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Prevalence of Low Back Pain among School-Aged Children between 10 and 12 Years

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Abstract: Low back pain (LBP) is one of the biggest health problems worldwide that often begins during childhood. The existence of a previous episode of LBP is a premonitory sign of future back pain problems, therefore, prevention among youth will be essential. The main objective of the study was to determine the lifetime, point, and 7-day prevalence of LBP in children. This cross-sectional study evaluated 849 participants (47.1 boys and 52.9% girls) aged 10–12 from 10 primary schools using a self-administered questionnaire. The results demonstrated a lifetime prevalence of LBP of 73.6%, a last 7-days prevalence of 21.2%, and a point prevalence of 9.66%. LBP intensity reported in a Visual Analogue Scale (VAS) was 3.37 (SD 2.02). Chi-square analysis identified a significant difference between boys and girls in LBP lifetime prevalence ($p < 0.001$), 7-day prevalence ($p = 0.035$), and point prevalence ($p = 0.014$). The Student's t-test in pain intensity showed the same differences ($p = 0.007$). Studies on LBP prevalence in young primary school students are scarce. Therefore, future studies investigating the prevention of LBP should focus on school interventions since schools are the most suitable institutions to participate in back pain prevention and health promotion.

Keywords: schoolchildren; low back pain; health promotion; primary school

Citation: Vidal-Conti, J.; Borràs, P.A.; Palou, P.; Muntaner-Mas, A. Prevalence of Low Back Pain among School-Aged Children between 10 and 12 Years. *Sustainability* **2021**, *13*, 12254. https://doi.org/10.3390/su132112254

Academic Editor: Giuseppe Battaglia

Received: 22 September 2021
Accepted: 4 November 2021
Published: 6 November 2021

1. Introduction

Low back pain (LBP) is one of the biggest health problems worldwide [1] that affects the population of all ages globally [2]. LBP often begins during childhood, however, during adolescence, the prevalence reaches similar values as in adults [3]. The existence of a previous episode of LBP is a premonitory sign of future back pain problems [4,5], therefore, prevention among youth is essential. In addition, LBP among adolescents is associated with school absenteeism, loss of educability, impairments at school, restricted physical activity, or, more often, combinations of these adversities [6,7] in addition to the impact on quality of life.

According to the literature, the lifetime prevalence of nonspecific LBP in children and teenagers varies between 3% and 70% [8–10], and these variations may be attributed more to differences in study design (cross-sectional or longitudinal), data collection method (questionnaire, examination, etc.), the definition of back pain, or to differences in age groups than to real differences among populations or geographical areas [8,11]. However, as of recently, a global rise in the incidence of LBP in adolescents has been noted, albeit with limited studies to support its epidemiology and etiology [12].

To date, the largest study performed on children to determine the prevalence and risk factors for LBP was conducted in Majorca (Spain) including 16,357 participants [13]. The results showed that at 13–15 years, 50.9% of boys and 69.3% of girls had suffered LBP at least once, and 21.0% and 30.7% of boys and girls, respectively, had LBP that limited their daily activities. Another study developed in Spain in 2015 among 1500 adolescents aged 12–18 years showed a lifetime prevalence of LBP of 44.5% (50.3% in girls and 38.9% in boys) [14]. The latest study in Spain was in 2021 among 264 students aged 6–11 years old and showed a lifetime prevalence of LBP of 49.6% (48.1% in girls and 51.4% in boys) [15].

In any case, further research needs to focus on evaluating the prevalence and consequences of recurrent low-back pain [16]. Not only the prevalence but the intensity of pain and the restrictions in daily life due to LBP are key points to analyze its effect on the quality of life. In addition, studies on young primary school students are scarce but necessary to improve back health through early detection and interventions [15]. Therefore, to obtain more detailed information about LBP among schoolchildren, we conducted a study with the main objective to determine the lifetime, point, and 7-day prevalence of LBP in children aged 10 to 12 years.

