

BACK PAIN IN SCHOOL CHILDREN A STUDY AMONG 1178 PUPILS

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ABSTRACT. The purpose of this study was to determine the prevalence of back pain in school children and the role of several contributing factors; 1178 school children of both sexes answered a previously validated questionnaire. The cumulative prevalence of back pain was 51.2%. Lumbar and leg pain, and thoracic pain were more common. After multivariate analysis, five qualitative variables were correlated with back pain with a statistical, significant positive correlation with age, previous back injury, volley-ball, female sex and time spent watching television.

Key words: low back pain, contributing factors, epidemiology, children.

Back pain is a major health problem in the industrialized countries, afflicting about 80% of the population at some time during their lives (4). The natural history for the more common types of trouble has not been determined. Actually, there is a great deal of research concerning children's back pain. Studies among children reported prevalences of between 7 and 40% (2, 3, 5-9). However, the subjects' age, the criteria for diagnosis of low back pain, and the methodology of these studies varied greatly, from one study to another, making comparisons difficult.

The purpose of this investigation was to study the prevalence of back pain in children in a defined population and to study risk factors in a population of school children.

MATERIALS AND METHODS

A questionnaire according to Alreck & Settler was designed (1). Some questions similar to those used by Salminen (8) and Balagué et al. (2) were also included. This questionnaire was validated one year before in the same population of children. Back pain was defined by a global statement of any spinal pain wherever the location, whenever in life. All sites of back pain (cervical, thoracic and lumbar) were analyzed. The cumulative prevalence of back pain and some risk

factors which are found in adults were analysed, such as prolonged sitting position, physical effort, time spent watching TV, smoking, riding mopeds, satchel carrying and previous back injury.

A college near Grenoble was chosen, because of its mixed urban-rural population, and because it concerns an homogeneous population of children of a relatively high social class. Also, all primary school children are channelled into secondary school in the same college, which facilitated the follow-up. All teachers of the children attended a meeting to familiarize themselves with our study and with the questionnaire. The questionnaire with a letter of instructions was given to 1299 children, and 1178 of them answered the questions (90.7%). The questionnaire was answered at home by the parents of the younger children, while the older ones answered it at school, with the help of a teacher and a nurse.

SPSS software was used for statistical analysis and BMDP software was used for multivariate analysis. Chi-square of Pearson and Fisher's test were used for correlation research. Statistical significance was accepted at the 5% level. The purpose of multivariate analysis is to separate the effect of each variable from the effect of correlated variables. A logistic regression through maximum probability was used for explanatory analysis. Thus, for selected variables the degree of back pain can be established independently of other variables. The relative risk factor given to a group of back pain sufferers can therefore be calculated as well as its confidence interval (CI) to a 95% level of accuracy.

RESULTS

More than 90% of the questionnaires (1178) were returned. However, some school children did not give valid replies to all questions. There was equal representation of the two sexes: 46.9% boys and 53.1% girls. The age range was 6 to 20 (mean age: 12.8 years; standard deviation: 3.47). The height of children range was 100 to 193 cm (mean height: 155 cm; standard deviation: 17.6). The cumulative prevalence of back pain was 51.2%. Table I shows only those children who had experienced frequent or continual back pain on several occasions. There was a statistically significant difference between the sexes, with a prevalence of 58.1% for girls (361 children) and 43.2% (238 children) for boys ($p = 0.0000$). The

Table 1. Prevalence of back pain

Total valid cases: 1176.

	<i>n</i>	%	%
Never	308	26.2	48.8
Only once	266	22.6	
Several occasions	427	36.3	51.2
Frequently	155	13.2	
Continually	20	1.7	

prevalence of back pain as a function of age showed an increasing frequency being greater to more than 50%, amongst children aged 12 years and over. This was observed in both boys and girls (Table II).

Specific locations of back pain were studied: lumbar pain (36.8%—434 children), lumbar and leg pain (4.2%—50 children), and thoracic pain (34.0%—401 children) were more common than cervical pain (26.5%—312 children). In our sample, 41.6% (490 children) experienced back pain while sitting in the classroom, and 50.8% (589 children) did not: 30.5% of back pain occurred within 1 hour and 69.5% occurred later.

