Abstract This study is based on data gathered by means of a postal questionnaire from a cohort of 640 38-year-old subjects. At the age of 14 years these subjects had been interviewed by their school doctor to ascertain whether any of them had a history of low back pain (LBP), and X-rays of the thoracic and lumbar spine were taken. The questionnaire contained related groups of questions, with LBP as the main topic. We wanted to identify probable risk factors in developing LBP. The results show a cumulative life-time prevalence of LBP of 70\%, a 1-year prevalence of 63\% and a point prevalence of 19\%, independent of gender. Women reported a higher incidence of LBP than men during the month and week before they filled out the questionnaire; they also reported a higher incidence of sciatica and greater use of the health care system and analgesics over the previous year. Heavy manual work was associated with LBP and sciatica, and smoking (more than 16 cigarettes per day) was more common among unemployed and sick-listed subjects. Severe LBP was associated with increased morbidity, reduced work capacity, deterioration in social life, mental and sexual problems, and increased smoking. A stepwise logistic regression analysis of “early” independent variables indicated that severe LBP is positively correlated with low social class for men and with menstruation and pregnancy for women.

Key words Low back pain • Prospective cohort study • Epidemiological aspects • Risk factors

Introduction

Low back pain (LBP) is a widespread health problem in industrialized countries, affecting 70\% of the population at some time during their lives \[14, 21, 25\]. LBP often has socioeconomic implications leading to reduced quality of life, sick leave, job loss and increased use of the health care system \[1, 28–30\]. The magnitude of the problem has focused attention on identifying risk factors for developing LBP, thereby facilitating prevention, as a logical approach. Multiple factors including aspects of working life, social problems and personal characteristics seem to be of great importance, but we do not know of these risk factors are causative. Predictive models indicate that some work-related factors, including motivation and education, influence the development of LBP \[6\]. The results of other studies show an association with smoking \[5, 14, 16\], pregnancy \[2, 12, 13, 24\] and psychological problems \[8, 15\]. The purpose of this investigation is to study aspects of work, social, medical and personal life in relation to LBP in a cohort of 640 subjects, with particular reference to “early” risk factors.

Materials and methods

Population

This prospective study is based on a cohort of 640 school children. In 1965 all 14-year-old pupils in Helsingør (a Danish county town with 30,000 inhabitants) underwent a radiological examination of the thoracic and lumbar spine, and their height and any history of
LBP was recorded by the school doctor. A more detailed description of radiographic changes and LBP in adolescence as risk factors for LBP in adults has been given in an earlier publication [18].

Design

A questionnaire, with LBP as the main topic, was mailed to 578 of the total cohort 25 years later. By this time, the former pupils were 38 years old and in the middle of the working lives. Among the 62 missing subjects, 24 had emigrated, 16 had died (14 M, 2 F) and 22 could not be located. The questionnaire was based on the earlier records taken by the school doctor; it was constructed according to a standardized Nordic questionnaire for analyzing musculoskeletal symptoms [22] and contained related groups of questions. LBP was defined as pain or discomfort in the lower part of the spine, as illustrated by a drawing. The first part of the questionnaire dealt with familiar occurrence of back disease (e.g., disk herniation, spondylosis), anthropometric items, education, type of work, military service for men, gynaecological issues for women, social conditions (social class, graded 1–5 [17]), physical activities at work and leisure, and smoking. The second part dealt with LBP severity, morbidity, contact with the health system and influence on work and leisure. A total of 481 (222 M, 259 F) subjects returned the questionnaires, after up to two reminders, corresponding to 83% of all possible respondents. On the basis of the recorded data, we have chosen to focus attention on the following three groups:

1. All subjects (n = 88; 35 M, 53 F) with a severe degree of LBP (defined as LBP for more than 30 days during the year before answering the questionnaire, including moderate, severe or varying degrees of pain, with or without sciatica)
2. All subjects (n = 37; 13 M, 24 F) carrying out heavy manual work (defined as frequent, heavy lifting/twisting and poor working posture)
3. All subjects (n = 95; 54 M, 41 F) smoking 16 or more cigarettes per day

Statistical methods

All data were entered into a new data program (Cyberline), and later transferred to the BMDP system [11]. We performed a univariate analysis of new independent variables, using Pearson’s chi-squared test with or without Yates control for qualitative variables and the Mann-Whitney and Kruskall-Wallis tests for quantitative variables. Five percent was chosen as the level of statistical significance.

Stepwise logistic regression analysis was carried out using the BMDP system. The analysis included all known independent variables from each subject’s school days and the first part of their adult life. These variables were: gender, familial occurrence of back disease, height at school age, final body height, growth rate, LBP and radiological changes in the thoracic and lumbar spine during adolescence, social class (on a scale of 1–5), marital status, school education and, for women, low back problems in connection with menstruation, pregnancy and child birth. These independent variables were examined against the dependent variable “severe LBP.” At each step, we excluded variables on the 15% level and included variables on the 10% level. The significance of the excluded variables were tested with current control. The utility of the statistical model was verified using Hosmer-Lemeshow’s test [20].

Results

Table 1 illustrates prevalence of LBP over a variety of periods – life time, 1 year, a single point in time – according to gender. We found that 90% of the subjects with a history of LBP had suffered pain during the year prior to answering the questionnaire.

Table 2 shows the variables that differed significantly according to gender. Of the male subjects, 56% (n = 123) were drafted into military service at an average age of 21 years; 95% completed their service and 15% (n = 19) had LBP during this period. Eleven percent (n = 10) were rejected because of LBP. Among the total group of respondents, 31% (n = 148) had more than one X-ray done of the spine some time during their lives, 5% (n = 23) had been admitted to hospital and 1% (n = 6) had undergone an operation because of LBP.

Severe LBP

During the year prior to answering the questionnaire, 18% (n = 88) had suffered severe LBP. Table 3 shows the sig-