence of LBP was 47.5% (n = 132), a last year prevalence of 44.2% (n = 123), and a last week prevalence of 18.8% (n = 50) was reported. Boys and girls reached lifetime prevalence of 52.3% (n = 64) and 47.7% (n = 82) ($\chi 2 = 1.978$, $p = .099$), respectively. By age group, lifetime episodes of LBP also showed a higher prevalence with increasing age ($\chi 2 = 32.637$; $p < .001$). In summary, our findings suggest that LBP increases with age. In addition, our results further strengthen the evidence that LBP onset could start as young as 10-years-old.

Keywords: Back health, low back pain, prevalence, kindergarten, primary education, children.

1. Introduction

It is well known that low back pain (LBP) prevalence is high during the course of school age children's lives (Calvo-Muñoz, Gómez-Conesa, & Sánchez-Meca, 2013; Salminen, 1984). However, literature investigating the initial onset of LBP in children between 3 and 11 years of age remains scarce. In Spain, the latest study of a sample of 1500 adolescents aged between 12 and 18 from the Valencian Community detected a 44.5% lifetime prevalence of LBP. Prevalence was higher in girls (50.3%) than in boys (38.9%) and reached 36.9% by 13 years of age (Miñana-Signes & Monfort-Pañego, 2015a). In addition, a growing body of evidence indicates LBP onset to be around age 10–14 (Hoy et al., 2014; Leboeuf-Yde & Kyvik, 1998; Woolf & Pfleger, 2003), with prevalence increasing with age, and approaching adult levels around age 18 (Jeffries, Milanese, & Grimmer-Somers, 2007).

LBP is a symptom rather than a disease (Maher, Underwood, & Buchbinder, 2017). The condition is common, and it is usually not possible to diagnose a specific pathoanatomical cause (Cieply & Milbrandt, 2009). Like other symptoms, such as headache or dizziness, LBP may cause marked discomfort and impairment in a child's everyday life and contribute to long-term problems. Research suggests that children and adolescents reporting back pain experience increased healthcare utilization, absenteeism, impairments at school, restrictions in physical activity, or combinations of these adversities (Roth-Isigkeit, Thyen, Stoven, Schwarzenberger, & Schmucker, 2005).

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Randomized control trials on back health education in school settings have found educational interventions to be effective by improving knowledge, postural habits, core muscle endurance, and back health in children (Dullien, Grifka, & Jansen, 2018; Habybabady et al., 2012; Hill & Keating, 2015; Kovacs et al., 2011; Vidal et al., 2011; Vidal et al., 2013). Because of these successes, other works (Miñana-Signes & Monfort-Pañego, 2015b; Monfort-Pañego et al., 2016; Monfort-Pañego & Miñana-Signes, 2020; Noll, Candotti, Vieira, & Loss, 2013) have sought to elaborate and design validated and reliable evaluation instruments to assess content related to back health. These have included knowledge, postural habits, and back health in the school setting. Although these randomized trials as well as validation studies have been performed, to the best of our knowledge, a lack of literature on LBP studies in children from 6 to 10 years persists. Thus, in order to provide findings that may guide the development of health promotion programs in the school context, our study aimed to analyze the prevalence of LBP in kindergarten and primary school students.

2. Materials and Methods

A cross-sectional study was performed.

2.1. Participants

The initial sample consisted of a total of 669 students sampled by convenience from two public kindergarten and primary schools in the city of Valencia, Spain during the 2019–2020 school year. Of the invited students, 278 (41.6% recruited; 8.9±2.1 years old; 52.2% girls, n= 145) children completed the questionnaires (Table 1) and were included in the present study.

TABLE 1

The sample was comprised of 5% (n = 14) kindergarten students (42.9% of girls, n= 6) and 95% (n = 264) primary education students (139% of girls, n= 139). In regards to the educational cycles, we observed that 32 (11.5%) belonged to the 1st cycle of PE, 89 (32%) to the 2nd cycle, and 143 (51.4%) belonged to the 3rd cycle.

2.2 Selection criteria

The inclusion criteria were as follows: students must have been between 3 and 11 years of age and been attending kindergarten or primary education at the two selected schools in Valencia during the study period. Students must have also had sufficient capacity to understand the questionnaire and complete it.

Exclusion criteria consisted of the following: students that did not return the informed consent form signed by their parents or guardians, those who did not participate due to illness or disability, and those who did not complete all questionnaire items.

