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Headache and quality of life in Finnish female municipal employees

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Abstract

Objectives: Migraine and other specific types of chronic headache impair health-related quality of life (HRQoL). However, undefined headache is common in general population and little is known about its impact on QoL. This study addresses the impact of undefined headache symptoms on quality of life in a population of working-age females.

Methods: This cross-sectional study consisted of 633 female municipal employees. Self-reported headache recurrence was defined by asking whether headache was occasional or recurrent. We assessed quality of life with two different instruments, the generic EUROHIS-QOL 8-item index (EUROHIS-8) and the preference-based instrument EuroQoL (EQ-5D) representing health-related QoL. Anxiety, depressive symptoms and work stress were measured using validated questionnaires. Adjusted hypothesis of linearity was evaluated using bootstrap type analysis of covariance with age, education and number of comorbidities as covariates.

Results: In the study population, 76% (n=481) had experienced headache during the past year, and of those 38% (n=184) had recurrent headache. The EQ-5D index decreased linearly with increasing headache symptoms and four out of five EQ-5D dimensions were lowest in recurrent headache group. Females with headache had lower QoL on every EUROHIS-8 item except for conditions of living place, compared to females without headache. These results remained statistically significant after adjustment with age, education and number of comorbidities. There were no differences in prevalence of musculoskeletal disorders between study groups.

Conclusions: This cross-sectional, observational study showed that self-reported recurrent headache is common among Finnish women belonging to active work force. Both health-related and general QoL is best in females without headache and lowest in the recurrent headache group. We conclude that recurrent headache, even when the subjects have low anxiety and depressive symptoms scores, is associated with low HRQoL in working-age females. These results underline the importance of headache, a common and neglected symptom deteriorating female employees' wellbeing.

Keywords: female; headache; quality of life.

Introduction

Headache is one of the most common disorders of the nervous system and highly prevalent in the adult population, especially among females [1–4]. Patient-reported outcome measures, such as health-related quality of life (HRQoL) have recently drawn growing interest in clinical research. Earlier studies in the field of headache and quality of life have focused mainly on migraine. Studies have shown that not only chronic headache, but also migraine even at asymptomatic times significantly impair HRQoL [5–10]. Comorbidities, especially mental symptoms, impair health-related quality of life more in headache patients than in persons without headache [2, 5, 11]. In contrast, in a large population-based study the role functioning of headache patients without comorbidities was

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comparable to that of headache-free persons without comorbidities [11]. Thus, although previous studies undeniably point out that migraine and chronic headache impair HRQoL, comorbidities, particularly psychiatric, play also a crucial role. In a recent review, population-based studies concerning the relationship between quality of life and headache have been emphasized as necessary means to improve treatment approaches [12]. In particular, the influence of headache on HRQoL in the working-age population without a specifically diagnosed headache problem or substantial mental comorbidities calls for further studies.

HRQoL is defined as the "physical, psychological and social domains of health, seen as distinct areas that are influenced by a person's experiences, beliefs, expectations and perceptions" [13]. Several validated instruments are available to measure HRQoL in headache populations [14]. These include EQ-5D, previously used in migraine studies [15–17]. EUROHIS measures quality of life in general and is recommended for use in public health research due to its broad coverage [18]. Population-based mean values of EUROHIS-8 have been assigned in a national survey in Finland [19].

Epidemiological studies have reported prevalence of specific headache entities, such as migraine, tension-type headache, medical overuse headache and several rarer forms, and have revealed that a person frequently may have more than one type of headache [20]. On the other hand, a substantial proportion of persons suffering from headache have not undergone diagnostic protocol to define their headache type [21]. Therefore, for the purpose of the present study, we considered it adequate to assess the impact of headache on QoL considering headache as a collective symptom regardless of etiology.

The aim of this cross-sectional, observational study was to determine the impact of unspecified, self-reported headache, either occasional or recurrent, on various aspects of quality of life in a female working-age population. Furthermore, we examined the effect of comorbid mental symptoms on the impact of headache.

