The relation between self-rated health, socioeconomic status, body mass index and disability pension among middle-aged men

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Accepted in revised form 2 April 2001

Abstract. The aim of this study was to assess the relations between self-rated health (SRH), socioeconomic status (SES), body mass index (BMI) and disability pension. Five birth-year cohorts of middle-aged male residents in Malmö, Sweden, were invited and 5313 with complete data constituted the cohort in this study. Each subject was followed for approximately 11 years. Of all subjects, 73% perceived their health as perfect and among obese men and blue collar workers, the corresponding figures were 67 and 68% respectively. The adjusted odds ratios for SRH less than perfect was 1.3 (CI: 1.1–1.7) for obese subjects and 1.7 (CI: 1.5–1.9) for blue collar workers. The interaction between low SES and obesity was estimated to 11% which was not statistically significant. The adjusted relative risks (RR) of disability pension was 3.3 for subjects with SRH less than perfect, 2.2 for blue collar workers and 2.0 for obese subjects, all statistically significant and only marginally less than the crude RR. Thus, SRH among middle-aged men was associated with obesity as well as low SES, but no evidence of synergism between obesity and low SES in relation to SRH was found. Furthermore, poor SRH in particular, but also low SES and obesity, independently predicted disability pension.

Key words: Body mass index, Disability pension, Interaction, Obesity, Self-rated health, Socioeconomic status

Introduction

Self-rated health (SRH) is increasingly attracting attention as a predictor of morbidity and mortality [1–11], whereas, according to the research literature, the relation to functional status has received less attention [12].

As a multidimensional concept, SRH status is related not only to objective measures of health but also to various other factors, e.g. age, sex, education, marital and social status and personal traits [6, 7, 10].

Today, social inequalities [13] and an increasing prevalence of obesity [14–16] constitute two major global health problems. Low socioeconomic status (SES) and obesity have in previous investigations been associated with the self-perception of bad health [3, 13, 17, 18] and are related to increased morbidity, disability and mortality as well [19–21]. The association between low SES and obesity has been reported in a number of studies [15, 16, 22–26] and one question that may be raised could be formulated as follows: Is SRH related only to obesity or low SES per se, or is it possible that an interaction between body mass index (BMI) and SES leading to a synergistic effect could be part of the explanation?

In general practice, it is of utmost importance to identify individuals at risk for impaired functional ability, eventually leading to a disability pension. Adequate intervention to prevent disability pension requires various means to distinguish relevant risk factors in a clinical setting characterized by complex information. Thus, to facilitate the understanding of the complex mechanisms eventually leading to a disability pension, it may be of importance to shed some light on the relation and possible interaction between different risk factors for disablement.

The aim of this study was, therefore, to assess the relation between SES and BMI on the one hand and SRH on the other. An additional purpose was to investigate the association of these factors with disability pension.

Methods

Subjects

In 1974–1978, complete birth-year cohorts of middle-aged male residents of Malmö, Sweden (251,431 inhabitants, 1 January 1974), were invited to participate in a screening programme [27]. The cohort in this study (men born 1926–1930) has been presented in detail elsewhere [28]. A total of 7697 men were invited and 5932 (77.1%) participated.

Mean age (±SD) at screening was 48.1 ± 0.7 years. According to the original protocol, men born in 1926 should be included in 1974, those born in 1927 in 1975 and so on. The slight variation in age at
screening is explained by temporary deviations from that protocol. Only subjects with complete data and without a previous retirement with disability pension (n = 5313) were included in this study and were followed from inclusion, defined by the date of examination, until death or the end of the calendar year when they turned 58, i.e. a total study period of approximately 11 years.

Screening data

Of the information obtained during the initial health examination, the following data was used in the present study: Body height, body weight, occupation and SRH.