2.3 Evaluation instruments

2.3.1 Nordic questionnaire

The Nordic questionnaire on LBP (Kuorinka et al., 1987) includes questions related to the duration of LBP symptoms over time and was administrated to all students. Sociodemographic data included were sex and age.

2.4 Procedure

The questionnaire was able to be administered at school or at home. Classroom teachers could provide the questionnaire in the school's computer room or provide families the guide to complete it. The questionnaire was available on Google Forms.

School age students have had more exposure to current technology throughout their lives compared to older individuals, which might make it more likely for them to return surveys in either format, paper-and-pencil, or computer (Weigold, Weigold, & Natera, 2019). As in other studies (Kovacs et al., 2011; Salminen, Erkintalo, Laine, & Pentti, 1995),

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the questionnaires were completed via self-registration by the students and with the help of their parents for the youngest children.

All students voluntarily participated in the study. The school administrators, class tutors, and parents were all informed about the study in writing and expressed their consent. The study was approved by the Ethics Committee in experimental research at the University of Valencia (reference number: H1509086047576).

2.5 Statistical analysis

Descriptive statistics including means, standard deviation, frequencies, and percentages were obtained to represent LBP prevalence data between gender and age groups. To assess the prevalence rate of LBP three types of analyses were considered: lifetime prevalence, period prevalence (last 12 months), and point prevalence (last 7 days). Chi-square tests were performed to compare the prevalence of LBP across sex and age. The level of significance for all comparisons was set at $p < .05$. Data analyses were carried out using SPSS® IBM® software, ver. 26.

3. Results

3.1 Level of back health

We observed a lifetime prevalence of LBP of 47.5% (n = 132), a period prevalence of 44.2% (n = 123), and a point prevalence of 18.8% (n = 50). Boys reported 52.3% (n = 64) lifetime prevalence of LBP and girls reported 47.7% (n = 82) ($\chi 2 = 1.978$, $p = .099$) (Figure 1).

FIGURE 1

According to the educational stage, primary education students registered a higher lifetime prevalence of LBP (49.6%, n = 113) than the youngest (kindergarten) (7.1%, n = 1) ($\chi^2 = 9.620$, $p = .001$). By age group, lifetime episodes of LBP also showed a higher prevalence increasing with age ($\chi^2 = 32.637$; $p < .001$). (Figure 2)

FIGURE 2

Regarding period prevalence of LBP, prevalence also increased with age ($\chi^2 = 37.543$; $p = .001$) (Figure 3). No statistically significant differences were found between girls 42.1% (n = 61) and boys 46.6% (n = 62) ($\chi^2 = .361$; $p = .321$).

FIGURE 3

Likewise, point prevalence of LBP also increased in prevalence with age and differences were statistically significant ($\chi^2 = 43.199$; $p < .001$) (Figure 4). No statistically significant differences were found between girls 19.3% (n = 28) and boys 16.5% (n = 22) ($\chi^2 = .361$; $p = .329$).

FIGURE 4

Only 2.6% (n= 7) of the students registered absences from school due to their LBP, whereas 10.8% (n= 30) of students reported visiting health care professionals because of their LPB. Further, physical education lessons provoked LBP in 15.5% (n= 43) of students

4. Discussion

The present study aimed to analyze the prevalence of LBP in a sample of kindergarten and primary school students. The prevalence is the proportion of a population having the specific characteristics of interest across a given time period. There are several ways to measure and report prevalence depending on the timeframe of the estimate. Assessments of LBP prevalence in children vary widely between studies depending on the age

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of study participants and methodological differences between studies, particularly in terms of how LBP is defined (Jones & Macfarlane, 2005).

Our results further strengthen the evidence that LBP is a relatively common symptom in early adolescence. The prevalence of LBP increased with age in our study, in agreement with earlier findings (Calvo-Muñoz et al., 2013; Jeffries et al., 2007; Woolf & Pfleger, 2003). In the early childhood education stage, reported symptoms were scarce, and the sample participating was small compared to that of the primary education stage.

In general, primary education students aged between 6 and 11-years-old (8.9±2.1 years; n = 264) reported a 49.6% (n = 131) lifetime prevalence of LBP. Conversely, other studies have reported a 23% prevalence among children of the same age range (9.7±2.3; n = 267) (Mierau, Cassidy, & Yong-Hing, 1989), 20% (n= 30) in a sample of children aged between 6 and 12 years old (Santos, Lunkes, Ribeiro, & Souza, 2019) or even less at 5-7% in a younger cohort of boys and girls aged 6 to 9 years old (Wirth, Knecht, & Humphreys, 2013).

