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Coronary heart disease from a psychosocial perspective

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Vital exhaustion in coronary heart disease: the impact of socioeconomic status³

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Abstract

Background:

Vital exhaustion has been shown to be a significant risk factor contributing to coronary heart disease, as well as a predictor of a worse prognosis among coronary patients. Socioeconomic differences in vital exhaustion may be part of the causal mechanism in the health and mortality inequalities connected with socioeconomic disadvantage. Our aim was to explore socioeconomic inequalities in vital exhaustion among coronary patients.

Methods:

We included 362 patients (32% women, mean age 56 ± 7.3 years) who were referred for coronary-angiography. The Maastricht interview for Vital Exhaustion was conducted with each patient. Level of income and education were used as indicators of socioeconomic status. Functional status was assessed with the NYHA (dyspnoe symptoms) and CCS (chest pain) scales.

Results:

Logistic regression showed significant socioeconomic inequalities in vital exhaustion among patients. Participants with low and middle income and education had a higher probability of being exhausted in comparison to patients with high income and education (odds ratio (95% confidence interval): 13.31 (4.67 – 37.94), and 2.10 (1.19 – 3.64), respectively). Associations remained statistically significant after controlling for the effect of functional status and seriousness of disease. Socioeconomic differences were more salient among men than among women.

Conclusion:

Low education and income seem to be strongly associated with higher vital exhaustion among patients; a significant factor contributing to worse prognosis and lower quality of life among patients with coronary heart disease.

Introduction

Many patients with coronary heart disease (CHD) experience vital exhaustion, which is characterized by unusual fatigue, a lack of energy, increased irritability and feelings of demoralization (1, 2). Vital exhaustion has some features similar to depression; however, depressed mood, a key symptom of depression, is almost absent in vital exhaustion (3, 4). Vital exhaustion was found to be a risk factor for CHD, especially for myocardial infarction. This relationship has been described in various prospective studies with representative population samples (2, 6, 7).

Vital exhaustion not only increases the risk of coronary heart disease, but also contributes to a worse prognosis. Mendes de Leon et al. (8) and Kop et al. (9) observed in an 18-month follow-up of patients after successful percutaneous transluminal coronary angioplasty (PTCA) that the presence of vital exhaustion independently increased the risk of myocardial infarction, coronary bypass surgery, PCI and cardiac death. In a case-control study of women after the first MI it was found that the risk of MI associated with vital exhaustion was 2.75 times higher, even after adjustment for several confounding variables (10). Interventions focusing on reducing vital exhaustion had a beneficial effect on levels of depression, exhaustion and anginal complaints among coronary patients. However, the available evidence shows only a limited preventive effect regarding the risk of a new cardiac event (11, 12, 13).

Because of its connection to cardiac events, it has been hypothesized that vital exhaustion results from the underlying cardiac insufficiency. However, the degree of exhaustion seems to be unrelated to exercise-induced ischaemia, electrocardiography abnormalities, cardiac pump function, and severity of coronary heart disease measured by angiography (14, 15). It has been shown that psychologically stressful life events, and possibly also inflammatory processes, may significantly contribute to the development of vital exhaustion prior to myocardial infarction (16).

Some evidence shows that lower socioeconomic status may also be a possible predictor of vital exhaustion. Low income or education has been found to be associated with elevated vital exhaustion scores in a few studies (2, 5, 17). So what are the possible pathways in the relationship between socioeconomic status, vital exhaustion and coronary heart disease? It is well known that lower socioeconomic status is associated with higher incidence of lifestyle risk factors and medical risk factors (18, 19, 20, 21), higher cardiac risk in the population (22, 23) and with a worse prognosis among patients (24, 25). It has been hypothesized that low socioeconomic status may be linked to increased cardiac risk via psychosocial mechanisms. Davey Smith & Lynch (26) proposed that early life socioeconomic disadvantage contributes to increased levels of psychosocial risk factors later in life. Several studies which found a higher prevalence of psychosocial risk factors in lower socioeconomic groups support this hypothesis (17, 27, 28, 29). Negative psychosocial characteristics may consequently contribute to the increased risk and worse prognosis of coronary heart disease (30).