Height (to the nearest cm) and weight (to the nearest 0.1 kg) were measured using calibrated scales. Body mass index, defined as weight (kg) divided by height squared (m$^2$), was used to estimate the degree of overweight and was classified as suggested by Bray [29] and as used on the national level by Statistics Sweden in the Surveys of Living Conditions [30]. Thus, obesity was defined as BMI $\geq$ 30.0 kg/m$^2$.

Data on SRH was obtained from a questionnaire and self-rated perfect health was based on an affirmative answer to the question ‘Do you feel perfectly healthy?’.

The Nordic Classification of Occupation (Nordisk yrkessklerificering, NYK) was used at screening for classification according to occupational category, NYK-74 from the start of the screening up until 27 September 1978 and NYK-78 thereafter [31]. The NYK-code was, prior to the analysis, re-coded in accordance with the occupational classification used in the Population and Housing Census 1980 [32]. In this classification, a code for socioeconomic distribution is included, which categorizes the subject according to the qualification level (not merely the education required) of his occupational position. After aggregation, two categories were used in this study: (a) blue collar workers and (b) white collar workers.

Data on disability pension

According to Swedish legislation during the follow-up of this study, subjects aged 16–64 years could be granted disability pension, if their working capacity was impaired by at least 50% due to disease. A temporary pension was granted if the impairment was not expected to be permanent. Applications for disability pension are made by either the patient or the social insurance office and are administered by the social insurance offices. A doctor’s certificate accompanying the application is compulsory.

Since 1971, the National Social Insurance Board in Sweden maintains a cumulative data base of all decisions on disability pension. It includes data on year and month of birth, date of retirement, type (temporary or permanent) and extent of the disability pension, marital status and diagnoses.

Statistical methods

The variables BMI, SES and SRH, screened at the base-line examination, were analysed cross-sectionally. Disability pensions, on the other hand, were granted during follow-up and thus analysed longitudinally. Logistic regression was performed to calculate odds ratios (OR), used for estimation of relative risks in cross-sectional data (SRH, SES and BMI), and Cox’s proportional hazards model was used to calculate relative risks (RR) in longitudinal data (disability pension). For both methods 95% confidence intervals (CI) were computed. The $\chi^2$ test was used to test for differences in proportions. The test was two-sided.

The interaction between SES and BMI and their relation to SRH may be estimated using the expression for explained fraction (XF$_{\text{chain}}$). An assumed causal chain $A \rightarrow B \rightarrow \text{case}$, implicates an increased prevalence of B among those exposed for A. The XF$_{\text{chain}}$ can be used to estimate how much of the excess RR from A that may be explained by B. In the following, let A denote being a blue collar worker, B denote obesity and cases be those who rated their health less than perfect. The proportion of subjects with poor SRH among those with low SES that depend on this increased prevalence of obesity was calculated using the equation for impact fractions (IF) [33]:

$$IF = \frac{\sum_{i=0}^{k}(p_i - p_i')RR_i}{\sum_{i=0}^{k} p_i'RR_i}$$

where $p_0'$ is the prevalence of obese blue collar workers, $p_0''$ the prevalence of obese white collar workers, $p_i'$ is the prevalence of non-obese blue collar workers and $p_i''$ the prevalence of non-obese white collar workers. RR$_0$ is the OR for poor SRH among obese blue collar workers and RR$_1$ the OR for poor SRH among non-obese blue collar workers.

In order to calculate the adjusted RR of poor SRH for blue collar workers (RR$_{A^*}$) after eliminating the cases caused by the excess prevalence of obesity the following equation was used:

$$RR_{A^*} = (1 - IF)RR_A$$

where RR$_A$ is the crude RR (estimated by the OR) from being a blue collar worker.

Now, the explained fraction of the excess RR from obesity among blue collar workers may be obtained as

$$XF_{\text{chain}} = \frac{(RR_A - 1) - (RR_{A^*} - 1)}{RR_A - 1}$$

Rothman [34] has suggested a measure of interaction between A (low SES) and B (obesity) if any, the