Methods

Study population

The subjects for this study were enrolled from the PORTAAT (PORi To Aid Against Threats) study population comprising employees of the city of Pori, Finland in the years 2014–2015 [22]. The study population includes workers from 10 work units, who were selected by the chief of the welfare unit of the city of Pori. Invitation and study information letters were sent to the employees as an email attachment by the managers of the work units. There were no exclusion criteria. Librarians, museum employees, computer workers, groundkeepers, social workers, physicians, nurses, administrative officials, and general office staff were invited to an enrolment appointment with the study nurse. Altogether 836 employees (732 females, 104 males) consented to participate in the PORTAAT study. For the present analyses, we included all females, total of 633, for whom the data acquired included the EUROHIS-8 and the EQ-5D questionnaires and two questions on headache: (1) "Have you had headache during the past year?"; (2) "Has your headache been recurrent?". These subsequent questions divide the study population into three groups, those without headache, those with occasional headache and those with recurrent headache.

Demographic, lifestyle and health data

Demographic, lifestyle and health data were collected using self-administered questionnaires. Body mass index (BMI) was calculated as weight (kg) divided by the square of height (m^2). Height and weight of the participants were measured by the study nurse. Questions assessed smoking ("current smoker" or "non-smoking"), marital status ("cohabiting or not"), financial satisfaction (with the question "Do you have to spare expenditures?" "yes" or "no"), years of education, quality of sleep ("good" or "not good") and alcohol consumption (the 3-item Alcohol Use Disorders Identification Test, AUDIT-C) [23]. Leisure-time physical activity (LTPA) was classified as follows: high: LTPA for ≥30 min at a time for four or more times a week; moderate: LTPA for ≥30 min at a time for two to three times a week; low: LTPA for ≥30 min at a time for a maximum of one time a week.

Anxiety was assessed by the Generalized Anxiety Disorder scale (GAD-7), which is a self-rated 7-item questionnaire [24]. The total score ranges from 0 to 21; 0–4 = no or little anxiety, 5–9 = some anxiety, 10–15 = substantial anxiety, and 16–21 = severe anxiety; score 10 or more has 89% sensitivity and 82% specificity for generalized anxiety [24].

Depressive symptoms were assessed using the Major Depression Inventory (MDI) [25]. The MDI is a self-rated questionnaire consisting of 10 items. It measures depressive symptoms during the past two weeks on a 6-point Likert-type scale from 0 = never to 5 = all the time and total score ranges from 0 to 50, higher score indicating higher amount of depressive symptoms. Optimal cut-off score for major (moderate to severe) depression is 26 [25].

Work-related stress was evaluated by the Bergen Burnout Indicator (BBI-15) [26] which measures occupational burnout using 15 questions. The answers are given using Likert-type scales from 1 to 6 (1 = completely disagree to 6 = completely agree) that are summed up to score from 15 to 90, a high score indicating high level of work stress.

A study subject was considered to have diabetes, hypertension, malignancy, psychiatric, musculoskeletal and/or pulmonary disorder if the disease was diagnosed by a physician and/or she was using appropriate medication. This information was obtained from the medical records.

Quality of life

To assess the HRQoL widely we used two questionnaires the EUROHIS-QoL 8-item questionnaire (EUROHIS-8) and the EQ-5D.

EUROHIS-8 is a shortened version of the WHOQOL-Bref scale, developed on the basis of the WHO definition of the quality of life

[27–29]. It has been recommended for use in public health research and it has good reliability, validity and internal consistency [18]. EUROHIS-8 measures quality of life broadly: the four domains measured are psychological, physical, social, and environmental, and each is represented by two items. Each item is answered on a five-point Likert scale ranging from 1 (very poor) to 5 (very good). The overall quality of life score is formed by summing the scores of the eight items and divided by eight to get the EUROHIS-8 mean; hence the theoretical range of the EUROHIS-8 is from 1.00 to 5.00. Higher scores indicate better quality of life. In the Finnish general female population (>30 years old) the mean score for EUROHIS-8 was 4.00 [30].

The EQ-5D is a generic instrument for measuring HRQoL and is applicable to a wide range of conditions [31]. The EQ-5D score comprises five dimensions of health: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension is assessed on a 3-point scale; level 1 (no problems), level 2 (some problems), and level 3 (extreme problems) and the EQ-5D total score is derived from the health state code, which is the combination of levels from each of the five dimensions. The score is a continuous range from −0.59 to 1.00. The maximum score 1.00 indicates the best health state.