However, most research concentrates on exploring the role of socioeconomic status among the general population. Little is known about the association of socioeconomic status and vital exhaustion among patients who already have coronary heart disease. Socioeconomic differences in patients showing vital exhaustion may be a part of the causal mechanism in health and mortality inequalities connected with

socioeconomic disadvantage among patients with coronary heart disease.

The aim of this study was to explore the association between socioeconomic status and vital exhaustion among coronary patients. As the clinical state of patients can influence this association, we decided to control for the effect of functional status and the seriousness of disease in our statistical analyses. Vital exhaustion in the general population has been shown to be significantly influenced by gender; we therefore also explored the differences in vital exhaustion levels among male and female coronary patients.

Methods

Study design

We analyzed cross-sectional data obtained from 362 patients with already diagnosed stable angina pectoris or suspected of the angina pectoris by the symptoms. Patients were referred by their cardiologists according to ESC guidelines (31) to the East Slovakian Institute for Cardiac and Vascular Diseases in Kosice for coronary angiography (CAG). Patients from the whole East Slovakian region (about 1.5 million inhabitants) are referred to this medical centre for diagnosis and treatment. Data collection in the study was carried out from November 2004 to March 2007.

We included patients meeting the following criteria: coronary heart disease (CHD) in their medical history, age < 75, without severe cognitive impairments or psychiatric disorders, and without serious co-morbidity. Participants were provided with information about the study and they signed an informed consent letter. Ethical approval for this procedure was obtained from the medical ethics committee. Response rate was 94.1%, with no differences between responders and non-responders in age or gender. A structured interview was conducted with each patient by a trained interviewer prior to CAG. The type of therapeutic intervention (percutaneous coronary intervention, coronary artery bypass grafting, pharmacology treatment) was chosen depending on the results of CAG, independently from participation in this study.

Measures

Vital exhaustion

The structured Maastricht interview for Vital Exhaustion was conducted with each patient. This instrument was designed to measure feelings of exhaustion by asking a patient a set of 23 questions which concern for instance: tiredness, lack of energy, irritability, disrupted sleep, or difficulty concentrating. The answer categories are: Yes (2 points), Question mark (1 point), or No (0 points). A score ranges from 0-46. The cut-off point of 17 or higher identifies participants as 'exhausted' (32). The scale was found

to have good validity and reliability (33). In our study we used a Slovak translation of this measure, the Cronbach's alpha in the present study was 0.84.

Socioeconomic status

Income level and educational level were used as the indicators of socioeconomic status. Participants' income were divided into three levels: 1) low income: income lower than the 'minimum wage', 2) middle income: higher than the 'minimum wage', and 3) high income: twice the 'minimum wage' and higher. The 'minimum wage' is a standardized indicator of the financial situation used in Slovakia, and it takes into account the income of all members of the household. Participants' education levels were assessed by the type of school completed: basic, middle (secondary with or without school-leaving examination) and high (university) education. There were no differences in the income measures between the two gender groups in our study.

Functional status and seriousness of disease

Functional status was assessed based on two scales, both consisting of 4 classes: the NYHA classification of dyspnea symptoms (34) and the CCS - severity of chest pain (35). The seriousness of the disease was assessed by the type of intervention indicated after the CAG: 'pharmaceutically', or (PTCA: Percutaneous Transluminal Coronary Angioplasty), or 'CABG' (Coronary Artery Bypass Grafting).

Analysis

We used logistic regression models to examine the effect of gender and the effect of low and middle income and education on the occurrence of high vital exhaustion. In the first step, the crude effects of income, education and gender on vital exhaustion were computed using the highest levels as a reference category. Next, the model was adjusted for functional status and the seriousness of the disease. Crude and adjusted effects of income and education on vital exhaustion were also computed separately for males and females. Among women, the high and middle income groups were merged into one category, as were the high and middle education groups, since the number of females in the high education and income groups was very low. Analyses were performed using SPSS 12.0.1 for Windows.

