Rheumatol Int (2006) 27:131–139
DOI 10.1007/s00296-006-0177-5

ORIGINAL ARTICLE

Occupational work and quality of life in osteoarthritis patients

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Received: 20 November 2005 / Accepted: 17 July 2006 / Published online: 9 November 2006

Abstract The ageing European population suffers from chronic diseases, including osteoarthritis (OA). The aim of this study was to investigate the work activity/ability, the quality of life and reciprocal interaction between both in OA patients. A total of 750 OA outpatients were evaluated by a questionnaire study. Work Ability Index (WAI) and General Health Questionnaire 28 (GHQ 28) were used as tools for work ability and quality of life assessment, respectively. Statistical analysis was performed by means of ANOVA tests. A total of 22.2% OA patients were still active professionally. They had decreased work ability and decreased quality of life. A worse work ability and a worse quality of life were related with a blue-collar work, multi-joint localization of OA and co-existence of other diseases. A negative correlation was found between general scores of GHQ 28 and that of WAI and five WAI components. Findings indicate a need for work ability promotion among OA working patients to maintain both, better quality of life and higher level of satisfaction with job.

Keywords Work ability · Quality of life · Osteoarthritis

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Introduction

According to data from the medical literature, about 25% of the world population suffers from diseases of musculo-skeletal system [1]. The significance of the problem is illustrated by the fact that years 2000–2010 have been designated by WHO as the decade of bones and joints [2]. Among diseases of musculoskeletal system, the most common is osteoarthritis (OA). This is the most frequent cause of chronic pain and physical disability. As a long-lasting disease, OA not only requires significant financial expenditures on treatment, rehabilitation and social care but also affects the life of patients, influencing their occupational activity, leading to decreased quality of life [3].

As early as in 1946, health was defined by WHO not only as lack of disease but also as a state of complete physical, intellectual and social well being, including work ability [4].

Work has a different significance for healthy people than for those who are chronically ill, for younger people than for older ones, but generally, work ability is a basis of human being happiness. Work ability can be evaluated objectively, i.e. on the basis of one's examination of a functional state, skills and physical efficiency. A subjective evaluation, i.e. asking one for his or her opinion, is also applied.

For the latter purpose the Finnish instrument called Work Ability Index (WAI) is currently in use [5]. Employees' subjective evaluation of their own work ability by means of WAI has been a subject of many research studies almost exclusively done on healthy people [6–13]. Up to now, only one paper using WAI for the evaluation of work ability of patients suffering

from chronic diseases of cardiovascular system has been published [14].

Although there is a large amount of literature concerning life quality of patients suffering from rheumatic diseases, including OA, never has this topic been dealt within the context of their occupational activity [15–21]. The purpose of our study was to evaluate occupational activity within a group of OA patients, work ability and quality of life among those still working and to correlate patients' work ability and their life quality.

Materials and methods

Patients

A total of 750 consecutive out-clinic OA patients aged 45 and more were enrolled in the study. Patients were diagnosed as having OA of the knee, hip, hand, neck or back. All fulfilled the current American College of Rheumatology criteria for OA diagnosis [22–24]. For neck/back OA, narrowing of intervertebral space and osteophyte formation were necessary conditions. Patients were recruited by doctors in out-clinic departments of rheumatology and rehabilitation. Participation in the study was completely voluntary.

For their occupational activity, patients were divided into two groups: still active and inactive. Patients still occupationally active were analyzed with regard to their age (up to 55 years, more than 55 and working and retired), gender, type of work and health status (clinical localization of OA and co-existing diseases).

For the type of work, patients were divided into two groups: performing physical work (blue-collar workers) and performing non-physical work (white-collar workers).

A detailed characteristic of the working patients is presented in Table 1. Two patients returned incomplete questionnaires, therefore Tables 2, 3, 4 and 5 contain data calculated for 164 patients but Tables 5, 6, 7, 8 and 9 for 165 patients.