Stratified by age, 7-year-old students reported a low lifetime prevalence of LBP (3.80%, n= 5) with prevalence rising by age group up to a 37% lifetime and period prevalence of LBP in 10-year-old students. In the work by Taimela, Kujala, Salminen, & Viljanen (1997), the reported prevalence of LBP was very low (1.1%; 95% CI, 0.2-3.1%) among the 7-year-old and 10-year-old (6.0%; 95% CI, 3.9-8.7%) schoolchildren, like in Wedderkopp, Leboeuf-Yde, Andersen, Froberg, & Hansen (2001), who reported less than 10% prevalence between 8 and 10 years of age. In our study, the LBP prevalence reported at 10-years-old was quite similar to that reported by a group of 13-year-olds in a previous study (Miñana-Signes & Monfort-Pañego, 2015a).

In our study, 9-year-old students reported a 19.70% (n = 26) lifetime prevalence of LBP, whereas Gunzburg et al (1999) reported a considerably higher prevalence at 36% (n= 142).

In our study, 9-11 year-old students reported a 54.5% (n = 150) lifetime prevalence of LBP, similar to a study with a sample of 571 children in the 4th and 5th grades (9-11 years old) from Southeastern (UUEE) which reported a 56.4% prevalence (Ratliffe & Hannon, 2010).

Last year prevalence in the primary education stage was lower than the lifetime prevalence (44.2%, n = 123). However, the lowest prevalence was for the most recent recall, the last week prevalence, at 18.9% (n = 50) in the primary education stage. In various studies carried out by Cardon's research group, the prevalence ranged from 28% to 31% (Cardon, de Clercq, Geldhof, De Clercq, & de Bourdeaudhuij, 2007; Geldhof, Cardon, De Bourdeaudhuij, & De Clercq, 2007) in a sample comprising fourth- and fifth-grade elementary schoolchildren (9.7 years±0.7, range 8.1–12.0). Higher values have been reported in the last 7-days days (76.7%) (Ratliffe & Hannon, 2010).

In regards to Physical Education lessons, in the study by Ratliffe & Hannon (2010), 27.7% of students aged 9–11 years old reported LBP because the PE subject, more than in our study (15.5%; n = 43). Regarding medical intervention for LBP from a doctor or physiotherapist, some school-age children (33%; n = 33) in previous studies sought care (Gunzburg et al., 1999), and 10.8% (n = 30) reported seeking care in our study.

Despite the fact that some of the literature has reported differences between the sexes (Jeffries et al., 2007; MacDonald, Stuart, & Rodenberg, 2017), the results of our study, did not coincide with the findings of other authors (Gunzburg et al., 1999; Taimela et al., 1997).

However, when it comes to high prevalence, as Maher et al. (2017) have already explained, we do not have to be alarmed and seek physician intervention immediately. LBP is a symptom rather than a disease, and the most common form of LBP is non-specific LBP. This term is used when the patho-anatomical cause of pain cannot be determined. In most cases, it appears and disappears naturally, except when it becomes chronic (Burton, 1996). Therefore, the key to a better understanding of back health seems to be to investigate its development in school-age children.

There are known limitations associated with the reliance and accuracy of self-reported data on LBP, and this may be especially true in young children. However, the

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agreement between questionnaires and interviews regarding the occurrence of LBP (at least one experience), LBP in the past 12 months, and recurrent or continuous LBP in other studies was 95%, 97%, and 90%, respectively (Salminen et al., 1995). However, we do not know the effect of the parents completing the questionnaire *versus* the students themselves in the cases of kindergarten and first grades of the primary education cohort.

5. Conclusions

In summary, our findings suggest that LBP increases with age. In addition, our results further strengthen the evidence that the onset could start at 10-years-old. Future studies should address kindergarten and primary school ages in order to support public health programs as well health educational initiatives at schools.