2. Materials and Methods

2.1. Participants

This cross-sectional study evaluated students of 5th- and 6th-grade primary school students (10–12 years old) from Majorca (Spain). The rationale for choosing this age group was based on the previous literature. Previous research demonstrated that the non-specific LBP prevalence is very low among children younger than 7 years old (1%) [15], and from the age of 13, with the onset of adolescence, the values are already very high. These data suggest the need to intervene already in primary school children. Data collection was carried out between February and March 2021. The study covered a final sample of 849 participants (reliability level of 95% and sampling error of 3.4%) aged 10–12 from 10 primary schools, of whom 400 were boys (47.1%) and 449 were girls (52.9%), with a mean age of 11.3 (33.5% were 10 years old, 47.9% were 11 years old and 18.6% were 12 years old). The sample was selected from different clusters (schools) using convenience sampling. All schools received a letter inviting them to participate in the study and informing them about the characteristics and objectives of the study.

2.2. Selection Criteria

The inclusion criteria were as follows: students must be aged between 10 and 12 years old and attending 5th or 6th grade primary school. Exclusion criteria were as follows: students whose parents or guardians did not return the informed consent form signed and those who did not participate due to illness or disability.

2.3. Instruments

The study was based on a structured and self-administered questionnaire to investigate the prevalence of LBP in a population of children aged between 10 and 12 years. The questionnaire and data collection methodology were validated [17] beforehand in a two-phase study. The pilot phase focused on the questionnaire's understandability and the viability of the data collection methodology. The validation phase, on the other hand, focused on the reliability, internal coherence, and validity of the questionnaire. Interclass Correlation Coefficients values ranged between 0.83 and 0.88 and kappa values in the range of 0.88 to 1.

The data related to back pain included lifetime prevalence (never/just once/sometimes/frequently/almost constantly), last 7-days prevalence (yes/no), point prevalence (yes/no), LBP in bed or upon rising (yes/no), LBP impeding usual activities (never/only when in pain/always), last 3-months LBP intensity (VAS scale ranged from 0 to 10), and also included sex (boy/girl) and age (date of birth). In addition, height and weight were included in the questionnaire to determine the body mass index (BMI).

2.4. Procedure

The questionnaire was administered at school or home. Teachers gave away the questionnaire at the school's classroom using laptops or provided families with the guide to fill it. The questionnaire was available on Google Forms. All participants (students, teachers, and parents) were informed about the purpose of the study and its procedure. Moreover, students' parents or tutors were requested to give their consent for children to

participate in the study. The study was approved by the Research Ethics Committee of the University of the Balearic Islands (reference number: 130CER19).

2.5. Statistical Analysis

After checking for normality with Kolmogorov–Smirnov tests, descriptive characteristics of the sample were calculated, including means with SDs for continuous variables, frequency counts, and percentages for categorical variables.

Differences in all variables, year group (10-years, 11-years, and 12-years), and sex (boys and girls) were examined with univariate analysis of variance (ANOVA) and the chi-squared test for continuous and categorical variables, respectively. To study the association of LBP lifetime prevalence (outcome variable) and sex and age (exposure variables), we conducted binary logistic regression with the calculation of the corresponding odds ratio (OR) and 95% confidence interval (CI). To perform figures and logistic regression, LBP lifetime prevalence outcome was transformed into a new outcome: those children who answered "never or only once" were considered into the response "no LBP", whilst those who answered "sometimes, frequently or almost always" were considered into the response "LBP".

All statistical analyses were performed using the Statistical Package for Social Sciences (IBM SPSS Statistics for Windows, version 24.0, Armonk, NY, USA: IBM Corp) with the significance level set at $p < 0.05$.

3. Results

The results demonstrated a lifetime prevalence of LBP of 73.6%, which means that 625 out of 849 participants stated that they had suffered from back pain at least once in their lives. Those who have suffered LBP indicated on a scale of 1–10 a pain intensity of 3.37 (SD 2.02). The last 7-days prevalence reached 21.2% (n = 180) and the point prevalence reached 9.66% (n = 82). The chi-square analysis identified a significant difference between boys and girls in LBP lifetime prevalence ($p < 0.001$), 7-day prevalence ($p = 0.035$), and point prevalence ($p = 0.014$). The Student's t-test in pain intensity showed the same differences ($p = 0.007$). In the previous items, girls present higher values of prevalence and intensity of pain than boys.