Methods

This was a questionnaire study. For the evaluation of work ability, the Polish version of WAI was used [25]. WAI consists of seven elements, two objective (number of diseases diagnosed by a doctor, disease-related absence from work during the previous 12 months), while the remaining five (current work ability, work ability in reference to job requirements—both physical and intellectual ones, disease-related impairment of work ability, own prognosis of work ability in the next 2 years and mental ability to work) are subjective. WAI score ranges from 7 to 49 points and results could be: poor (up to 27 points), moderate (28–36 points), good (37–43 points) or excellent (44–49 points).

Table 1 Detailed characteristic of working patients

	Number of patients	Percentage
Gender		
Women	126	76
Men	40	24
Area of the body affected by OA		
Hip	5	3
Knee	4	2.4
Hand	7	4.2
Neck/back + hip	25	15
Neck/back + knee	15	9
Neck/back + hand	15	9
Neck/back + osteoporosis	8	4.8
Neck/back + hip + knee	7	4.2
Neck/back + hip + hand	3	1.8
Neck/back + knee + hand	4	2.4
Neck/back + hip + knee + hand	4	2.4
Occupational activity		
Non-retired patients	135	81.8
Retired patients	31	18.2
Type of work		
White-collar workers	126	75.8
Blue-collar workers	40	24.2

Age: 45–74.0, mean 53.97 ± 6.21. Mean duration of OA: 10 months–50 years, mean 12.2 ± 8.20

The research tool used for the patients' mental status as a measure of their life quality was General Health Questionnaire (GHQ 28, according to Goldberg) [26]. GHQ 28 consists of 28 questions grouped by 7 in 4 categories concerning: somatic symptoms, anxiety or insomnia, impaired functioning and depression symptoms. GHQ 28 score ranges from 0 to 28 points. The number of points is in reverse proportion to one's mental status and results could be: good (0 points), moderate (1–4 points) or bad (5–28 points).

Statistical analysis

Statistical analysis has been made using SPSS 10.0 kit. The pattern of WAI scores in the studied group was not normal, therefore statistical analyses used had to be adequate. For calculating the significance of differences between the groups (>2) as independent data, Kruskal–Wallis test was used; for differences between the two groups, Mann–Whitney test; for calculations of difference significance, variance analysis (ANOVA); and for evaluating co-existing diseases, factor analysis (Varimax procedure with Kaiser's normalization).

Results

Evaluation of work ability in the working patients

WAI and gender and age of the working patients

Results in the whole group and with regard to patients' gender and age are presented in Tables 2 and 3.

Differences in WAI score between men and women in the whole group as well as between the three patients' age groups were not statistically significant.

WAI and patients' work load type

Results of WAI in patients with regard to the work load type in the three age groups are presented in Table 4.

Only in the non-retired patients, both up to 55 years and in older ones, differences in WAI scores between white and blue-collar workers were statistically significant ($P < 0.01$).

WAI score and the patients' health status

WAI score and clinical localization of OA WAI scores and clinical localization of OA patients are presented in Fig. 1. WAI scores ranged from 21.3 to 36.0. Generally, WAI scores were lower in patients with a multi-joint form of OA than in patients with a single or a double-joint form of OA. The lowest WAI scores were found in patients with hip OA.

As regards the clinical form of OA, differences in WAI scores between individual groups were at the border of statistical significance ($P = 0.1$). The differences between groups of patients suffering from single-joint, double-joint and multi-joint forms of OA were statistically insignificant.

WAI score and co-existing diseases It was assumed that co-existence of OA with other diseases affects WAI score. Patients reporting symptoms (objectively confirmed by a doctor) of other non-OA diseases were analyzed and their WAI score counted. WAI results were compared to results of patients without a given symptom. For diseases most often co-existing with OA, results are presented in Table 5.

Statistically significant differences were found only between patients with and without urogenital system diseases ($P < 0.05$). Differences between WAI score in patients with or without a history of injuries related to accidents were at the border of statistical significance ($P = 0.1$). In the remaining cases, differences in WAI score between patients with or without co-existing diseases were statistically insignificant.

