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Work Ability in Ageing Workers Suffering From Chronic Diseases

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The aim of this study was to investigate the work ability in ageing workers suffering from osteoarthritis (OA), coronary heart disease (CHD) or hypertension (H). One hundred and sixty-six OA and 355 CHD/H outpatients were evaluated. The Work Ability Index (WAI) served for work ability assessment. Patients' results were compared with the results of a control group of 225 healthy young workers. Statistical analysis was performed with ANOVA tests. WAI in female and male CHD/H patients was higher than in OA patients ($p < .01$*), better work ability was related to better education (*$p < .01$*), white-collar work (*$p < .01$*) and better recreation (*$p < .01$*); subjective work ability was determined mostly by the objective health status. The promotion of work ability among workers suffering from advanced age-related diseases should be closely related to the promotion of health. It is indicative to improve occupational education and skills, already at an early stage of a disease.*

work ability ageing age-related diseases chronic diseases

1. INRODUCTION

The population of the world is undergoing changes. Currently the most evident are demographic changes in terms of an increase in the mean age of the population. The tendency to ageing will continue. It was estimated that in 2000 the world population aged 65 years and over was 450 million (an increase of 9.5 million comparing to 1999). It is predicted that in 2030 this figure will increase to 973 million, which in practice means an increase of 6.9–12% in the world, 15.5–24.3% in Europe,

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12.6–20.3% in the USA, 6–12% in Asia, 5.5–12% in Latin America and in the Caribbean [1]. Data concerning Poland in 2002 are as follows: out of the total of 38,228,000 Polish citizens, 4,887,600 (12.7%) were people aged 65 years and over [2].

Demographic changes are followed by epidemiological changes. Worldwide epidemiological studies indicate a tendency of change in the leading cause of death: infective diseases and acute states are currently replaced by chronic and degenerative diseases [1]. The social burden of diseases can be demonstrated by indicators of disability, e.g., years lost due to disability (YLD). According to a 2002 WHO report both in the world and in Europe, among men and women, the greatest burden are diseases of (a) the nervous system, (b) the sense organs, (c) the locomotor system, and (d) the cardiovascular system (the fourth place in Europe and the fifth in the world) [3]. The health status of the Polish population can be illustrated with an analysis of first-time certificates entitling to a pension issued by the Social Insurance Institution (ZUS). In 2001 the greatest number of disability certificates (22.4%) was issued on the grounds of cardiovascular system diseases, followed by psychiatric (15.2%) and locomotor system diseases (14.7%) [4].

The ageing of a population is a challenge for the occupational health and safety sector. As the process of ageing affects everyone, including every worker, the term *an elderly worker* is based on that period of occupational activity when essential changes influencing work performance take place. The functional capacity of a human organism, mainly physical one, starts to deteriorate after the age of 30 reaching a critical value after the next 15–25 years. Therefore the age of 45–50 is recognised as an age criterion for an ageing worker [5, 6, 7].

Preliminary data of the International Labour Organization indicate that in 2025 ageing workers will constitute 32% of all workers in Europe, 30% in the USA, 21% in Asia and 17% in Latin America (as cited in [6]). The percentage of ageing workers in Poland is also high. According to data from the Central Statistical Office (GUS), the economic and occupational activity in Poland in 2002 was the following: there were 14,401,000 people aged ≥45 (i.e., 46% of all people), 5,672,000 of them were economically active (i.e., 33% of all the economically active people) and 4,900,000 of them were employed (i.e., 35% of all the employed people) [2]. These data indicate the need to increase employment of ageing workers, with regards to all tendencies affecting the whole world population and the physiology of the ageing body.

Work ability (in its physical and psychological aspects), ageing and occupational experience create a dynamic system in which an elder worker functions. Understanding this dynamic system was the reason why a new concept of work ability was born in the Finnish Institute of the Occupational Health at the end of the last century. This ability—different for each individual—is understood as a dynamic process of an interaction between human resources and work. This process undergoes permanent changes during the whole professional life and is modified by two main factors: ageing and the character of the work involved [6].

The current demographic situation on the labour market requires an increase in the employment of ageing workers. Therefore the promotion of work ability is necessary to increase this employment rate leading directly to better productivity and work quality. This also makes it possible to decrease the percentage of disability and protects against premature retirement [6, 8]. The promotion of work ability should take into consideration the ageing of the population and, at the same time, a wide spectrum of age-related diseases. Respecting their high prevalence in the general population, this applies first of all to coronary heart disease (CHD), hypertension (H) and osteoarthritis (OA) [8].

The improvement of work ability is strictly linked with an improvement in the quality of life. The quality of life can be defined as a picture of a particular fragment of one's life (e.g., professional life) in comparison to an ideal model. The quality of life in various chronic diseases has been the subject of many scientific publications [9]. Even though there is a large body of literature on the quality of life in CHD, H and OA, there is no literature on work ability in workers suffering

from these diseases. The current study intends, at least partially, to bridge this gap.

2. AIM

The aim of this study was (a) to assess work ability in ageing workers (aged ≥45) diagnosed and systematically treated for age-related diseases of the locomotor system (OA) or the cardiovascular system (CHD, H); and (b) to evaluate occupational and extra-occupational factors influencing work ability in those workers.

3. METHODOLOGY

The study was performed among patients in the following departments: the Outpatient Department for Adults and the Department of Rheumatological Rehabilitation, Institute of Rheumatology, Warszawa, Poland; and the Outpatients Department of Cardiology and the Department of Cardiology, Central Clinical Hospital, Warszawa, Poland.