Author Contributions: "Conceptualization, Miñana-Signes, Monfort-Pañego and Noll; methodology, Miñana-Signes, Monfort-Pañego and Noll; software, Miñana-Signes, Monfort-Pañego, Bosh-Bivià and Noll; validation, all the authors; formal analysis, all the authors; data curation, Bosh-Bivià; writing—original draft preparation, Miñana-Signes and Bosh-Bivià; writing—review and editing, all the authors; visualization, Monfort-Pañego and Noll; supervision, Monfort-Pañego and Noll; project administration, Miñana-Signes. All the authors have read and agreed to the published version of the manuscript.".
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Conflicts of Interest: "The authors declare no conflict of interest."

Appendix B

Table 1 Descriptive data of the sample.

	School 1	**School 2**	**Total**
	M±SD	**M±SD**	**M±SD**
Age (years)	8.34±2.9	9.34±1.5	8.99±2.1
	n (%)	**n (%)**	**n (%)**
3	8 (8.2%)	0	8 (2.9%)
4	4 (4.1%)	0	4 (1.4%)
5	2 (2.1%)	0	2 (0.7%)
6	9 (9.3%)	8 (4.5%)	17 (6.2%)
7	10 (10.4%)	5 (2.8%)	15 (5.4%)
8	3 (3.1%)	34 (18.8%)	37 (13.4%)
9	13 (13.4%)	39 (21.5%)	52 (18.7%)
10	34 (32.1%)	46 (25.4%)	80 (28.8%)

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11	14 (14.4%)	29 (27.1%)	43 (23.7 %)
	97 (100%)	181 (100)	278 (100%)