Results

The sociodemographic characteristics of the participants in different socioeconomic groups are presented in Table 1.

Table 1. Descriptive statistics of the study variables

	1. Low income	2. Middle income	3. High income	1. Low education	2. Middle education	3. High education	Total sample
Age							
mean	51.4	57.1	55.4	56.7	55.5	56.1	55.9
range (SD)	27-71	32-75	38-72	27-71	32-75	38-72	27-75 (7.3)
Gender							
Male	31	142	57	70	131	44	245
Female	19	76	15	48	60	9	117
Vital exhaustion							
Exhausted	45	126	27	90	100	16	206
Non-exhausted	5	89	43	25	85	34	144
Functional status							
Class I., II.	26	102	41	56	91	28	175
Class III., IV.	20	101	25	55	84	21	160
Seriousness of disease							
CABG	12	63	25	31	51	25	107
PTCA/stent	10	57	17	30	46	14	90
Pharmacotherapy	25	96	29	55	89	13	157

As expected, participants with low income were more likely to feel exhausted in comparison to patients with high income. Participants with middle income had higher likelihood of being exhausted compared to the high-income group of participants. This association remained significant even after controlling for functional status and seriousness of disease (Table2).

Patients with low and middle education had higher chance of being exhausted compared to participants with high education. All associations remained significant after controlling for the seriousness of disease. However, when functional status was added into the regression model, no significant association between education and vital exhaustion was found (Table2).

Gender was also found to be a significant factor influencing the level of vital exhaustion: female participants were more likely to be exhausted in comparison to male participants. This association remained statistically significant even after controlling for functional status and seriousness of disease (Table2).

Table2. Logistic regression analysis- risk of having higher vital exhaustion in different income, educational and gender groups.

Vital Exhaustion	Crude effect OR(95% CI)	Effect adjusted for functional status OR(95% CI)	Effect adjusted for seriousness of disease OR(95% CI)
Income ¹			
high	1.00	1.00	1.00
middle	2.10 (1.19-3.64)	2.33 (1.10-4.93)	2.03 (1.16-3.57)
low	13.31 (4.67-37.94)	5.18 (1.67-16.16)	11.81 (4.12-33.85)
Education ¹			
high	1.00	1.00	1.00
middle	2.33 (1.20-4.54)	1.03 (0.42-2.53)	2.15 (1.10-4.24)
low	6.93 (3.28-14.64)	2.47 (0.89-6.83)	6.31 (2.96-13.46)
Gender ²			
male	1.00	1.00	1.00
female	2.10 (1.24-3.25)	2.20 (1.10-4.60)	1.83 (1.12-3.10)

Statistically significant effect is in bold ($p < 0.05$)

¹ Model was adjusted for the effect of age and gender.

² Model was adjusted for the effect of age.

The risk of being exhausted was also computed separately among male and female patients. Among men, logistic regression showed that male patients with low income and middle income were more likely to feel exhausted compared to the high-income group. All associations remained significant after controlling for functional status and the seriousness of disease. Similar results were found with regard to education. (Table3).

In the group of female patients, income had no significant effect on vital exhaustion. Education influenced exhaustion scores among women, but this association disappeared after controlling for functional status and seriousness of disease (Table3).

Table 3. Logistic regression analysis- risk of having higher vital exhaustion in different income and educational groups by gender.