3.1. Study Groups

Work ability was assessed in 166 OA and 355 CHD/H patients. Inclusion criteria were (a) age ≥45 and (b) diagnosis of OA (according to the standards of the Polish Rheumatology Society) [10], CHD or H (according to the standards of the Polish Cardiology Society) [11, 12]. Exclusion criteria were age <45 and a diagnosis of other locomotor/cardiovascular system diseases. The control group consisted of 90 blue- and 125 white-collar young healthy workers aged 30–35 with a minimal professional experience of 1 year.

Detailed characteristics of workers in whom work ability was assessed are given in Table 1.

TABLE 1. Characteristics of People in Whom Work Ability Was Assessed

		OA Patients		H/CHD Patients		Control	
Characteristics		***n***	**%**	***n***	**%**	***n***	**%**
Overall number		166	100	355	100	225	100
	Occupationally active	135	81.8	265	74.7	—	—
	Retired	31	18.2	90	25.3	—	—
	Females	126	75.8	82	23.1	123	54.5
	Males	40	24.2	273	76.9	102	45.5
Age							
	M (years)	54.0 ± 6.21		54.1 ± 6.12		31.9 ± 2.12	
	Minimum	45.0		45.0		30.0	
	Maximum	74.0		76.0		35.0	
Education							
	Primary	9	4.8	12	3.4	6	2.7
	Basic vocational	20	12.1	18	4.8	66	29.5
	Secondary vocational	31	18.8	76	21.3	38	17.0
	Secondary	15	9.1	48	13.4	33	14.1
	Post-secondary	13	7.9	14	4.0	27	12.1
	Tertiary	78	47.3	187	52.6	55	24.1

Table 1. *(continued)*

Characteristics		OA Patients		H/CHD Patients		Control	
		n	%	*n*	%	*n*	%
Type of work							
	White-collar workers	126	75.8	291	81.8	135	60
	Blue-collar workers	40	24.2	64	18.2	90	40
Reported age of best work ability							
	<30	9	17.2	79	22.2	—	—
	30–35	89	53.7	129	36.4	—	—
	>35	48	29.1	147	41.4	—	—

Notes. OA—osteoarthritis, H/CHD—hypertension/coronary heart disease.

3.2. Methods

This was a questionnaire study. A set of questions including ones about work activity, work ability, occupational and extra-occupational factors influencing work ability was prepared and printed for the purpose of this study. Questionnaires were filled in by a medical doctor in the presence of the patient.

Patients' participation in the study was fully voluntary.

3.3. Work Ability

As a tool to assess work ability a Polish version of the Finnish Work Ability Index (WAI) questionnaire was used [13, 14]. Work ability measured with WAI is considered *poor* (7–27 points), *moderate* (28–36 points), *good* (37–43 points) or *excellent* (44–49 points).

3.4. Factors Influencing Work Ability

To assess occupational factors, a scale to measure psychosocial work load was used. This scale is a Polish adaptation of the checklist of the European Foundation for the Improvement of Living and Working Conditions (1994) [15]. The scale consists of 20 questions. The subject can give a *yes* (1 point) or a *no* (0 points) answer. The more points are gathered, the greater the psychosocial work load and the greater the risk of crossing the borderline of tolerance and, in consequence, of developing classical negative symptoms of occupational stress. The scoring system is as follows: 0–3 points indicate an acceptable load, 4–11 points stand for a conditionally acceptable load, 11 points and more signify an unacceptable load.

Extra-occupational factors were assessed with a questionnaire developed for this study. Four factors were identified: economic (1 question about the cost of treatment and medicines), family life (3 questions about care-giving to other family members and duties secondary to spouse's professional activity), life style (4 questions about sleeping hours, smoking, alcohol use, regular meals) and recreation (2 questions about physical and cultural activity). Each question carried between 1 and 4 points; 1 and 2 points indicated a weak influence of a given factor, 3 and 4 points—a strong influence.

3.5. Statistical Analysis

The results of work ability in the studied groups were statistically analysed. As statistical distribution of WAI results in the groups of rheumatic, cardiologic and control patients was not normal, appropriate analytical tests for this type of dissemination were used. To assess the significance of the differences between 2 incoherent groups (>2) the Kruskal-Wallis test was applied, while for 2 groups—the Mann-Whitney test. In some cases variance analysis (ANOVA) was used. Regression analysis was used to assess the significance of occupational and extra-occupational factors influence on work ability [16]. The whole statistical analysis was performed in SPSS version 8.0.

4. RESULTS

4.1. WAI: General Values

Results of WAI in rheumatic and cardiologic patients and in the control group were compared. WAI results in rheumatic patients varied from 11 to 48 (*M*: 32.9 ± 6.97; excellent: 4.3% of patients, good: 30.5%, moderate: 45.7%, poor: 19.5%); in cardiologic patients it ranged from 15 to 46 (*M*: 35.0 ± 5.27; excellent: 3.4% of patients, good: 39.4%, moderate: 48.0%, poor: 8.8%). In the control group WAI was 26–49 (*M*: 41.7 ± 4.20; excellent: 38.4% of workers, good: 50.5%, moderate: 10.6%, poor: 0.5%). Although the differences of mean WAI results between rheumatic and cardiologic patients, between patients and the control group, and among all studied groups were not big, they were statistically significant ($p < .01$).