In our sample, 15.5% had sought medical advice once for back pain (177 children), and 15.3% several times (175 children). X-rays were taken in 19.1% (219 children). The degree of medical advice increased with age: 12.9% at 10 years old and, 51.3% at 18 years old. 25.5% (300 children) received some form of therapy

(16.2% were treated with physiotherapy). An exemption from physical training at school was noted in 12.4% (142 children).

Contributing factors

Television: Most of the subjects (55.2%) watched TV less than 1 hour a day; 30.5% less than 2 hours a day; 5.3% more than 2 hours every day; and 9.1% did not watch TV at all. The prevalence of back pain was over 50% among those who spent more than 1 hour a day watching television ($p = 0.0000$) (Table III).

"Moped": Only children aged 14 years and over were analysed (504 children). Of these, 80% (403 children) did not ride mopeds at all. The correlation between back pain and riding mopeds was not statistically significant ($p = 0.3$).

Smoking: Only children aged 10 years and over were analyzed (795 children); 136 children (17.1%) of our sample smoked; 659 children (82.9%) did not smoke. Among those who smoked, 113 had back pain (83.1%) and 23 (16.9%) did not. Among children who did not smoke, 390 had back pain (59.2%) and 269 (40.8%) did not. The correlation between smoking and back pain was statistically significant ($p = 0.0000$).

Sports: Ninety-five children (8.3%) of our sample participated in competitive sports; 787 children (69.2%) trained regularly at least twice a week; 229 children (19.4%) only irregularly; and 27 children (2.3%) did not participate in any sport activity.

Table II. Prevalence of back pain as a function of age and sex

Total valid cases: 595.

	Girls		Boys		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
6 years	2	13.3	0	0	2	5.4
7 years	2	9.5	3	11.1	5	10.4
8 years	10	21.7	3	17.6	13	20.6
9 years	11	31.4	8	17.7	19	23.7
10 years	14	30.4	9	26.4	23	28.7
11 years	27	42.1	14	29.1	41	36.6
12 years	31	60.7	22	47.8	53	54.6
13 years	42	66.6	30	38.9	72	51.4
14 years	35	63.6	23	44.2	58	54.2
15 years	55	76.3	15	44.1	70	66.0
16 years	42	89.3	43	79.6	85	84.1
17 years	46	86.7	30	68.1	76	78.3
18 years	32	84.2	30	85.7	62	84.9
19 years	6	75.0	5	50.0	11	61.1
20 years	3	100	2	66.6	5	83.3

Table III. Correlation between presence of back pain and hours per day spent watching television

Total valid cases: 1148 $p = 0.0000$.

		Never	< 1 h	1–2 h	> 2 h
No back pain	<i>n</i>	57	336	142	19
	%	54.8	52.9	40.7	31.1
Back pain	<i>n</i>	47	298	207	42
	%	45.2	47.0	59.3	68.8

There was no correlation between intensity of sport participation and back pain ($p = 0.1$). Disregarding the order of preference, skiing seemed to be the sport most commonly practiced (53.1%), followed by tennis (28.7%), swimming (23.2%), gymnastics (17.7%) and cycling (16.2%). The prevalence of back pain calculated for participants of each sport exceeded 60% for volley-ball (78.2%), climbing (67.8%), golf (64.8%), basket-ball (62.6%), and hand-ball (61.7%).

Satchel carrying: Of 274 children 188 (68.6%) had back pain when they carried their satchels by hand. Of 80 children 43 (53.7%) had pain when carrying over the shoulder, and of 807 children 363 (45%) had pain when carrying on the back. There was a significant correlation between presence of back pain and the satchel carrying position ($p < 0.0000$) (Table IV).

Previous back injury: Ninety-six children (8.9%) had previous back injury, and 983 (91.1%) did not.

Multivariate analysis

Before multivariate analysis, 10 variables were significant: age ($p = 0.0000$), sex ($p = 0.0000$), football

Table IV. Correlation between presence of back pain and satchel carrying

Total valid cases: 1162. $p < 0.0000$.

		On the back	Over the shoulder	By hand
No back pain	<i>n</i>	445	37	86
	%	55	46.3	31.4
Back pain	<i>n</i>	363	43	188
	%	45	53.7	68.6

($p = 0.0000$), volley-ball ($p = 0.0002$), judo ($p = 0.0000$), golf ($p = 0.05$), smoking ($p = 0.0000$), television ($p = 0.0000$), satchel carrying ($p = 0.0000$) and previous back injury ($p = 0.0000$). After multivariate analysis, 5 qualitative variables were correlated to back pain with statistical significance: age, previous back injury, volley-ball, female sex, and television.