A mathematical model was set up to check the hypothesis if some of the co-existing diseases in particular affect work ability. Regression analysis showed that a model where WAI score was a dependent variable, while diseases most often co-existing with OA in the studied patients were independent variables is statistically insignificant.

Evaluation of general health and mental status in the working patients

GHQ 28 and gender/age of working patients

Results of the whole group and with regard to patients' gender and age are presented in Tables 6 and 7.

Table 2 WAI in OA patients: general results and results by gender

	General results	Females	Males
WAI ranges	$N = 164$ Mean = 32.9 (11–48) SD ± 6.97	$N = 125$ Mean = 33.1 (13–48) SD ± 6.71	$N = 39$ Mean = 32.0 (11–45) SD ± 7.82
Excellent	7 (4.3%)	5 (4.0 %)	2 (5.1%)
Good	50 (30.5%)	38 (30.4%)	12 (30.8%)
Moderate	75 (45.7%)	58 (46.4%)	17 (43.6%)
Poor	32 (19.2%)	24 (19.2%)	8 (20.5%)

$P > 0.05$

Table 3 WAI in OA patients: results by age groups

	Patients up to 55 years old	Patients older than 55 years	Retired patients
WAI ranges	$N = 103$ Mean = 32.4 (11–47) SD ± 4.27	$N = 31$ Mean = 33.9 (16–46) SD ± 7.09	$N = 30$ Mean = 33.6 (21–48) SD ± 7.82
Excellent	3 (2.9%)	1 (3.2%)	3 (10.0%)
Good	32 (31.3%)	11 (35.5%)	7 (23.3%)
Moderate	46 (44.7%)	13 (41.9%)	16 (53.3%)
Poor	22 (21.4%)	6 (19.4%)	4 (13.3%)

$P > 0.05$

Table 4 WAI in OA patients: results by age and type of work

	Patients up to 55 years old*	Patients older than 55 years*	Retired patients
White-collar workers	$N = 73$ Mean = 34.9 (24–47) SD ± 5.37	$N = 23$ Mean = 36.4 (27–46) SD ± 5.23	$N = 28$ Mean = 33.6 (21–48) SD ± 6.61
Blue-collar workers	$N = 30$ Mean = 26.4 (11–40) SD ± 7.27	$N = 8$ Mean = 26.7 (16–38) SD ± 7.12	$N = 2$ Mean = 33.0 (29–37) SD ± 5.65