4.2. WAI Results According to Gender

WAI of the rheumatic and cardiologic patients and of the control group with regards to gender was compared. Results are presented in Figure 1. In rheumatic female patients, WAI ranged from 13 to 48 (*M*: 33.1 ± 6.71); in cardiologic female patients it was 19–46 (*M*: 34.6 ± 5.89); in control females: 26–49 (*M*: 41.6 ± 4.15). In rheumatic male patients, WAI ranged from 11 to 45 (*M*: 32.0 ± 7.82); in cardiologic male patients: 15–46 (*M*: 35.2 ± 5.06); in control males: 29–49 (*M*: 42.2 ± 4.26). Both in females and males, the WAI results in patients significantly differed from the results in the control group ($p < .01$). Moreover the differences among all compared groups were statistically significant ($p < .01$). For men, but not for women, the differences between rheumatic and cardiologic patients were statistically significant ($p < .05$). Within each analyzed group, differences between females and males were statistically insignificant.

4.3. WAI Results According to Age

WAI of rheumatic and cardiologic patients aged ≤55, >55 and in retired patients was compared. Results are presented in Figure 2.

For those ≤55, in rheumatic patients, WAI results ranged from 11 to 47 (*M*: 32.4 ± 4.27); in cardiologic patients, they were 15–46 (*M*: 34.7 ± 5.42). For those >55, in rheumatic patients WAI results were 16–46 (*M*: 33.9 ± 7.09); in cardiologic patients: 21–46 (*M*: 35.9 ± 5.30). For retired rheumatic patients, WAI results ranged from 21 to 48 (*M*: 33.6 ± 6.42); for retired cardiologic patients: 23–43 (*M*: 35.1 ± 4.86). Only in the <55 group was the difference between rheumatic and cardiologic patients statistically significant ($p < .01$). In other groups the differences were

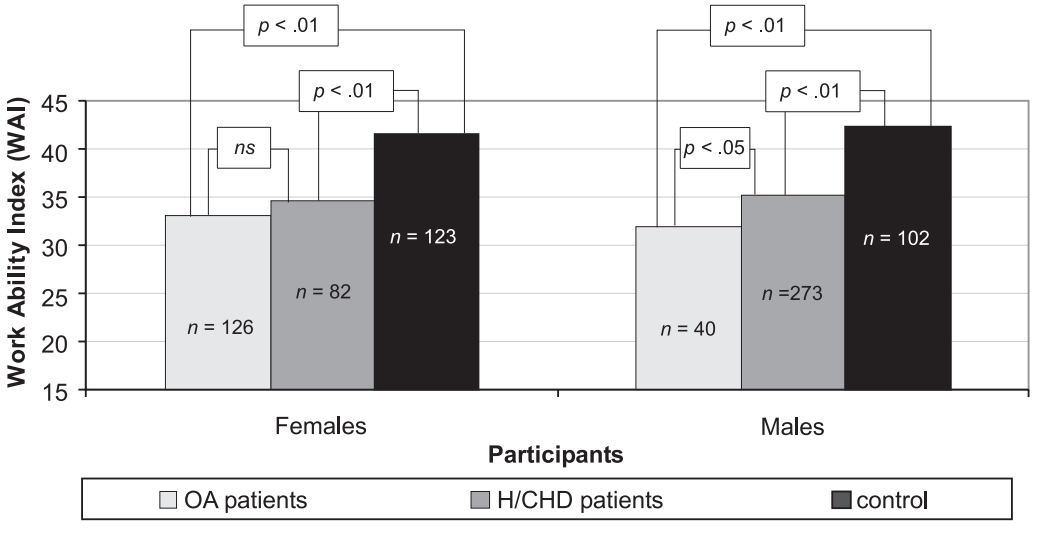

Figure 1. Work Ability Index (WAI) results according to gender. *Notes.* OA—osteoarthritis, H/CHD—hypertension/coronary heart disease.

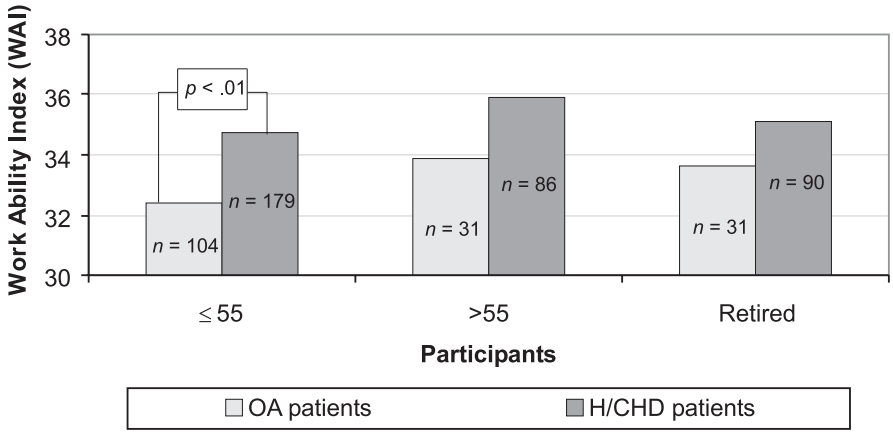

Figure 2. Work Ability Index (WAI) results according to age. *Notes.* OA—osteoarthritis, H/CHD—hypertension/coronary heart disease.

not significant. Within each analyzed group, the differences between patients of different age were statistically insignificant.