Age ($p = 0.0000$): The relative risk for 5–9-year-olds was started at one. Other relative risks were calculated with regard to this age. At 10–12 years, the relative risk was 2.79 (95% CI: 1.79–4.34). At 13–15 years, the relative risk was 4.18 (95% CI: 2.69–6.49). At 16–20 years, the relative risk was 16.5 (95% CI: 9.90–27.47).

Previous back injury ($p = 0.0000$): The relative risk of having back pain with a previous back injury was 5.40 (95% CI: 2.97–9.80).

Volley-ball ($p = 0.001$): The relative risk of having back pain if participating at volley-ball was 3.21 (95% CI: 1.48–6.99).

Female sex ($p = 0.0000$): The relative risk of having back pain being a girl was 2.43 (95% CI: 1.83–3.24).

Television ($p = 0.0003$): The relative risk of having back pain if watching TV, for more than 1 hour per day was 1.71 (95% CI: 1.27–2.30).

After multivariate analysis, the other variables analyzed did not correlate with back pain, with statistical significance, as satchel carrying ($p = 0.4$), and other sports activities: football ($p = 0.6$), judo ($p = 0.3$) and golf ($p = 0.1$). However, the relative risk of back pain among smokers was 1.64 (95% CI: 0.95–1.27). This is not significant because the confidence interval approached 1 ($p = 0.07$).

DISCUSSION

The prevalence of back pain seems to correspond to that reported in the literature (2, 3, 5–9). However, comparisons were difficult because the subject, age, and the criteria for diagnosis of back pain or low back pain have varied greatly from one study to another. In our sample, the cumulative prevalence of back pain was 51.2%; 14.9% of them had frequent or continual back pain. Lumbar and leg pain (41%) were more common than thoracic pain (34%) and cervical pain (26.5%). Balagué et al. (2) and Salminen (8) reported similar findings. There is an important increase in back pain after the age of 12 years, particularly among girls; prevalence of back pain is less than

42% before 11 years, and increases to 60% amongst those aged 12 years or more. Our findings are similar to those in Switzerland (2, 9), and in the study by Fairbank et al. (3). The age of 12 years is the growing age, which is the age of puberty for children. Moreover, this is when secondary school commences with the rhythm of school, an increase in the stress and constraints on the back such as greater satchel weight and longer duration of sitting position.

Just like Salminen (8) and Balagué et al. (2), we found that the sitting position is unpleasant for school children: 41.6% of our sample experienced back pain when sitting in the classroom. Furthermore, 69.5% of back pain occurred after 1 hour of sitting. We estimate that in France, the duration of the sitting position in all primary and secondary school is more than 15,000 hours in the classroom.

In our sample, 30.8% sought medical advice once or several times for back pain. X-rays were taken in 19.1%, and 16.2% were treated with physiotherapy. Also, 12.4% were exempted from physical exercise at school. Our results are similar to those of Balagué et al. (2) and Wagenhauser (9). This suggests that postural factors in children are more important than serious organic pathology. However, in our study, we cannot estimate the frequency of back pain due to abnormalities such as scoliosis, kyphosis or Scheurmann's disease.

Among possible contributing factors (4), we found a statistically significant correlation with age, previous back injury, female sex, volley ball, time spent watching TV and smoking. These correlations proved true after multivariate analysis, except for smoking; however, other factors, as riding mopeds, carrying satchel, or other sports activities, did not correlate significantly with back pain after multivariate analysis. Balagué et al. (2) also found a statistically significant correlation with time spent watching TV, smoking and competitive sports; regarding the sport most preferred in schools in Switzerland, a prevalence of low back pain exceeding 50% was found, by this author, only for volley-ball (2). In our sample, prevalence of back pain was 78.2% for volley-ball. Volley-ball seems to be a sport which affects the back because it induces hyperextension of the spine and causes

rough spinal compression. The effect of watching TV on the back seems to be secondary to prolonged postural pain and perhaps responsible for a decrease in sleeping time.

CONCLUSION

The prevalence of back pain and particularly low back and leg pain amongst this group of school children seems to be similar to that of other studies. Girls and boys aged 12 years or more are more often affected. Medical advice and medical care are sufficient. This study has shown a significantly positive correlation after multivariate analysis with some associated factors studied.

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