*$P < 0.01$

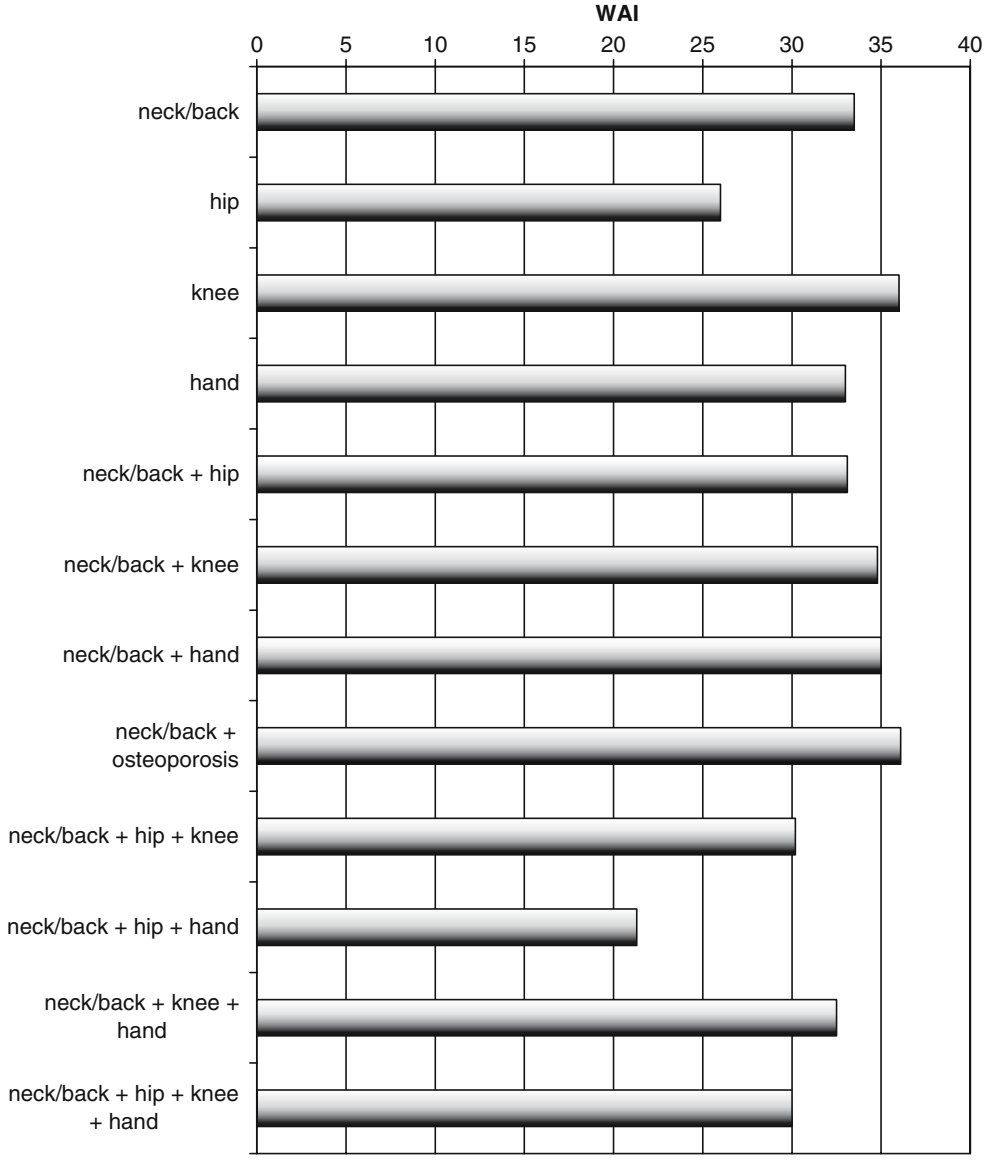

Fig. 1 The patients' WAI scores and clinical localization of OA

The difference in GHQ 28 score between men and women in the whole group was at the border of statistical significance ($P = 0.059$). Differences in GHQ 28 score between the three analyzed age groups were statistically insignificant.

GHQ 28 score and the work load type

Results of GHQ 28 in patients with regard to the work load type in the three age groups are presented in Table 8.

Differences in GHQ 28 scores between white and blue-collar workers were statistically significant ($P < 0.01$) in the two groups of non-retired patients, independent of their age. In the group of retired patients, the differences were not statistically significant.

GHQ 28 score and patients' health status

GHQ 28 score and clinical localization of OA

Results of GHQ 28 score in relation to the localization of OA are presented in Fig. 2. GHQ 28 scores ranged from 3.80 to 15.66. In general, GHQ 28 scores were higher in patients with a multi-joint form of OA than in patients with a single or a double-joint form of OA. The highest GHQ 28 scores were found in patients with hip OA.

Differences in GHQ 28 scores within the groups of patients suffering from various clinical forms of OA were at the level of statistical tendency ($P = 0.1$). Differences between the groups of patients suffering from single-joint, two-joint and multi-joint forms of OA were not statistically significant ($P = 0.3$).