4.4. WAI Results According to the Type of Work

WAI of the rheumatic and cardiologic patients and of the control group with regards to blue- or white-collar type of work was compared. Results are shown in Figure 3. For white-collar workers the results were the following: in rheumatic patients the mean WAI was 34.9 ± 5.67 (range: 21–48), in cardiologic patients *M*: 35.9 ± 4.84 (range: 19–46), in the control group *M*: 42.5 ± 3.84 (range: 26–49). For blue-collar workers the results were the following: in rheumatic patients the mean WAI was 26.8 ± 7.16 (range: 11–40), in cardiologic patients *M*: 31.1 ± 5.33 (range: 15–42), in the control group *M*: 41.0 ± 4.55 (range: 30–49). The differences in WAI, both for blue- and white-collar workers, between the patients and the control groups, between rheumatic and cardiologic patients, and among all the studied groups were statistically significant ($p < .01$). Within each analyzed group, the differences between blue- and white-collar workers were statistically significant ($p < .05$).

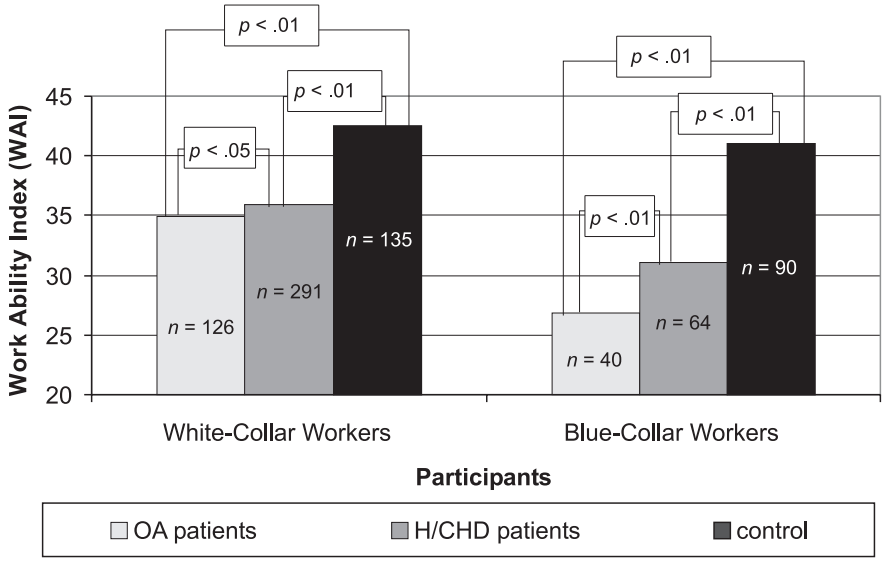

Figure 3. Work Ability Index (WAI) results according to type of work. *Notes.* OA—osteoarthritis, H/CHD—hypertension/coronary heart disease.

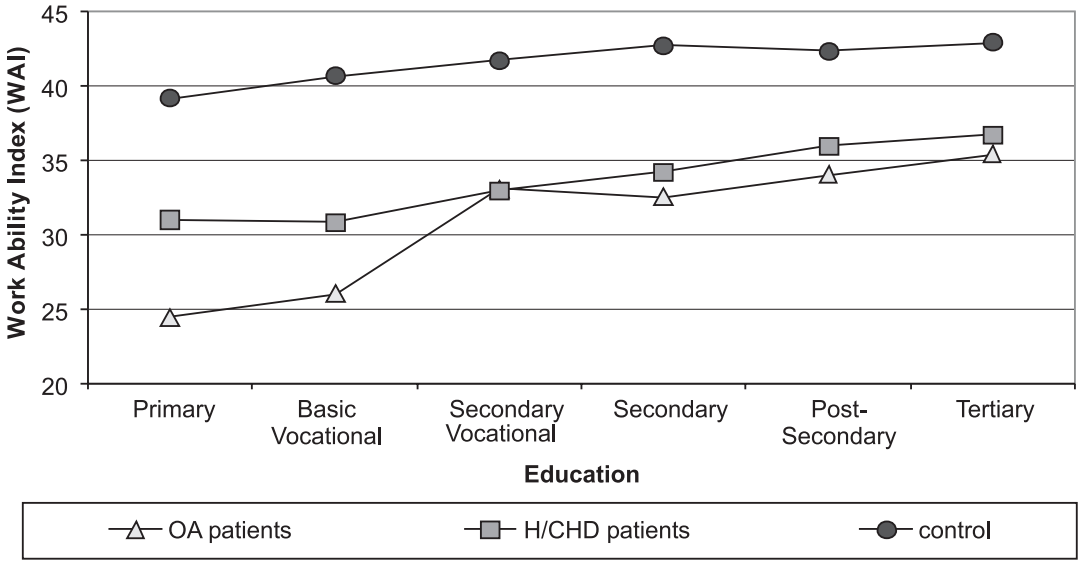

Figure 4. Work Ability Index (WAI) results according to the level of education. *Notes.* OA—osteoarthritis, H/CHD—hypertension/coronary heart disease.

4.5. WAI Results According to the Level of Education

WAI results in rheumatic and cardiologic patients, and in the control group were analyzed with regards to education. Results are presented in Figure 4. In all studied groups, the level of education significantly differentiated work ability ($p < .01$).