Vital Exhaustion		Crude effect OR (95% CI)	Effect adjusted for functional status OR (95% CI)	Effect adjusted for seriousness of disease OR (95% CI)
Males				
Income	high	1.00	1.00	1.00
	middle	2.54 (1.32-4.87)	1.96 (0.86-4.46)	2.48 (1.29-4.77)
	low	14.25 (4.33-46.86)	4.84 (1.34-17.49)	12.23 (3.68-40.59)
Education	high	1.00	1.00	1.00
	middle	2.23 (1.10-4.68)	1.19 (0.46-3.10)	2.15 (1.10-4.60)
	low	6.44 (2.77-15.10)	2.71 (1.1-8.1)	5.98 (2.51- 14.24)
Females				
Income	high + middle*	1.00	1.00	1.00
	low	9.31 (1.19-73.15)	2.82 (0.32-26.20)	3.26 (0.35-31.25)
Education	high + middle*	1.00	1.00	1.00
	low	3.62 (1.40-9.32)	2.87 (0.64-12.80)	3.87 (0.77-19.55)

Statistically significant effect is in bold ($p < 0.05$)

* Categories have been merged to prevent empty cells.

Discussion

The results of our study show that low level of income and low educational grade, were inversely associated with vital exhaustion scores among male patients with coronary heart disease. This association remained significant after controlling for the effects of patient’s functional status and the seriousness of disease. Higher levels of vital exhaustion among low educated groups were reported in previous studies focusing on cardiac risk among representative population samples (5, 6, 7, 17). The results of our study show that this association remains significant among people who already suffer from coronary heart disease.

Vital exhaustion is a significant factor contributing to a worse prognosis among coronary patients, and reducing vital exhaustion has a beneficial effect on levels of depression, exhaustion and anginal complaints among patients (8, 11). Higher vital exhaustion in the low socioeconomic group of coronary patients thus indicates that socioeconomic disadvantage may consequently have a negative effect on the general quality of life among coronary patients and on later prognosis of disease. As we proposed in the introduction, one possible pathway by which socioeconomic disadvantage negatively affects cardiac risk is through psychological factors such as depression or vital exhaustion. It is possible that a similar mechanism exists in the process by which socioeconomic disadvantage influences

patients' quality of life or prognosis. The cross-sectional design of our study did not allow us to explore the subsequent impact of socioeconomic status and vital exhaustion on patients' prognosis. However, the striking socioeconomic inequalities found in vital exhaustion among our patients, support the above hypothesis.

The association between socioeconomic status and vital exhaustion in our study was significantly more salient among men than among women. These findings are in line with previous studies showing women reporting higher vital exhaustion compared to men (5, 15). Appels et al. (12) presented the results of analyses of the origins of increased exhaustion in females, which has shown that of all biographical characteristics, holding a job and simultaneously taking care of the household was most strongly associated with elevated exhaustion. Moreover, the pathway mechanisms between socioeconomic status, gender and the development of disease might be different among males and females. Available evidence shows that men are probably more susceptible to the health deteriorating effects of income inequality, economic deprivation and loss of status than women. The effects of socioeconomic status on health could be also explained by differences in psychosocial distress perception and coping strategies (19, 37). It is also possible that income and education are not as powerful predictors for women as they are for men, and that the less commonly used predictors (such as marital status, or being a single parent) might be stronger predictors for females.

The limitations of our study concern its cross-sectional design and the fact, that relative to the male participants, the female sample is smaller in particular (the number of women with high income or high educational level is very small). However, the latter distribution is quite characteristic for the population of women in this age group in the whole population of Slovakia.

Conclusion

Despite its limitations, our study makes a contribution to an important but somehow neglected area of research. Low education and income of patients had strong adverse effects on their vital exhaustion, which is a significant risk factor contributing to a worse prognosis and a lower quality of life in CHD. These results need confirmation however, preferably in a longitudinal study, which would provide better insight into the effects of socioeconomic status the outcomes, and also enable the exploration of the causal relationships between the variables. Future research might also be focused on possible explanations of gender differences. High vital exhaustion scores among patients with low education and income indicate that more focus on managing this problem is needed in particular socioeconomic groups, which should be taken into account when designing interventions focusing on quality of life among coronary patients.

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