Table 5 WAI in OA patients with and without co-existing diseases

Non-OA disease	Yes	No
Cardiovascular system	$N = 76$ Mean = 32.4 SD ± 7.09	$N = 90$ Mean = 33.3 SD ± 6.40
Digestive system	$N = 50$ Mean = 31.6 SD ± 8.02	$N = 116$ Mean = 33.6 SD ± 6.40
Injuries related to accidents*	$N = 46$ Mean = 31.1 SD ± 8.23	$N = 120$ Mean = 33.7 SD ± 6.30
Metabolic and endocrine system	$N = 38$ Mean = 31.8 SD ± 5.96	$N = 128$ Mean = 33.3 SD ± 7.24
Urogenital system**	$N = 30$ Mean = 29.7 SD ± 5.82	$N = 136$ Mean = 33.6 SD ± 7.02

*$P = 0.1$, **$P < 0.05$

Table 6 GHQ 28 in OA patients: general results and results by gender

	General results	Females	Males
GHQ 28 ranges	$N = 165$ Mean = 6.62 (0–23) SD ± 5.68	$N = 126$ Mean = 7.08 (0–23) SD ± 5.82	$N = 39$ Mean = 5.12 (0–21) SD ± 4.97
Good	91 (55.2%)	73 (57.9%)	18 (46.2%)
Moderate	47 (28.5%)	34 (27.0%)	13 (33.3%)
Poor	27 (16.4%)	19 (15.1%)	8 (20.5%)

*$P = 0.059$

Table 7 GHQ 28 in OA patients: results by age groups

	Patients up to 55 years old	Patients older than 55 years	Retired patients
GHQ 28 ranges	$N = 104$ Mean = 7.12 (0–23) SD ± 6.08	$N = 31$ Mean = 5.74 (0–14) SD ± 4.16	$N = 30$ Mean = 5.80 (0–21) SD ± 5.52
Good	59 (56.7%)	18 (58.1%)	14 (45.2%)
Moderate	27 (26.0%)	9 (29.0%)	11 (35.5%)
Poor	18 (17.3%)	4(12.9%)	5 (16.1%)

*$P > 0.05$

GHQ 28 score and co-existing diseases Analogically to WAI assessment, it was assumed that co-existence of OA with other diseases affects GHQ 28 score. Patients reporting symptoms (objectively confirmed by a doctor) of other non-OA diseases were analyzed and their GHQ 28 score counted. GHQ 28 results were compared to the results of patients without a given symptom. For diseases most often co-existing with OA, results are presented in Table 9.

Table 8 GHQ 28 in OA patients: results by age and type of work

	Patients up to 55 years old*	Patients older than 55 years*	Retired patients
White-collar workers	$N = 74$ Mean = 6.02 (0–23) SD ± 5.45	$N = 23$ Mean = 4.91 (0–12) SD ± 4.20	$N = 28$ Mean = 5.89 (0–21) SD ± 5.63
Blue-collar workers	$N = 30$ Mean = 9.83 (0–21) SD ± 6.78	$N = 8$ Mean = 8.12 (4–14) SD ± 3.13	$N = 2$ Mean = 4.50 (1–8) SD ± 4.94

*$P < 0.01$

Only a difference in GHQ 28 scores between patients with and without urogenital systems was at the level of statistical tendency ($P = 0.01$). In the remaining cases, differences in GHQ 28 score between patients with or without co-existing diseases were statistically insignificant.

A mathematical model was again set up to check if some of the co-existing diseases can, in particular, affect the life quality of patients. A model where GHQ 28 score was a dependent variable, while independent variables were the diseases listed above was statistically insignificant according to regression analysis.

Comparison between WAI and GHQ 28 scores

A correlation between general GHQ 28 and WAI scores as well as between the scores of individual components of WAI was analyzed. The results are shown in Fig. 3. A statistically significant negative correlation was found between general GHQ 28 and WAI scores ($P < 0.05$). Concerning the WAI components, a statistically significant negative correlation was found between general GHQ 28 scores and the following components: work ability in reference to job requirements (question no. 2), number of co-diseases diagnosed by a doctor (question no. 3), disease-related impairment of work ability (question no. 4), disease-related absence from work in the previous 12 months (question no. 5) and mental ability to work (question no. 7). There was no such correlation between general GHQ 28 scores and the remaining components of WAI, i.e. current work ability (question no. 1) and own prognosis of work ability in the next 2 years (question no. 6).