4.6. Results in Specific Items of the WAI Questionnaire

Answers given by rheumatic and cardiologic patients as well as by the control group for specific items of the WAI questionnaire were compared. Results are presented in Figure 5. The mean of the answers in the rheumatic, cardiologic and control groups were, respectively, the following:

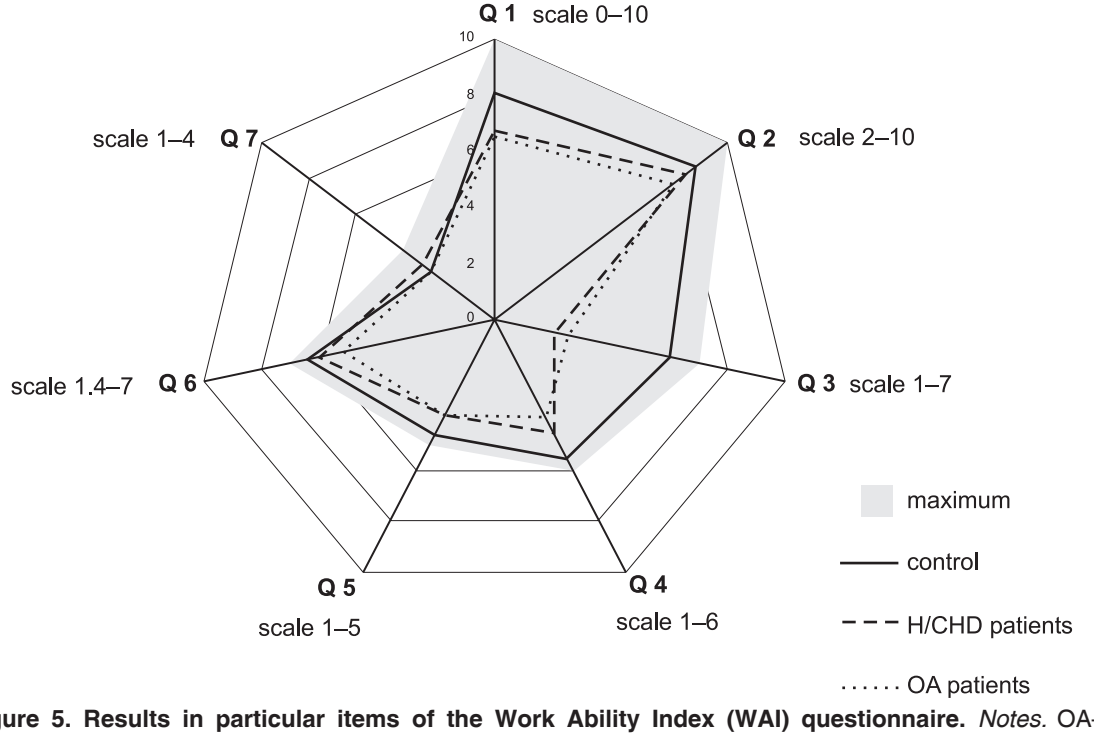

Figure 5. Results in particular items of the Work Ability Index (WAI) questionnaire. *Notes.* OA—osteoarthritis, H/CHD—hypertension/coronary heart disease.

- Question 1: Subjective estimation of present work ability compared with the lifetime best (scale 0–10): 6.5, 6.7, 8.1.
- Question 2: Subjective work ability in relation to both physical and mental demands of the work (scale 2–10): 7.7, 8.2, 8.6.
- Question 3: Number of diagnosed diseases (scale 1–7): 2.5, 2.1, 6.0.
- Question 4: Subjective estimation of work impairment due to disease (scale 1–6): 3.9, 4.5, 5.5.
- Question 5: Sickness absence during past year (scale 1–5): 3.8, 3.8, 4.6.
- Question 6: Own prognosis of work ability after 2 years (scale 1, 4 or 7): 5.2, 6.0, 6.4.
- Question 7: Psychological resources (enjoying daily tasks, activity and life spirit, optimistic about the future) (scale 1–4): 2.7, 3.1, 2.7.

4.7. WAI Results According to Psychosocial Work Load

WAI of rheumatic and cardiologic patients and of the control group with regards to acceptable, conditionally acceptable and unacceptable psychosocial work load was compared. Results are shown in Figure 6. For those who reported acceptable load, results were the following: in rheumatic patients the mean WAI result was 33.9 ± 7.68 (range: 16–45), in cardiologic patients *M* was 32.7 ± 6 (range: 19–41), in the control group *M*: 39.9 ± 3.93 (range: 35–47). For those who reported conditionally acceptable load, results were the following: in rheumatic patients *M*: 33.1 ± 6.90 (range: 11–47), in cardiologic patients *M*: 35.1 ± 5.18 (range: 20–46), in the control group *M*: 41.5 ± 3.93 (range: 29–49). For those who reported unacceptable load, results were the following: in rheumatic patients *M*: 32.9 ± 6.97 (range: 11–48), in cardiologic patients *M*: 35.2 ± 5.30 (range: 15–44), in the control group *M*: 42.4 ± 4.40 (range: 26–47). For all three levels of psychosocial work load, differences of WAI between groups of patients and the control group as well as among all analyzed groups were statistically significant ($p < .05$). A comparison between rheumatic and cardiologic patients was not possible due to the small number of cases in the groups. Within each analyzed group, the differences among workers with different levels of work load were statistically significant in the control group only ($p < .05$).