Nevertheless, 65.25% of participants indicated that LBP never prevents them from doing daily activities (68.5% boys and 62.4 girls, $p = 0.037$). The presence of LBP in bed or upon rising was found in 119 students (14.02%), with significant differences by sex ($p = 0.01$). Other characteristics of the LBP among the study population by sex are shown in Table 1.

According to the group age (10, 11, and 12 years old), no significant differences were found in LBP life prevalence ($p = 0.247$), 7-days prevalence ($p = 0.417$), point prevalence ($p = 0.809$), or pain intensity ($p = 0.845$). Other characteristics of LBP among the study population by age are shown in Table 2.

Using the dichotomic variable created from the question related to the LBP lifetime prevalence, it shows 53.71% of LBP prevalence, with a significant difference between boys and girls (39.5% and 52.30%, respectively, $p < 0.001$) (Figure 1).

In addition, according to the group age and using the dichotomic variable for LBP prevalence, no significant difference was found between 10-, 11-, and 12-year-old groups (44.8%, 45.9%, and 53.2%, respectively, $p = 0.245$) (Figure 1).

The binary logistic regression with lifetime prevalence as the outcome variable and sex and age as exposure variables showed that factor independently associated with LBP was girls (OR = 1.80; $p < 0.001$; 95% CI = 1.34–2.41) but not the age ($p > 0.05$).

Table 1. Characteristics of the total sample by sex.

	Total n = 849		**Boys n = 400**		**Girls n = 449**		***p***
	n	**%**	**n**	**%**	**n**	**%**	
LBP life-time prevalence							
Never	224	26.38	135	33.75	89	19.82	$X^2 = 24.632$ $p < 0.001$
Just once	232	27.33	107	26.75	125	27.84	
Sometimes	350	41.22	144	36	206	45.88	
Frequently	28	3.30	10	2.5	18	4.01	
Almost constantly	15	1.77	4	1	11	2.45	
LBP ever (no)	456	43.71	242	60.5	214	47.66	$X^2 = 14.024$ $p < 0.001$
LBP 7-days prevalence	180	21.20	72	18	108	24.05	$X^2 = 4.640$ $p = 0.035$
LBP point prevalence	82	9.66	28	7	54	12.03	$X^2 = 6.126$ $p = 0.014$
LBP in bed or upon rising (yes)	119	14.02	43	10.75	76	16.93	$X^2 = 6.696$ $p = 0.010$
LBP impeding usual activities							
Never	554	65.25	274	68.5	280	62.36	$X^2 = 6.610$ $p = 0.037$
Only when in pain	285	33.57	119	29.75	166	36.97	
Always	10	1.18	7	1.75	3	0.67	
Age groups							
10 years	250	33.50	106	30.60	144	36.00	$X^2 = 2.399$ $p = 0.301$
11 years	357	47.90	173	50.00	184	46.00	
12 years	139	18.60	67	19.40	72	18.00	
	Mean	SD	Mean	SD	Mean	SD	
Age	11.29	0.89	11.34	0.98	11.25	0.80	$t = 1.331$ $p = 0.183$
BMI	18.79	3.57	19.32	4.05	18.32	3.00	$t = 3.707$ $p < 0.001$
LBP intensity (1–10) *	3.37	2.02	3.12	1.83	3.56	2.14	$t = -2.712$ $p = 0.007$

* Result from participants who reported LBP (n = 456). Note: t-value (t); Chi squared (X^2); *p*-value (*p*).

Table 2. Characteristics of the sample by age.

