Low Back Pain among Primary School Teachers

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Low back pain (LBP) is a prevalent musculoskeletal disease that affects a large percentage of the working population, including teachers. The World Health Organization has identified the school as an effective environment for improving child health. For this reason, the figure of the teacher is a fundamental piece in the process of knowledge acquisition about postural education and prevention of LBP among schoolchildren. The present study aims to determine the knowledge of postural education and back pain prevention among primary school teachers. This cross-sectional study evaluated 85 primary school teachers from Majorca (Spain), of whom 17.6% were physical education teachers and 82.4% were classroom teachers. The study was based on two different structured and self-administered questionnaires to investigate into specific knowledge about LBP: Low Back Pain Knowledge Questionnaire (LKQ) and COSACUES-AEF Questionnaire. The results demonstrated a lifetime prevalence of LBP of 96.5% with significant differences determined by sex. The knowledge of participants about LBP was 17.3 in LKQ (range scale 0–24) and 4.3 in COSACUES (range scale 1–10). In conclusion, the teachers knowledge is insufficient to carry out an efficient and useful health promotion program among schoolchildren to prevent LBP.

Keywords: low back pain ; knowledge ; primary school ; teachers

1. Introduction

Many musculoskeletal diseases are major health issues that cause disability and have a substantial influence on the general population's quality of life [1][2]. Low back pain (LBP) is one of the most prevalent musculoskeletal diseases that affects the working population, including teachers [1][3], and is a leading cause of disability in both developed and developing countries [4].

A systematic review published in 2011 clearly suggested that teachers are at risk for developing musculoskeletal disorders [2]. School teachers represent an occupational group among which there appears to be a high prevalence of low back pain (LBP). Examples of this are a 1-month prevalence of LBP of 59.2% in Hong Kong [5], a 12-month prevalence of 45.6% in China [4], 60% in Brazil [6], 64.9% in Kenya [7], and a life-time prevalence of 41.1% in Brazil [8], 44.9% in Turkey [9], 34.8% in France [10], 40.4% and 48.1% in Malaysia [3][11].

On the other hand, LPB among schoolchildren is widely demonstrated, with a lifetime prevalence of LBP in children and teenagers that varies between 3% and 63% [12]. LBP often begins during childhood, however, during adolescence, the prevalence reaches similar values as in adults [13].

The schools are considered a privileged framework for developing an efficient healthcare education program, being a place where children spend most of their time in constant interaction with their peer group. Therefore, the World Health Organization [14] has identified it as an effective environment for improving child health.

For this reason, the figure of the teacher is a fundamental piece in the process of acquiring knowledge about postural education and, concretely, adequate postural habits, to prevent LBP [15]. Postural education is a fundamental pillar on which adequate physical activity and healthy habits are based; this should be developed by physical education teachers [16]. Additionally, in the process of detecting any postural disorder in children, it would be beneficial if, in addition to the doctor being involved, the physical education teacher and the other teachers were also involved [17].

Many postural education programs among children were demonstrated to be effective [18][19], but, in most of them, the intervention was carried out by a researcher, not a teacher. It is important to highlight this fact because, once research is completed, the intervention does not last over time and, consequently, the effects tend to disappear. So, the question is, do teachers have enough knowledge about postural education and how to promote LBP prevention among schoolchildren?

Currently, there are no studies that analyze the knowledge of teachers in relation to postural education. Just one intervention study includes variables about knowledge [20]. This study among teachers with chronic LBP investigated the teachers' education level based on Alexandre technique lessons combined with an integrative model of behavioral prediction in a three-month follow-up after the intervention. In comparison to the control group, the results revealed that the intervention group's teacher educational plan facilitated the adoption of Alexandre technique behaviors in teachers and fostered skills and abilities, indirect subjective norms, direct and indirect attitude, direct and indirect perceived behavioral control, and perceived risk.

For all these reasons, it is considered necessary to promote the initial and permanent training of teachers and, specifically, of physical education teachers on postural education in order to be able to promote it appropriately at school age [16].

2. Analysis on Results

Eighty five respondents completed the questionnaire, of whom 21 were men (24.7%) 64 were women (75.3%), 15 were physical education teachers (17.6%) and 70 were classroom teachers (82.4%).

The results demonstrated a lifetime prevalence of LBP of 96.5%, which means that only 3 out of 85 participants stated that they had never suffered from back pain. Last 7 days prevalence reached 35.3% (n = 30), and point prevalence reached 24.7% (n = 21).