4.8. WAI Results According to Extra-Occupational Features

WAI of rheumatic and cardiologic patients as well as of the control group with regards to four extra-occupational factors hypothetically influencing work ability (economic, family life, life style and recreation factor) was compared. Results of those

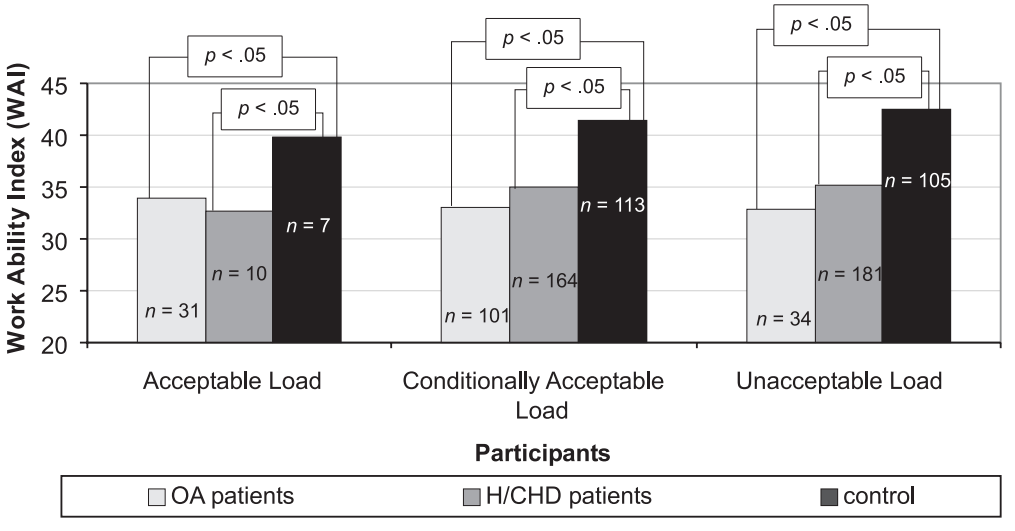

Figure 6. Work Ability Index (WAI) results according to psychosocial work load. *Notes.* OA—osteoarthritis, H/CHD—hypertension/coronary heart disease.

workers who were less affected by a given factor were compared with the results of those who were more affected (in a versus manner). For specific factors, results were the following:

- economic factor: in rheumatic patients: *M*: 33.2 ± 6.79 vs. *M*: 30.8 ± 8.13, in cardiologic patients: *M*: 35.2 ± 5.22 vs. *M*: 32.9 ± 5.56, in the control group: *M*: 42.0 ± 4.12 vs. *M*: 36.6 ± 4.36;
- family life: in rheumatic patients: *M*: 33.1 ± 6.94 vs. *M*: 28.6 ± 6.61, in cardiologic patients: *M*: 35.1 ± 5.28 vs. *M*: 33.9 ± 5.16, in the control group: *M*: 42.1 ± 4.03 vs. *M*: 37.0 ± 4.71;
- life style: in rheumatic patients: *M*: 33.0 ± 6.90 vs. *M*: 30.0 ± 9.46, in cardiologic patients: *M*: 35.1 ± 5.28 vs. *M*: 34.7 ± 5.21, in the control group: *M*: 41.6 ± 4.17 vs. *M*: 42.7 ± 4.33;
- recreation: in rheumatic patients: 36.7± 5.20 vs. 30.9 ± 6.95, in cardiologic patients: *M*: 35.9 ± 5.01 vs. *M*: 34.1 ± 5.44, in the control group: *M*: 42.8 ± 4.42 vs. *M*: 41.6 ± 4.13.

Only for the recreation factor was the difference among all the compared groups statistically significant ($p < .01$). For other factors, due to the small number of persons in subgroups, a statistical analysis was not possible. From the analysis of regression, where WAI was a dependent variable and psychosocial work load and extra-occupational factors were independent variables, it could be concluded that in the following groups WAI was supported mostly by the following factors: in rheumatic patients: recreation ($\beta = -0.329$), family life ($\beta = -0.229$) and economic ($\beta = -0.192$); in cardiologic patients: economic factor ($\beta = -0.258$) and recreation ($\beta = -0.131$), whereas in the control group: family life ($\beta = -0.229$) and economic factor ($\beta = -0.162$). The negative value of β indicates an inverse correlation between the factors studied and WAI. This is caused by the fact that extra-occupational factors were considered as a balance, i.e., the greater the β value, the greater the balance of the factor influencing work ability.

5. DISCUSSION

This study faces the ongoing changes in the world population. Bearing in mind that Poland's working population is not only ageing but also is also suffering from chronic diseases, we searched for a way in which this problem can, and should, be approached.

Regarding the high prevalence of chronic age-related diseases of locomotor and cardiovascular systems in the general population, it is necessary to pay close attention to workers suffering from OA, CHD or H to facilitate their longest work activity with the best work ability possible. This would make it possible for many workers to stay within the labor force. An ageing worker who suffers from a chronic disease requires intensive support from both occupational health and work organization specialists. This support should result in avoiding premature retirement (or at least postponing this fact) and in keeping professionally active those workers who are still relatively young but have already gained essential work experience.