Discussion

Elderly people suffering from chronic diseases not only want to work but—from the economical point of view—must often work. They should maintain a good

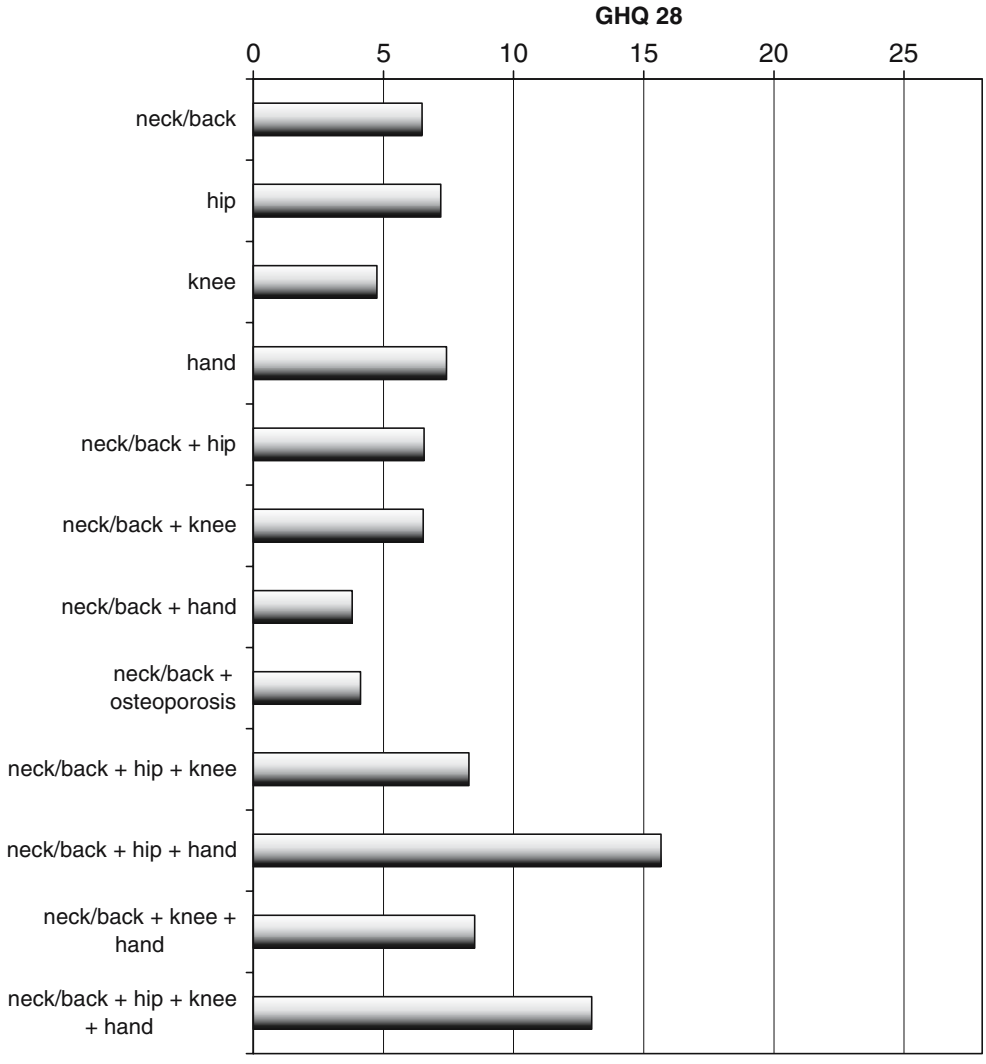

Fig. 2 The patients' GHQ 28 scores and clinical localization of OA

work ability and the highest possible level of satisfaction with their job.

In this study, patients' occupational activity was found to be 22.2%. Similar results were shown in a large study made by Rossignol et al. [27]. In a cohort of 10,412 OA patients, 20% were still active professionally. Both results should be evaluated in the broader context of common occurrence of OA, in general population being about 85% in the older age group [28]. This group of employees should be treated with special care, so as to allow them to maintain the highest possible work ability as long as possible.