When the participant knowledge about LBP was assessed using LKQ, it was found that the average score of each dimension was 6.52 in general aspects, 3.2 in concepts, and 7.55 in treatments. The total score was 17.27 (over 24), which is the same as saying 7.2 out of 10. When knowledge was assessed using COSACUES questionnaire, the average final score was 4.31 out of 10.

Table 1 shows results by sex. In relation to the prevalence of LBP, chi-squared analysis identified a significant difference between men and women in LBP lifetime prevalence (p = 0.01), but not in 7-day prevalence (p = 0.601) or point prevalence (p = 0.572). In relation to knowledge, no differences were found between men and women either with LKQ or COSACUES questionnaire (p > 0.05).

Table 1. Characteristics of the total sample by sex.

	Total (n = 85)		**Men (n = 21)**		**Women (n = 64)**		***p***
	X	**(SD)**	**X**	**(SD)**	**X**	**(SD)**	
LKQ dimension (range scale)							
General Aspects (0–9)	**6.52**	**(1.21)**	**6.71**	**(1.19)**	**6.45**	**(1.22)**	**t = 0.856 *p* = 0.394**
Concepts (0–4)	**3.20**	**(0.94)**	**2.86**	**(1.28)**	**3.31**	**(0.77)**	**t = −1.545 *p* = 0.135**
Treatments (0–11)	**7.55**	**(2.19)**	**7.19**	**(2.18)**	**7.67**	**(2.20)**	**t = −0.873 *p* = 0.385**
Total score (0–24)	**17.27**	**(3.43)**	**16.76**	**(3.88)**	**17.44**	**(3.28)**	**t = −0.782 *p* = 0.436**
Total score (0–10)	**7.20**	**(1.43)**	**6.98**	**(1.62)**	**7.27**	**(1.37)**	
COSACUES (range scale 1–10)	**4.31**	**(1.95)**	**4.89**	**(2.42)**	**4.12**	**(1.75)**	**t = 1.342 *p* = 0.191**
METs	**3191**	**(4092)**	**3998**	**(3016)**	**2926**	**(4376)**	**t = 1.042 *p* = 0.300**
	n	**(%)**	**n**	**(%)**	**n**	**(%)**	
LKQ categories							
Low	**17**	**(20)**	**3**	**(14.3)**	**14**	**(21.9)**	**X^2 = 1.834 *p* = 0.400**
Moderate	**34**	**(40)**	**11**	**(52.4)**	**23**	**(35.9)**	
High	**34**	**(40)**	**7**	**(33.3)**	**27**	**(42.4)**	

	Total (n = 85)		Men (n = 21)		Women (n = 64)		*p*
	X	(SD)	X	(SD)	X	(SD)	
Kind of teacher							
PE teacher	15	(17.6)	7	(33.3)	8	(12.5)	$X^2 = 4.722$ $p = 0.046$
Classroom teacher	70	(82.4)	14	(66.7)	56	(87.5)	
LBP prevalence							
Never	3	(3.5)	3	(14.3)	0	(0)	
Only once	5	(5.9)	2	(9.5)	3	(4.7)	
Sometimes	48	(56.5)	13	(61.9)	35	(54.7)	$X^2 = 13.325$ $p = 0.010$
Frequently	26	(30.6)	3	(14.3)	23	(35.9)	
Almost always	3	(3.5)	0	(0)	3	(4.7)	
LBP ever (yes)	77	(90.6)	16	(76.2)	61	(95.3)	$X^2 = 6.781$ $p = 0.020$
LBP 1 week prevalence (yes)	30	(35.3)	6	(28.6)	24	(37.5)	$X^2 = 0.552$ $p = 0.601$
LBP point prevalence (yes)	21	(24.7)	4	(19)	17	(26.6)	$X^2 = 0.480$ $p = 0.572$
Phisical Activity Level							
Low	18	(21.2)	5	(23.8)	13	(20.3)	
Moderate	36	(42.4)	3	(14.3)	33	(51.6)	$X^2 = 10.226$ $p = 0.006$
High	31	(36.5)	13	(61.9)	18	(28.1)	

Other characteristics of the LBP among the study population by sex are shown in **Table 1**.

Type of teacher group (physical education teachers vs. classroom teachers) (**Table 2**), showed no significant differences in LBP life prevalence ($p = 0.121$), 7-days prevalence ($p = 0.376$) and point prevalence ($p = 0.338$). In relation to the knowledge, in LKQ, no differences were found in total score ($p = 0.217$), but significant differences were found in the dimension of general aspect ($p = 0.002$). Using the COSACUES questionnaire, significant differences were found between physical education teachers and classroom teachers (5.46 and 4.06 over 10 respectively, $p = 0.011$).

Table 2. Characteristics of the sample by kind of teacher.