Statistical methods

Statistical significances for the unadjusted hypothesis of linearity across categories of self-reported headache recurrence were evaluated using the Cochran-Armitage test for trend, the Cuzick test and analysis of variance with an appropriate contrast. Adjusted hypothesis of linearity (orthogonal polynomial) was evaluated using bootstrap type analysis of covariance with age, education and number of comorbidities as covariates. The bootstrap method is significantly helpful when the theoretical distribution of the test statistic is unknown or in the case of violation of the assumptions. Hochberg's procedure was applied to correct levels of significance for multiple testing. The normality of the variables was tested using the Shapiro-Wilk W test. Correlations were estimated by Spearman's correlation coefficient method. The Stata 15.0, StataCorp LP (College Station, TX, USA) statistical package was used for the analysis.

Results

The study population consisted of 633 female employees (mean age 48 ± 10 years) of whom 76% (n=481) had experienced headache during the past year. Of them, 184 (38%) had recurrent headache. The baseline characteristics of the study subjects are shown in Table 1. Age, financial satisfaction, quality of sleep, and alcohol consumption were lowest in the recurrent headache group and highest in the non-headache group. Mean scores of anxiety, depressive symptoms and work-related stress were highest in the recurrent headache group and lowest in those without headache. Yet, all these psychological risk factor scores were low in all groups. The prevalence of diabetes was higher in the non-headache group, otherwise there were no differences between groups in the prevalence of reported comorbidities.

Table 1: Characteristics of the 633 study subjects.

	Self-reported headache recurrence			p-Value*
	No n=152 (24%)	Occasional n=297 (47%)	Recurrent n=184 (29%)	
Age, years, mean, SD	51 (10)	49 (10)	46 (10)	<0.001
Body mass index, kg/m^2, mean, SD	26.3 (4.2)	26.5 (4.7)	27.3 (5.4)	0.055
Current smoking, n, %	12 (8)	27 (9)	16 (9)	0.81
Cohabiting n, %	121 (80)	237 (80)	151 (82)	0.56
Financial satisfaction, n, %	117 (77)	217 (73)	124 (67)	0.048
Education years, mean, SD	13.9 (2.7)	13.9 (2.8)	14.3 (2.6)	0.16
Leisure time physical activity, n, %				0.35
Low	30 (20)	61 (21)	41 (22)	
Moderate	64 (42)	130 (44)	82 (45)	
High	58 (38)	106 (36)	61 (33)	
Good quality of sleep, n, %	123 (81)	229 (77)	131 (71)	0.035
AUDIT-C score, mean, SD	3.1 (1.6)	2.8 (1.5)	2.4 (1.6)	<0.001
GAD-7 score, mean, SD	2.1 (2.6)	2.9 (3.5)	3.7 (3.3)	<0.001
MDI score, mean, SD	4.0 (5.7)	5.0 (5.8)	6.2 (5.5)	<0.001
BBI-15 score, mean, SD	29.0 (10.2)	31.7 (10.4)	32.9 (10.9)	<0.001
Number of chronic diseases, mean, SD	1.1 (1.2)	1.0 (1.2)	1.3 (1.4)	0.17
Diabetes mellitus, n, %	11 (7)	8 (3)	5 (3)	0.039
Musculoskeletal disorder, n, %	32 (21)	58 (20)	43 (23)	0.57
Hypertension, n, %	30 (20)	46 (15)	25 (14)	0.13
Psychiatric disease, n, %	6 (4)	12 (4)	12 (7)	0.25
Pulmonary disease, n, %	9 (6)	22 (7)	16 (9)	0.34
Malignancy, n, %	1 (1)	5 (2)	3 (2)	0.48

*p for linearity, AUDIT-C, the 3-item Alcohol Use Disorders Identification Test; GAD-7, Generalized Anxiety Disorder 7-item scale; MDI, Major Depression Inventory; BBI-15, Bergen Burnout Indicator.

Figure 1 shows the mean scores of the EQ-5D and the EUROHIS-8 score for each item and the total scores for the two headache categories adjusted for age, education years and number of comorbidities. The mean EQ-5D score was lowest in the recurrent headache group (0.811 [SD 0.177]) compared to the no headache (0.889 [SD 0.135]) and the occasional headache group (0.884 [SD 0.120]) (p for linearity <0.001) (Figure 1). Also the mean EUROHIS-8 total score was lowest in the recurrent headache group: no headache 4.2 (SD 0.5), occasional headache 4.1 (SD 0.5) and recurrent headache 3.9 (SD 0.5) (p for linearity <0.001)

(Figure 1). In comparison with the general working-aged female population in Finland, the total EUROHIS-8 score was higher in the groups having no headache or occasional headache, but lower in the recurrent headache group [19]. On every EUROHIS-8 item, except for conditions of living place (item 6), persons with recurrent headache had significantly lower QoL than those without headache.