So far, studies in which WAI was used to assess work ability were done with healthy employees. There are only few studies on work ability in employees suffering from chronic diseases. Results of studies of Sauni et al. [29] done in bronchial asthma patients and Kurtze et al. [30] in fibromyalgia patients showed that work ability is decreased in chronically ill patients. The research tools in both studies were other than WAI. In our study for the first time WAI was used for the evaluation of work ability in OA patients.

For measuring the patients' quality of life, GHQ 28 questionnaire, widely used in general medical practice, served as a tool [31–36]. It has been shown that this tool is as good as the Short Form 36 Questionnaire (SF 36). Failde et al. [37], in a group of patients suffering from ischemic heart disease, applied GHQ 28 and SF 36 and elicited very similar results.

As our results could not be compared to any other results concerning occupationally active patients, they have been compared with results obtained in healthy people and patients suffering from non-OA chronic diseases.

In our patients, the average WAI score was 32.9 ± 6.97 (*moderate)* whereas the average GHQ 28

Table 9 GHQ 28 in OA patients with and without co-existing diseases

Non-OA disease	Yes	No
Cardiovascular system	$N = 76$ Mean = 7.05 SD ± 5.83	$N = 90$ Mean = 6.25 SD ± 5.56
Digestive system	$N = 50$ Mean = 7.38 SD ± 5.98	$N = 116$ Mean = 6.29 SD ± 5.54
Injuries related to accidents	$N = 46$ Mean = 7.17 SD ± 5.65	$N = 120$ Mean = 6.41 SD ± 5.70
Metabolic and endocrine system	$N = 38$ Mean = 6.97 SD ± 5.62	$N = 128$ Mean = 6.51 SD ± 5.71
Urogenital system*	$N = 30$ Mean = 8.53 SD ± 6.46	$N = 136$ Mean = 6.20 SD ± 5.43

*$P = 0.01$

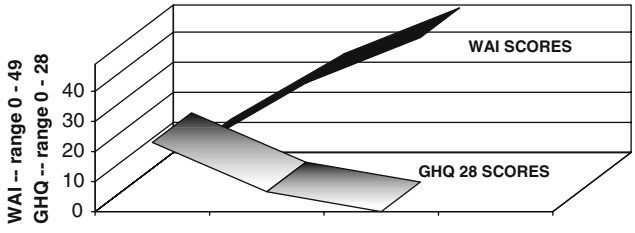

Fig. 3 Correlation of GHQ 28 score and WAI scores in OA patients

score was 6.62 ± 5.68 (poor). In a division into WAI and GHQ 28 categories, most patients had moderate or good work ability and moderate quality of life. These results are optimistic and may predict a good response to work ability and quality of life promotion.

It was expected that dividing the studied patients into age groups should reveal some tendencies. However, it has not been shown and differences between WAI score and GHQ 28 score results obtained in the three age sub-groups were statistically insignificant. Possibly, the influence of age on the work ability and quality of life of patients suffering from OA is masked by the effect of a chronic and painful disease itself.

Concerning WAI, any influence of the patients' gender on their work ability was not found either. These results differ from those obtained from healthy participants. Many research studies indicate that people's work ability decreases with age. Pohijonen [38] showed that a critical age for the decrease of work ability is 44–44 years, while Ilmarinen et al. [7] 51 years. It should be noted that in those studies, the participants' scope of ages was much greater, while in our study all patients were aged 45 or above. Ilmarinen et al. [7] were also able to show a gender difference in decrease of work ability with age, but only in white-collar workers. In their study, aging women revealed a smaller decrease in their work ability than aging men.