	Total (n = 85)		PE Teachers (n = 15)		Classroom Teachers (n = 70)		*p*
	X	(SD)	X	(SD)	X	(SD)	
LKQ (range scale)							
General Aspects (0–9)	6.52	(−1.21)	7.13	(0.64)	6.39	(1.27)	t = 3.337 $p = 0.002$
Concepts (0–4)	3.20	(0.94)	3.33	(0.98)	3.17	(0.93)	t = 0.606 $p = 0.546$
Treatments (0–11)	7.55	(2.19)	7.80	(1.82)	7.50	(2.27)	t = 0.479 $p = 0.633$
Total score (0–24)	17.27	(3.43)	18.27	(2.25)	17.06	(3.61)	t = 1.244 $p = 0.217$
Total score (0–10)	7.20	(1.43)	7.61	(0.94)	7.11	(1.50)	
COSACUES (range scale 1–10)	4.31	(1.95)	5.46	(2.54)	4.06	(1.73)	t = 2.596 $p = 0.011$
METs	3191	(4092)	5512	(8038)	2693	(2418)	t = 2.496 $p = 0.015$

	Total (n = 85)		PE Teachers (n = 15)		Classroom Teachers (n = 70)		*p*
	X	(SD)	X	(SD)	X	(SD)	
	n	(%)	n	(%)	n	(%)	
LKQ categories							
Low	**17**	**(20)**	**0**	**(0)**	**17**	**(24.3)**	
Moderate	**34**	**(40)**	**8**	**(53.3)**	**26**	**(37.1)**	$X^2 = 4.655$ $p = 0.098$
High	**34**	**(40)**	**7**	**(46.7)**	**27**	**(38.6)**	
Sex (men)			**7**	**46.7**	**14**	**20**	$X^2 = 4.722$ $p = 0.046$
LBP prevalence							
Never	**3**	**(3.5)**	**2**	**(13.3)**	**1**	**(1.4)**	
Only once	**5**	**(5.9)**	**1**	**(6.7)**	**4**	**(5.7)**	
Sometimes	**48**	**(56.5)**	**9**	**(60)**	**39**	**(55.7)**	$X^2 = 7.300$ $p = 0.121$
Frequently	**26**	**(30.6)**	**2**	**(13.3)**	**24**	**(34.3)**	
Almost always	**3**	**(3.5)**	**1**	**(6.7)**	**2**	**(2.9)**	
LBP ever (yes)	**77**	**(90.6)**	**12**	**(80)**	**65**	**(92.9)**	$X^2 = 2.395$ $p = 0.144$
LBP 1 week prevalence (yes)	**30**	**(35.3)**	**7**	**(46.7)**	**23**	**(32.9)**	$X^2 = 1.032$ $p = 0.376$
LBP point prevalence (yes)	**21**	**(24.7)**	**2**	**(13.3)**	**19**	**(27.1)**	$X^2 = 1.266$ $p = 0.338$
Physical Activity Level							
Low	**18**	**(21.2)**	**2**	**(13.3)**	**16**	**(22.9)**	
Moderate	**36**	**(42.4)**	**3**	**(20)**	**33**	**(47.1)**	$X^2 = 7.232$ $p = 0.027$
High	**31**	**(36.5)**	**10**	**(66.7)**	**21**	**(30)**	

Other characteristics of the LBP among the study population by kind of teacher are shown in **Table 2**.

No significant differences were found between those who have never had LBP and those who have suffered it in the LKQ questionnaire ($p = 0.341$) or COSACUES ($p = 0.438$). Using the LKQ questionnaire, the score was higher for those who have never had LBP (18.38) than those who have suffered it (17.16). On the other hand, using COSACUES, those who have suffered LBP scored higher (4.36) than those who never suffered it (3.79).

Binary logistic regression with LBP lifetime prevalence as a dependent variable and kind of teacher, knowledge (LKQ and COSACUES questionnaires), sex and physical activity as independent variables, showed that the factors independently associated with LBP were sex (OR = 0.06; $p = 0.011$; 95% CI = 0.007–0.526) and knowledge assessed with the COSACUES questionnaire (OR = 1.644; $p = 0.044$; 95% CI = 1.014–2.663) (**Table 3**).

Table 3. Logistic regression results for determining LBP prevalence.

	OR	*p*	I.C. 95.0%	
Classroom teacher	**5.210**	**0.109**	**0.691**	**39.272**
LKQ	**0.581**	**0.163**	**0.271**	**1.245**
COSACUES	**1.644**	**0.044**	**1.014**	**2.663**
Sex	**0.060**	**0.011**	**0.007**	**0.526**
Physical Activity				

	OR	*p*	I.C. 95.0%	
High Level		**0.509**		
Moderate level	**0.405**	**0.428**	**0.043**	**3.800**
Low Level	**1.896**	**0.620**	**0.151**	**23.775**

3. Current Insights

The present research aimed to determine the knowledge of postural education and back pain prevention among primary school teachers. Furthermore, LBP prevalence and its relationship with postural education knowledge were examined.