Figure 2 shows the proportion of study subjects in each headache group experiencing problems in the five dimensions of EQ-5D. Except for self-care, the problems were in linear relationship with severity of headache, and were most frequent in the recurrent headache group.

Discussion

Our results show that headache is common in female municipal employees; 76% of women reported headache during the past year, and 38% of them had recurrent headache. Although not directly comparable, these figures are in line with a previous study on headache patients in Finland ([32] Nikoforow, [33] Korolainen). QoL correlated with self-reported headache: the females with recurrent headache had lower QoL measured by either the EQ-5D or the EUROHIS-8 questionnaires. Interestingly, the QoL of the groups having no headache or occasional headache was higher than that in the Finnish working-aged female population on average [19]. Several explanations may be outlined. Evidently, our study population consisted of female employees with relatively good overall health and healthy lifestyle. Most of them sleep well, are physically active and have no economic burden. On the contrary, the HRQoL of recurrent headache group was lower than that in general female population. This cannot be explained by coexisting psychological factors, since the mean scores of anxiety, depressive symptoms and work-related stress were low also in the recurrent headache group, not exceeding the cut-off for therapeutic intervention or other corrective measures. The prevalence of musculoskeletal disorders, a common reason for pain symptoms, was approximately 20% in all study groups, notably, the presence of musculoskeletal disorder does not necessarily implicate pain.

The prevalence of headache in female populations in our study is comparable to that reported in previous studies [3, 4, 32, 34]. Moreover, our results support the conclusion that the more frequently one has headache, the lower the QoL. The EUROHIS-8 questionnaire measures QoL broadly, and our results illustrates the fact that headache, especially if recurrent, affects most factors contributing to a

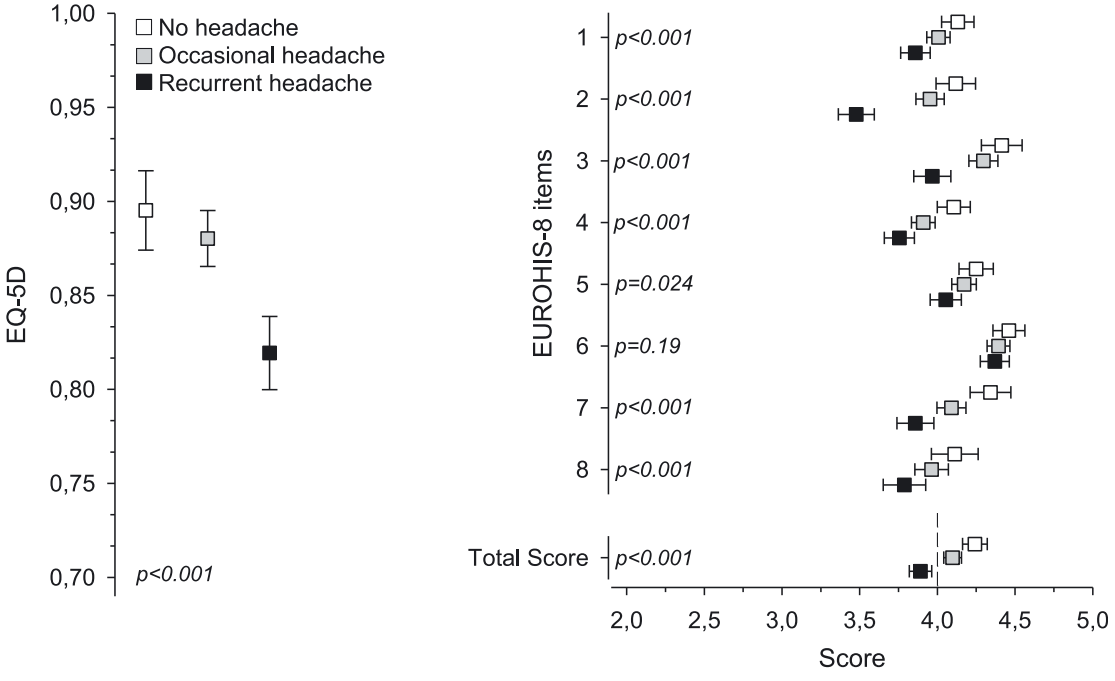

Figure 1: The EQ-5D index score (mean) and the EUROHIS-8 items and the total score (mean) in the groups according to self-reported headache recurrence, adjusted for age, education years and number of comorbidities. Whiskers show the 95% confidence intervals. The dotted line shows the mean score of the EUROHIS-8 item index in the general Finnish female population aged 30–65 years [19]. Hochberg's procedure was applied to correct levels of significance for multiple testing. EUROHIS-8 items: 1) quality of life; 2) health; 3) daily activities; 4) yourself; 5) relationships; 6) living place; 7) energy; 8) money.