As a tool to measure work ability we used a Polish translation of the Finnish Work Ability Index [13, 14]. The WAI questionnaire has been recently retested for its reliability and, along with the results of previous studies, is considered as a reliable tool to assess work ability for both research and everyday practice [6, 13, 17, 18, 19]. According to medical and occupational health literature there have been no studies on assessing work ability in OA or H/CHD patients, which makes comparing results impossible. For this reason, despite the gradation of work ability given by WAI authors (*excellent*, *good*, *moderate* and *poor*), in our study, the results of both groups of patients were compared with each other. This analysis created a unique opportunity to compare work ability in two groups of workers suffering from the most common advanced age-related diseases. Secondly, our patients' results were compared with the results of young healthy workers aged 30–35 matched according to gender and type of work (blue- and white-collar workers) with a minimal work experience of 1 year. It was assumed that at this age workers do not have advanced age-related diseases yet but are already

experienced enough in their profession. Since in both groups our patients reported 30–35 as the age of their best work ability, this analysis of results made it possible to compare the results of patients with their idealistic results, a gold standard. Thirdly and finally, we compared our results with the results of studies performed in ageing healthy workers.

Our results showed that the mean value of WAI among workers suffering from OA was 32.9 ± 6.97, i.e., within the range of moderate work ability. It should be said that these are optimistic results as a vast majority of rheumatic (76.2%) and cardiologic patients (87.4%) had moderate or good work ability, which possibly promises a positive response to future work promotion activities. Both females and males suffering from OA or H/CHD had decreased work ability in comparison with the control group; WAI was 32.9 ± 6.97 vs. 41.7 ± 4.20, and 35.0 ± 5.27 vs. 41.7 ± 4.20, respectively. Differences between WAI in patients and in the control group were statistically significant ($p < .01$). This result is not surprising and seems to be a logical consequence of advanced age and chronic diseases. In some studies performed in healthy ageing workers it was shown that work ability decreases with age [18, 20, 21]. In our study workers with OA had worse work ability in comparison to H/CHD workers and this difference was statistically significant ($p < .01$). This could be explained by the fact that among OA workers, more than a double percentage of patients gained a poor WAI result as compared to H/CHD patients (19.5% vs. 8.8%), which in turn could be an effect secondary to chronic physical discomfort caused by pain and movement limitation due to OA.

Assuming that patients in different age groups had different work ability, we subdivided our patients into three subgroups: ≤55, >55 and retired. In each age category H/CHD patients had better work ability than OA patients and the difference in the <55 group was statistically significant ($p < .01$). Nevertheless, in each group of patients, the differences between age groups were not significant. Our results are then somewhat contrary to those found in healthy ageing workers in other studies. Pohjonen's study indicated that 40–44 was the critical age for a decrease in work ability [21]; according to a study by Ilmarinen, Tuomi and Klockars it was 51 [20]. It might be concluded that among workers with chronic diseases, work ability decreases due to diseases rather than age.

Both in patients and in the control group, work ability was differentiated by the type of work. In all compared groups white-collar workers had better work ability in comparison with blue-collar ones; patients had better work ability than the control group, and H/CHD patients' work ability was better than OA patients'. These differences were statistically significant ($p < .01$). In a study on the promotion of work ability, Tuomi, Huutanen, Nykyri and Ilmarinen showed that work demands, the work environment, work organization, the work population, the promotion of health and the promotion of the development of occupational skills correlated with good work quality, work satisfaction and general well-being until retirement [8]. Our results in patients with chronic diseases indicate a necessity to improve work ability primarily in the group of blue-collar workers. This could give equal opportunities to both groups of workers on the labor market.

We have also found both in patients and in the control group that work ability was differentiated by the level of education: the higher the education level, the better the work ability. The differences were statistically significant in patients ($p < .01$) and in the control group ($p < .05$). With regards to the chronic nature of diseases like OA, H and CHD, it is advisable to pay attention to the development of occupational education and skills, already at the very early stage of the disease. This would create a system of self-motivation to maintain good work ability for as long as possible.

In our study, the subjective assessment of work ability (WAI) was influenced mostly by the objective assessment of the health status. H/CHD and OA patients reached the lowest scores in answering Question 3 (The number of diagnosed diseases): 2.5 and 2.1 points, respectively, whereas the control group—in answering Question 7 (Psychological resources): 2.7 points. Other authors also report similar results on the influence of health status on work ability. Salonen et al. identify features responsible for premature

retirement in wood industry workers [22]. Those features were found to be bad health status, stress symptoms and physical work load. Similar results are disclosed in Pohojnen's study performed among home care workers [21]. The preliminary results of Kiss, Walgraeve and Vanhoorne's prospective, unfinished as yet, study among firemen, show that WAI is mostly influenced by age and by health: firstly by problems of the locomotor system, secondly by problems of the cardiovascular and respiratory systems [23]. On the other hand, Makowiec-Dąbrowska et al.'s study of workers in a metallurgical plant shows weak correlation between the assessment of subjective work ability and objective items of WAI (e.g., like health status) [18]. The results of our study and of other ones indicate that work ability in ageing workers is closely linked to health status. Therefore, when trying to improve work ability in a group of ageing workers, it is a sine qua non to look carefully after their health. It is very important to eliminate co-existing diseases and/or to prevent their results. This would enable creating a natural background for other activities aiming at an improvement of work ability in these workers.

