

THE INFLUENCE OF OCCUPATIONAL AND NON-OCCUPATIONAL FACTORS ON CHRONIC FATIGUE IN WOMEN

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Key words: Women, Chronic fatigue, Occupational and non-occupational load

Abstract. The aim of the present study was to assess the significance of different types of loads to which working women are subjected in relation to reported chronic fatigue. The investigation involved 255 women workers from two different occupational groups. The first group was employed at knitting and the second at assembly lines. Their level of chronic fatigue was assessed. We also analysed the influence of 30 variables on fatigue level. These variables concerned: a) physical and psychological workload, b) organizational (social) climate of work, and c) demographic and family factors. It was found that the most important factor influencing chronic fatigue was "experiencing emotional tension" resulting from family problems. Other factors, having substantial significance for the development of increased fatigue level were also associated with emotional tension and resulted from the social climate in the workplace.

INTRODUCTION

According to the most recent demographic survey women constitute 43.7% of the occupationally active population in Poland and 75% of them are married (5). Most of them find it very difficult to manage both occupational and home duties. Employment does not diminish the amount of their house work and does not release them from responsibility for family life. They only get much less time for home duties, which results in increased time pressure. They also have much less time for rest and sleep (12, 13). These women complain of chronic fatigue and emotional stress (3, 8).

The aim of the present study was to evaluate the level of chronic fatigue and to assess the direction and level of influence of different occupational and non-occupational factors on reported chronic fatigue.

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MATERIALS AND METHODS

The study involved blue-collar women workers. They constitute 34.8% of all industrial workers (5). This group is even more numerous in clothing and textile industries. According to physiological criteria the work at these posts is of the dynamic and static types. The choice of subjects was based on the type of physical load, the investigated population included workers performing tasks involving different exertion.

The study involved 255 women workers of knitting departments of two different factories and those employed at assembly lines making alarm-clocks and recorders. In the first two factories the subjects were 94 knitters and 44 quality control workers. Here they were regarded as one population. The investigated population of assembly workers (117 persons) did not constitute a complete sample, it is a 75% representation of female staff at chosen posts.

Table 1 presents the main characteristics of the investigated populations. Both groups include mostly young women, the mean age of knitters and quality controllers is 32.3 years, but 25 years old are most prevalent. Only 15% are above 45. The mean age of assembly workers is one year younger, but nearly 50% of subjects are in the 26–35 year age range. Knitters and quality controllers are more stable in their work: their mean period of employment in the present occupation is 9 years, and their total employment period 12.5 years. This is longer than in the case of assembly workers, who have been working in their present occupation for 6 years on average and having a total employment period of 11.5 years.

The assessment of chronic fatigue was based on questionnaire (Platonow test) modifications introduced at the Psychology Department of Brno (9). This questionnaire has already been successfully applied in other studies in Poland (11). According to this method, fatigue can be described by 6 parameters concerning the following symptoms: 1. ability of compensation for decreased work capacity, 2. emotional change, 3. sleep disturbances, 4. attention and memory disturbances, 5. somatic disorders, 6. general evaluation of fatigue (total index of the above 5 groups of symptoms). Each group of symptoms was evaluated on the basis of 3 questions with a five-point scale – 0 to 4. Thus the maximum score for one group is 12 and for the total evaluation 60.

The factors determining the level of chronic fatigue were assessed on the basis of variables concerning:

1. physical and psychological workload,
2. social (organizational) climate at work,
3. demographic situation and family status.

These groups included 30 variables. They were all studied with subjective methods, similarly as the level of fatigue itself. Work load was evaluated with the use of scales involving five different parameters of workload: 1. mental load, 2. work monotony, 3. interpersonal conflicts, 4. time pressure, and 5. physical workload. A separate scale was applied for each of these measures. The scales were of the Thurstone type (1). The points of these scales are the descriptions of eight occupational tasks (in the case of the 1–4 scale) and of nine everyday tasks (in the case of the physical load scale). The investigator knows the magnitude of load ascribed to these tasks from the earlier evaluation performed by arbitrators. The subjects compare their work with these descriptions which serve as standards. The



Table 1. Characteristics of investigated groups of subjects including age and employment period

a) Age

Occupation	below 25		26–35 years		36–45 years		above 45		N	x
	N	%	N	%	N	%	N	%		
Knitters and quality controllers	46	33.3	40	29.0	31	22.5	21	15.2	138	32.3
Assembly workers	31	26.5	55	47.0	24	20.5	7	6.0	117	31.1

b) Period of employment in present occupation

Occupation	less than 5 years		6–10 years		more than 10 years		N	%
	N	%	N	%	N	%		
Knitters and quality controllers	48	34.8	54	39.1	36	26.1	138	8.9
Assembly workers	60	58.1	24	20.5	25	21.4	117	6.0

c) Total period of employment

Occupation	less than 10 years		11–20 years		more than 20 years		N	%
	N	%	N	%	N	%		
Knitters and quality controllers	71	51.4	39	28.3	28	20.3	138	12.4
Assembly workers	57	48.7	49	41.9	11	9.4	117	11.6

detailed description of these scales, the methods of calculation of results, and psychometric properties were described elsewhere (2, 6).