Concerning GHQ 28, our patients' gender affected general self-evaluation of their life quality, but only in those who were retired. Men had higher scores than women, but the difference was statistically insignificant. Quite different results were obtained by Gage and Leidy [35]. In their study, younger people (below 60) of white race representing low socio-economical level had a greater probability of psychological stress. Noticeably, results reported by Ahumada et al. [36] showed that female sex and a high level of life stress were independent variables associated with psychological and social problems. Lack of correlation between age and GHQ 28 scores in our study could be, at least partly, explained by a low level of age variability in our patients.

In our OA patients, white-collar employees had higher WAI scores than blue-collar workers and the differences were statistically significant (34.9 vs 28.7, $P < 0.01$). A similar correlation was found in other studies with healthy employees. In our earlier studies, in healthy employees from various occupational groups, we have shown that both blue-collar and mixed workers (some physical and some non-physical work) have lower WAI scores than white-collar workers [12, 13]. Work limitations due to disability in OA patients were also subjected in papers by Rossigniol et al. [27] and Lerner et al. [39]. In both, authors report higher work limitation in blue-collar workers. The results presented above, concerning patients suffering from OA, reveal a necessity to improve work ability, first of all that of blue-collar workers.

As far as GHQ scales are concerned, in non-retired patients, both up to and over 55 years of age, white-collar workers had higher scores than blue-collar workers, and the differences were statistically significant (*5.79 vs 9.22, $P < 0.0$)*. This may indirectly indicate that a higher level of education allows better coping with everyday life problems and has a positive effect on one's life quality.

Not surprisingly, in our patients with a multi-joint form of OA, WAI scores were lower and GHQ 28 scores higher than in those diagnosed as having a single-joint or two-joint form of the disease. It implies that clinically advanced disease, being a great problem of disability due to chronic pain and movement limitation, affects both work ability and general life quality.

According to the medical literature, hip OA is the most disabling form of the disease [40–44]. In our study, results showed that all patients suffering from hip OA are the most affected ones. Their results of WAI were in the range of poor.

Another approach was to assess how diseases co-existing with OA influence patients' work ability and quality of life. In our study, diseases most frequently co-existing with OA were: cardiovascular, gastrointestinal, endocrine and metabolic, urogenital system diseases and post-accident injuries. Generally, we were able to show that co-existence of other diseases in OA patients influences work ability and quality of life; however, we failed to find out which affected system, in particular, is responsible for this phenomenon.

To reach the final goal of the study, we analyzed the correlations between patients' life quality and work ability. As expected, a negative, statistically significant correlation was found between general scores of GHQ 28 and WAI ($P < 0.05$), i.e. the better the work ability, the better the mood and vice versa. It would be a challenge to point out the direction of the correlation between work ability and life quality. Unfortunately, on the basis of our study, this was not possible.

These data referred to the global value of WAI. It was interesting to analyze which items of WAI affect, in particular, the patients' life quality. A negative, statistically significant correlation was found between general scores of GHQ 28 and five of the seven WAI components. Intriguing is that two subjective items, i.e. current work ability and own prognosis of work ability, did not correlate with GHQ scores. Possibly this finding should be addressed in our future studies.

Our study concerns a relatively small group of patients suffering from OA ($n = 166$). However, because the patients were not preselected for participation in the study, we believe that generalization of our results in reference to a larger population of patients may be justified. On the other hand, Poland, where the study has been conducted, does not belong to countries having demographic, economical and social conditions extremely different from the rest of Europe. Therefore, we think that our results should be interesting for most of European rheumatologists. Currently, there is a general agreement that rheumatology of the twenty-first century should not stay in its own frames, but go as much as possible out of them. Our study shows the new possibility—the approach to occupational medicine. The importance of work capacity in chronic diseases is addressed in conclusions drawn from the OMERACT IV Conference held in 1998. According to those conclusions, it is recommended now that in longitudinal observational studies, in addition to 5 "core" domains—health status, disease process, damage, mortality and toxicity/adverse reaction—two new domains: work disability and costs must be included [45].

Acknowledgments This research was funded by the State Committee for Scientific Research in frames of the Program PCZ 21-21 commissioned by the Minister of Economy, Labour and Social Policy.

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