In all the groups we studied, a vast majority of subjects reported conditionally acceptable or unacceptable psychosocial work load. In OA patients work ability correlated inversely with psychosocial work load: the greater the load, the worse the work ability. Differences among groups with different psychosocial work load were statistically significant ($p < .05$). Another result was found in H/CHD patients, in whom work ability directly correlated with psychosocial work load. Interestingly, similar results were found in the control group, where differences between groups with a different level of psychosocial work load were statistically significant ($p < .05$). Apparently, young healthy workers ambitiously take up occupational tasks, even close to the borderline of occupational stress and they continue to have good work ability. It is not easy to judge which event is the cause and which one is the result. The similarity of results obtained in cardiologic patients and in the control group as well as the contradiction in the results obtained in the two patients groups are intriguing. Our feeling is that these results should be explained again, like general WAI results, by the nature of the diseases diagnosed in patients. Probably a more evident psychophysical debility of OA patients could explain, at least partly, their bigger caution in undertaking occupational tasks and their worse self-assessment of work ability.

To assess extra-occupational factors influencing work ability four factors were identified in our study: economic, family life, life style and recreation. The results of the analyses in all studied groups and of the comparative analysis showed some tendencies which were not surprising: (a) for each factor, the results in the control group were better than in patients and (b) those people who were more affected by a given factor had better work ability than those who were less affected by that factor. The fact that for all four factors, the results of cardiologic patients were better than those of rheumatic patients could again be explained by the nature of diseases and the lower mental load in cardiologic patients, although studies directed towards these types of assessment were not done. An analysis of our results leads to the conclusion that when attempting to improve work ability in occupationally active OA and H/CHD patients, proper organization of work and after-work time should be carefully considered in order to offer workers due relaxation time after their working day. In the context of the ongoing debate about National Health Funds and health insurance, it is important to stress that medical expenses, treatment as well as family obligations influence the work ability of chronically ill, ageing workers. Considering that fact, as well as the chronic nature of the diseases discussed, it seems that the policy of partial reimbursement of medical expenses is very appropriate and should remain. Additionally, in ageing workers it is necessary to reduce their family obligations (those related to care giving to other family members) which, in turn, would require better access to the assistance of social workers. These activities could support a system of self-motivation to maintain good work ability.

Our results indicate that good work ability requires the promotion of work. The creation of a proper employment policy is a great challenge for the extended European Union. According to

a European Commission report, ambitious targets have been set at the level of the EU for the year 2010: to increase the overall employment rate to 70% and for people aged 55–64, to 50%. This task should be preceded by appropriate financial incentives to take up jobs, to remain at work, to increase work effort and to invest in education and training. Also non-financial incentives such as care services for children, disabled people and the frail elderly, health care, etc., have an important role to play. This comprehensive approach should support work ability, prolong work activity and ensure that work is friendly and attractive. Presently, the core policy of the EU is "to make work pay" [24].

Promotion of work ability has been the subject of research in a Finnish paper cited earlier [8]. According to Toumi et al.'s 11-year prospective study among blue- and white-collar workers, ageing workers' work ability was effectively improved if promotion focused on a decrease in repetitive movements, an improvement in supervisors' attitudes and an increase in physical exercise [25].

To the best of our knowledge, the current study is the first one to use WAI to assess work ability in a cohort of workers suffering from advanced age-related diseases. Our study was done in a limited number of patients; however, the patients enrolled were consecutive and non-selected out-clinic patients. Therefore we are convinced that our results could be generalized.

6. SUMMARY

The results of this study show deteriorated work ability in female and male OA as well as H/CHD patients, which is not surprising and seems to be a logical consequence of advanced age and chronic diseases. In each age category workers with OA had worse work ability in comparison to H/CHD workers. This could be a secondary effect of chronic physical discomfort caused by pain and movement limitation due to OA. Nevertheless, within each group of patients, differences in work ability between age groups were not very big. Thus it might be concluded that among workers with chronic diseases, work ability decreases due to disease rather than due to age. Since white-collar workers had better work ability in comparison with blue-collar ones, the necessity to improve work ability primarily in blue-collar workers seems to be clear and giving, in consequence, both groups of workers equal opportunities on the labor market. A vast majority of patients reported conditionally acceptable or unacceptable psychosocial work load. In OA patients work ability inversely correlated with psychosocial work load, whereas in H/CHD patients and in the control group—directly. Our feeling regarding this intriguing result is that again, like the general work ability results, this could be explained by the nature of the diseases diagnosed in patients. Probably more evident psychophysical debility of OA patients could explain, at least partly, their greater caution in undertaking occupational tasks and their worse self-assessment of work ability. Those patients who were more affected by a given extra-occupational factor had better work ability than those who were affected less and, for each of the four factors studied, the results of the cardiologic patients were better than those of the rheumatic patients. This result could again be explained by the nature of diseases and lower mental load in cardiologic patients. A subjective assessment of work ability was influenced mostly by the objective assessment of health status and patients reached the lowest scores in answering the question on the number of diagnosed diseases. These results indicate that patients' work ability was closely linked to health status. The fact that a vast majority of rheumatic and cardiologic patients had moderate or good work ability possibly promises a positive response to future work promotion activities.

The promotion of work ability among workers suffering from advanced age-related diseases is closely related to the promotion of health and the importance of time for both interventions should not be underestimated. The crucial point is to prevent and to treat the main disease diagnosed as well as all co-existing diseases. It is important to offer those workers a strong self-motivation system which would encourage them to prolong their work activity. Due to the chronic nature of OA, H and CHD as well as the physical

limitations in working (especially in OA patients), it is indicative to improve occupational education and skills, already in the early stages of diseases.

Although our study was done in a limited number of patients, the patients enrolled were consecutive and non-selected outpatients. Therefore we are convinced that our results could be extended to a general population of Polish ageing workers.

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