The study results showed that lifetime prevalence among teachers was 96.5%, the 7 day prevalence was 35.3%, and point prevalence was 24.7%. Other studies reported a lifetime prevalence of LBP from 34.8 to 48.1% [3][8][9][10][11], and 1 year prevalence from 45.6 to 64.9% [4][6][7]. These differences in the percentages may be due to the strategy for extracting data and the methodology used, sample age, sample size, the definition of LBP, or geographical factors [21]. Despite these differences, most studies show that LBP is a common problem among teachers.

Physical activity was also collected to characterize the sample, and because scientific evidence regarding the role of physical activity in the prevalence of LBP is controversial [22]. Some studies found a curvilinear relationship between them, considering that low and high values of physical activity are associated with an increased risk of back pain [23]. On the other hand, some studies presented different results, as a systematic review that concluded that a high level of physical activity was associated with an increase of LBP [24], or another systematic review that concluded that conflicting evidence was found for the association between physical activity and low back pain in general population [22]. In the present study, the level of physical activity was not associated with LBP.

Regarding the assessment of knowledge of LBP, this is the first study to evaluate the knowledge of LBP in teachers using validated questionnaires. To our knowledge, there is only one study that analyses the knowledge of teachers in relation to postural education, but this study uses a non-validated questionnaire. In that study, 8% of participants reported no knowledge of ergonomics principles, while 72% reported some knowledge, 16% had a reasonable amount of knowledge, and 4% reported extensive knowledge [6].

In our study, two kinds of questionnaires to assess the knowledge of teachers were used. LKQ assesses theoretical aspects, and COSACUES questionnaire assesses practical aspects. The score of LKQ was 17.27 in a 24 point rating scale, 18.27 in physical education teachers and 17.06 in classroom teachers. In either case, we consider that the values are well below what is expected and what is desired. Teachers, who are expected to teach their students, should score close to 24. In comparison, in the validation study of the LKQ questionnaire [25], it was given to 20 healthcare professionals with knowledge on low back pain, who scored an average of 23.55; in another study in nurses, the score was 19.2 [26].

In a study carried out among clinical students using LKQ, 3.5% of participants failed to answer all the questions correctly, in 95.5% less than sixteen questions were answered correctly, and 1.5% answered all the sixteen questions correctly [27]. In another study carried out among nurses, the average score was 19.1 [26], and among Thai adults, the average was 9.2 [28]. In a study carried out among LBP patients attending outpatient physiotherapy treatment in Malawi, only 8.8% of them answered all questions correctly [29]. In any case, despite the fact that there are few studies that evaluate knowledge of postural education, the results obtained should be better. This demonstrates the need to teach postural education from an early age.

In relation to COSACUES questionnaire results, the average final score was 4.31 in a 10 point rating scale, and was identified as an independent risk factor for LBP. Additionally, those who have ever suffered LBP scored higher (4.36) than those who never suffered it (3.79). These results can be explained because people with LBP care to learn about it. In any case, differences were not significant, and both groups' mean score was low (less than 5). These results are consistent with the findings of other studies that used COSACUES, where participants with LBP had slightly higher scores than those who never suffered it [30][31].

When the results were compared by kind of teacher, significant differences were found between physical education teachers (5.46) and classroom teachers (4.06). These findings may reflect the lack of teacher education (e.g., curriculum of teacher training degrees) in health promotion, specifically in postural education. Thus, it could be that providing

information and acquiring knowledge via teacher training degrees, postural education and LBP might have several benefits, such as increasing the knowledge of schoolchildren and their own back care.

It is more advantageous and easier to create healthy behaviors in the youth than it is to try and change already established harmful habits in adults. In this sense, schools play an important role. There have been certain interventions with diverse components that were assessed in randomized trials as possible choices for teaching postural education to elementary school children, with various components adapted to the children's age range [32]. Once the postural education sessions had been analyzed, all the proposals were adapted to the child population, including active methodology, comic books, games, and characters, among other things, and focused on biomechanics, the spinal column, and posture. As a result, the positive effects on acquiring knowledge and postural habits found in the studies cannot be used to reliably support postural education among schoolchildren. Following this analysis, we believe that intervention efforts should be concentrated on teachers, as they are the most important aspect in a successful intervention in establishing healthy habits.

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