	10 Years n = 280		11 Years n = 389		12 Yeas n = 140		Sign.
	n	**%**	**n**	**%**	**n**	**%**	
LBP life-time prevalence							
Never	67	26.80	90	25.2	37	26.60	$X^2 = 10.260$ $p = 0.247$
Just once	71	28.40	103	28.9	28	20.10	
Sometimes	99	39.60	146	40.9	67	48.20	
Frequently	5	2.00	14	3.9	5	3.60	
Almost constantly	8	3.20	4	1.1	2	1.40	
LBP ever (yes)	138	55.20	193	54.1	65	46.70	$X^2 = 2.817$ $p = 0.245$
LBP 7-days prevalence	56	22.40	71	19.9	35	25.20	$X^2 = 1.752$ $p = 0.417$
LBP point prevalence	22	8.80	35	9.8	15	10.80	$X^2 = 0.424$ $p = 0.809$
LBP in bed or upon rising	33	13.20	50	14	20	14.40	$X^2 = 0.129$ $p = 0.938$
LBP impeding usual activities							
Never	164	65.60	226	63.3	93	66.90	$X^2 = 9.760$ $p = 0.045$
Only when in pain	85	34.00	128	35.9	41	29.50	
Always	1	0.40	3	0.8	5	3.60	
Sex							
Boys	106	42.40	173	48.50	67	48.20	$X^2 = 2.399$ $p = 0.301$
Girls	144	57.60	184	51.50	72	51.80	
	Mean	SD	Mean	SD	Mean	SD	
BMI	18.15	3.20	18.83	3.52	19.67	4.40	$F = 6.826$ $p = 0.001$
LBP intensity (1–10) *	3.46	2.02	3.35	2.12	3.34	1.97	$F = 0.169$ $p = 0.845$

* Result from participants who reported LBP. Chi squared (X^2); Snedecar's F distribution (F); *p*-value (*p*).

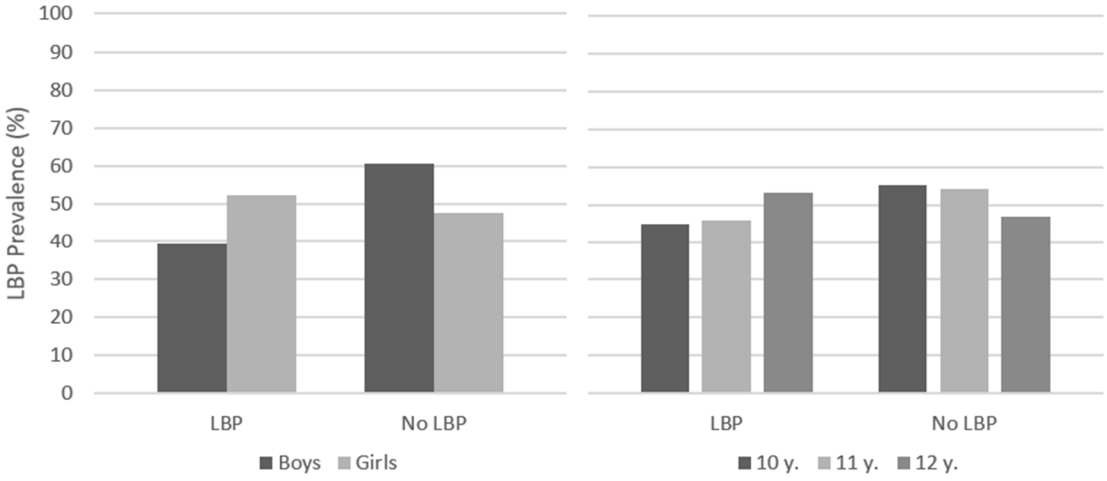

Figure 1. LBP prevalence by sex and age.