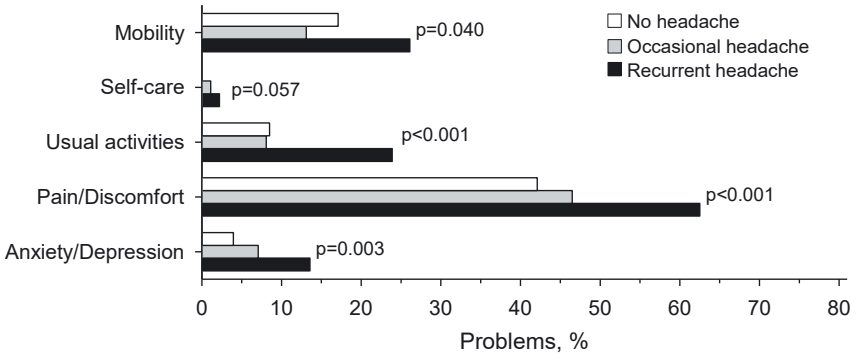

Figure 2: The percentage of study subjects reporting problems in five dimensions of EQ-5D.

person's well-being. Of the five items of EQ-5D, pain was expectedly the most common problem in both headache groups. Interestingly, also the females with no headache felt most problems in the pain area. Comparison of the three groups showed significant linearity in the prevalence of pain in relation to severity of headache, suggesting that headache is a major reason for deteriorating QoL. Pain experienced by headache-free subjects probably relates to the fact that musculoskeletal pain is very frequent in Finnish working aged population [35, 36].

Globally, it is estimated that the prevalence of headache in the general population is 47%, and the prevalence of chronic headache 3% [2, 3]. In working-aged female population the one-year prevalence of headache is 58% and of chronic headache 5% [37]. Previous studies have also shown that headaches are more frequent in the female populations [3, 38]. The higher incidence of headache in our study compared to global prevalence studies is likely explained by the age spectrum of our study population consisting of working-age women. The prevalence of headache is known to decrease with age [2]. Furthermore, our criterion for occasional headache (answer "no" to question "Has you headache been recurrent") allows women with only mild and incidental headache to be included in that headache group.

The strengths of our study include a relatively large cohort of female employees, which is well characterized and has a relatively homogenous cultural background. The questionnaires used to measure QoL and psychological risk factors (anxiety, depression, stress) are valid and reliable. To obtain better homogeneity of the study population, only female employees were included in this substudy, since the relative number of males in the PORTAAT study was low, reflecting the female dominance among municipal workers [39].

The major limitation of this study is the cross-sectional design, which prevents us from assessing any causality. Although the exact diagnoses are not known, we do not consider this as a problem, because the EUROHIS-8 and EQ-5D are not disease-specific questionnaires. Since the aim of the PORTAAT study was to assess cardiovascular health and work related aspects, information of exact number of headache days or treatment of headache was not included in the original data. Classification of headache used here is independent of pathophysiology of headache, and, being based on relatively gross categories, is considered to be adequate and more reliable for a retrospective study. Participants were invited to the PORTAAT study via e-mail, which may have caused a selection bias, since response rates in e-mail surveys tend to be lower than in mail surveys [40]. Our results may also have been affected by the healthy worker effect [41] since individuals outside the workforce were not included. Nevertheless, the mean age, gender distribution and the rate of sickness absence of the study participants were comparable to those of the entire personnel of the City of Pori [39].

Our study showed that headache is very common among Finnish working-age females, and that QoL significantly associates with self-reported headache. The novel finding of the present study is that among working-age women with recurrent headache, QoL was lower than among those with occasional or no headache, and it was also lower than that in Finnish female working-age population on average, even though the study subjects did not report any clinically significant psychological symptoms. The relation of menopause with headache and QoL remains an interesting subject of future studies.

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Ethical approval: The study protocol and consent forms were reviewed and approved by the Ethics Committee of the Hospital District of Southwestern Finland (REC number 00002216). All participants provided written informed consent for the project and subsequent medical research.

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