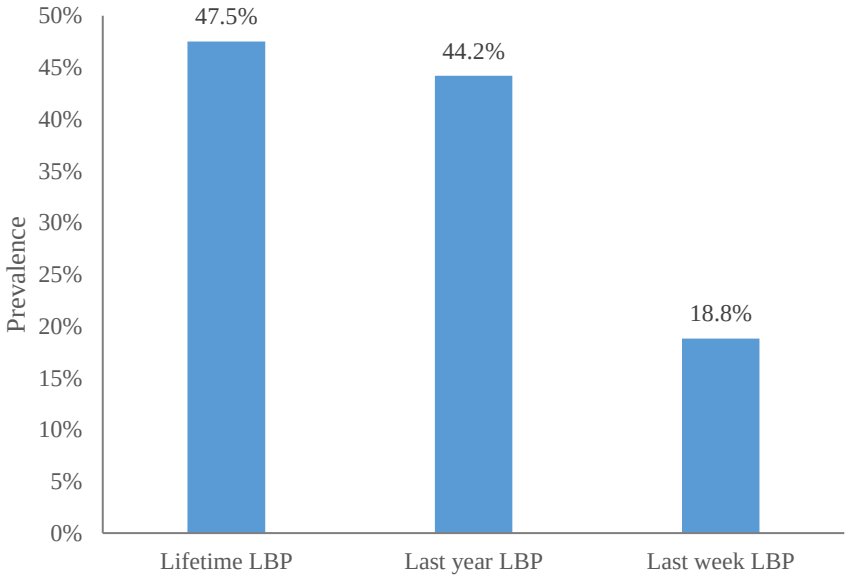

Figure 1 Types of LBP prevalence

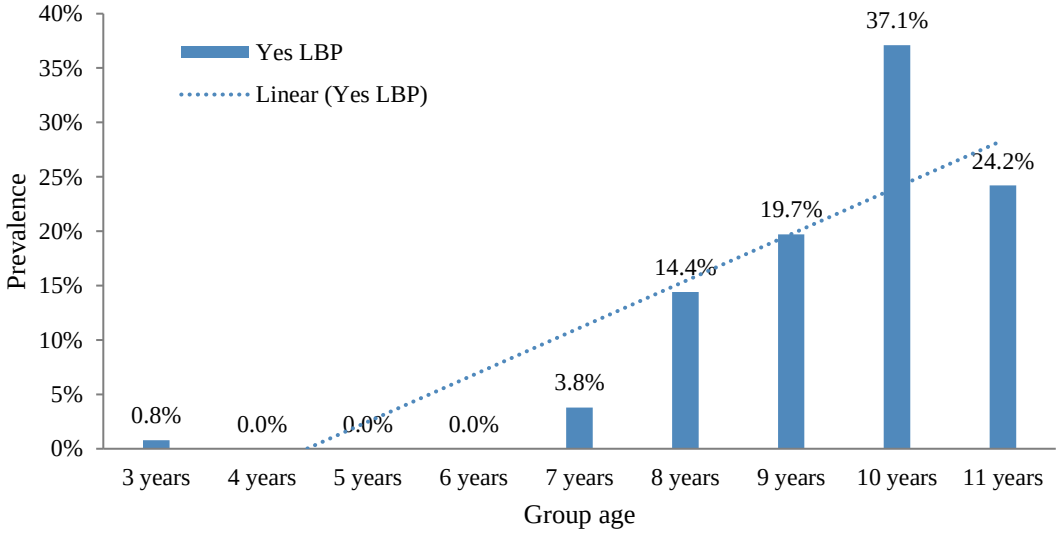

Figure 2 Lifetime prevalence of LBP by age group (%)

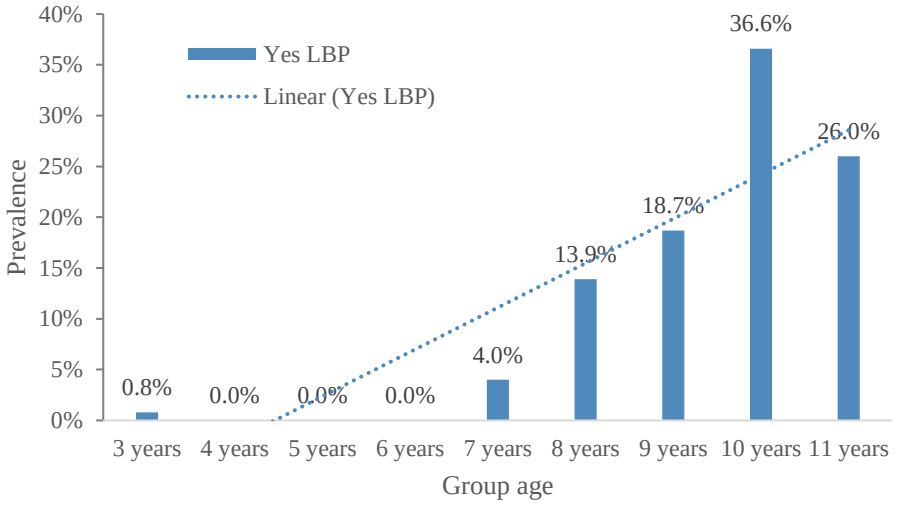

Figure 3 Last 12 months' prevalence of LBP by age group (%)

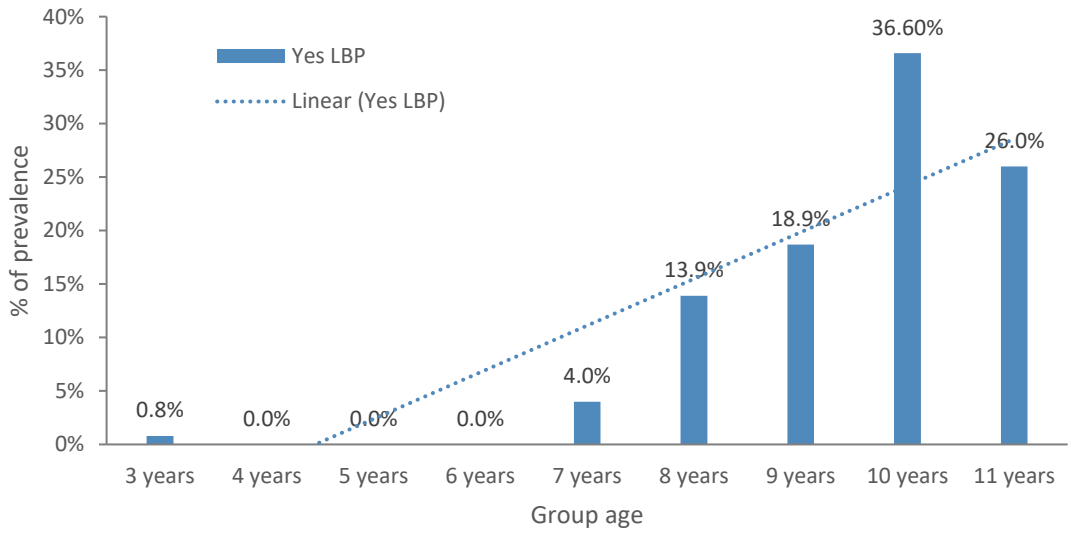

Figure 4 Last 7 days prevalence of LBP by age group (%)

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