4. Discussion

The present research aimed to determine the prevalence of LBP in schoolchildren aged 10–12 years. The study results showed that lifetime prevalence was 73.6%, the 7-day prevalence was 21.2%, and the point prevalence was 9.66%. Other studies reported a prevalence of LBP among children and adolescents from 0.8 to 84% [18]. This wide range of percentage values may be due to different study designs, the strategy for extracting data and the methodology used, sample age, sample size, the definition of LBP, or geographical factors [18–20]. To this last factor, differences can be observed between different countries, for example, the 1-year prevalence in Poland among children aged 10–19 was 41.5% [18]; the lifetime prevalence in Spain among children aged 6–12 was 47.5% [15], and aged 12–18, it was 44.5% [14]; in Tunisia among children aged 12–18, it was 35.8% [21]; in Kuwait among children aged 14–19, it was 70.3% [10]; in Italy among children aged 14–17, it was 61.3% [22]; and in Iran among children aged 11–14, it was 34.3% [23].

Despite these differences, most studies showed that girls had a higher prevalence of back pain than boys [6,18]. No existing studies have demonstrated a greater incidence of back pain among boys, but there are some in which no significant differences were found [15,24].

Our study showed differences between age groups, and the percentage of participants reporting LBP increased with age, being 44.8% in children aged 10, 45.9% in aged 11, and 53.2% in aged 12. However, those differences were not enough to be significant ($p = 0.245$). Probably, the narrow range of age could explain it because the majority of studies showed significant differences between age groups, for example, a study with Polish children and adolescents aged 10–19 [18], Spanish children aged 6–11 [15] and 12–18 [14], and Tunisian adolescents aged 12–18 [21]. In the same way, no significant differences were found in studies with a narrow range of age, as Brazilian adolescents aged 14–18 [20] and 15–18 [25] or Iranian adolescents aged 11 to 14 [23].

Determining the LBP prevalence is not enough. It is also necessary to quantify pain intensity, but just a few studies have considered it. In the present study, the mean intensity of the last 3-month's LBP was 3.37 on the VAS, and differences by sex were found, reporting higher values for girls (3.56) than boys (3.12). The results are according to other studies that found the main intensity of point LBP of 3.5 on the VAS [26], 2.58 [27], 5.7 [7], and last-month LBP of 2.9 [3] and 4.5 [28].

Pain intensity is related to limitations in daily activities [29]. Approximately one-quarter of adolescents with LBP miss school because of their LBP condition [30]. In our study, 34.75% of participants (31.5% of boys and 37.64% of girls) reported that LBP involves activity restrictions in their daily life. This result is in accordance with other studies developed in Spain where restrictions in activity were reported by 21.0% of boys and 30.7% of girls [13]. In a study developed in Germany, a total of 68.2% of participants reported restrictions in daily living activities attributable to pain. By ages, these restrictions were reported by 53.1% of the participants aged 4–9, 65.9% of those aged 10–12, 73.5% of those aged 13–15, and 81.3% of those aged 16 to 18 [7].

As a limitation, the presented research used validated instruments to determine LBP, but the obtained results are a subjective assessment of the reported LBP. Therefore, the results should be interpreted with caution because of their cross-sectional design.

5. Conclusions

This study showed that LBP is frequent in Spanish schoolchildren aged 10–12 years, and the mean pain intensity is 3.4 on a 0–10 scale. Its occurrence was related to female sex, which is in line with reports from other countries. In conclusion, our results further strengthen the evidence that the onset starts before adolescence. Future studies should focus on primary school age groups and on school interventions to promote schools as a suitable institution for promoting health.

Author Contributions: Conceptualization, P.P. and P.A.B.; methodology, J.V.-C.; formal analysis, J.V.-C. and A.M.-M.; resources, P.P.; writing—original draft preparation, J.V.-C. and A.M.-M.; writing—review and editing, P.P. and P.A.B. All authors have read and agreed to the published version of the manuscript.

Funding: Grant RTI2018-101023-A-I00 funded by MCIN/AEI/10.13039/501100011033 and by "ERDF A way of making Europe".

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of University of the Balearic Islands (protocol code 130CER19 and date of approval 5th Dec 2019).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data are available on request from the Physical Activity and Sports Research Group, University of the Balearic Islands. The request should be formulated and sent to josep.vidal@uib.es.

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

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