The social (organizational) climate of work was assessed with a 55 question questionnaire. Questions concerned: 1. organization of work at subject's workplace, 2. organization of work of the working team, 3. personal relations and cooperation of the subject with her team, 4. the nature of personal relations and the range of cooperation within the team, 5. the subject's self-demands as to the quantity and quality of performance and to the responsibility for the work process, 6. behaviour standards and demands for team work performance, 7. the nature of relations and the degree of cooperation of the subject with her direct superior, 8. the nature of inferiority-superiority relations of the working team with superiors, 9. emotional atmosphere within the team, 10. work satisfaction within the team, factory and profession. There were several questions for each of the above problems, each of them with a 5-point scale. Mean value was used as an indicator for subjective evaluation of every organizational climate dimension.

Information on family-home environment was based on a questionnaire. This can be nearly completely described objectively, e.g. number and age of children, time devoted to house work, time for rest. Subjective evaluation concerned emotions

associated with intra-family relations. The statements then received scores in accordance with earlier assumptions. This enabled researches to evaluate the subjects as having a lower (lower score) or higher (higher score) non-occupational workload. The home situation was characterized by 13 variables divided into three groups concerning living conditions, time budget and emotional atmosphere within the family. This group of variables included also those describing the subject's health.

RESULTS

The results of the assessment of chronic fatigue are presented in Table 2. Its total evaluation was in the 22–23 points range, for a 60 point scale. It seems that this score is not very high for a population, but still it is somewhat increased. This level was increased above 30 points in 12% of knitters and 18% of assembly workers.

Taking into account the groups of symptoms contributing to the general assessment, the highest score, in both groups of workers, was given to somatic disorders, such as headaches, heart problems and gastric complaints. The scores were higher than the average level (i.e. 6 points) in about 40% of knitters and 34% of assembly workers.

The evaluation of the effect of factors associated with workload, social climate of work and family situation on this kind of fatigue was performed with the use of multiple regression and multiple correlation analyses. Statistical analysis of results was carried out by applying Odra 1304 software.

Table 3 presents multiple correlation coefficients (R) of the full set of the occupational and non-occupational factors with chronic fatigue and multiple determination coefficients ($100 R^2$). The multiple correlation indices demonstrate that the influence of controlled variables is very high. Multiple determination coefficients demonstrate that these variables determine more than 80% of total variance of chronic fatigue.

Table 4 presents the statistically significant ($p \leq 0.05$) partial regression coefficients (unstandardized). As we can see, beside positive coefficients there are many negative ones. It means that the studied variables have got an anisotropic influence on fatigue. All the independent variables were chosen so that each of them can be a potential source of a load for the subject: the higher values of the variables mean higher load or a more difficult situation and should be connected with the higher level of fatigue. However, such a situation did not always take place.

The factor which always positively correlated with fatigue is emotional tension, following from difficult personal situations (Table 4c). A higher level of emotional tension always accompanies a higher level of fatigue both in the case of its general estimation and its different symptoms. This variable has got the same direction of influence in the case of knitters and quality controllers' fatigue as in the case of assembly workers' fatigue. Regression coefficients are also noteworthy, their values are compared with others, the highest. Hence, the increase of emotional tension will be a source of greater fatigue than the increase of a level on the scale of other variables.

On the grounds of results shown in Table 4, we can distinguish a few variables which influence fatigue in the same way as the above mentioned emotional tension. These are the following: personal relations of the subject with the team,





Table 2. Assessment of chronic fatigue

Intervals	Knitters and quality controllers N = 138										Assembly workers N = 117									
	0-3		4-6		7-9		10-12		x		0-3		4-6		7-9		10-12		x	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Groups of fatigue symptoms																				
Decreased efficiency	51	37.0	55	39.8	25	18.1	7	5.1	4.7	41	35.0	47	40.2	21	17.9	8	6.9	4.8		
Emotional disturbances	53	38.4	60	43.5	22	15.9	3	2.2	4.6	40	34.2	48	41.0	27	23.0	2	1.7	4.8		
Sleep disturbances	60	43.5	56	40.6	21	15.2	1	0.7	4.1	57	48.7	39	33.3	17	14.5	4	3.5	4.2		
Attention and memory disorders	84	60.8	41	29.7	12	8.7	1	0.7	3.3	64	54.7	39	33.3	12	10.2	2	1.8	3.6		
Somatic changes	27	19.6	56	40.6	44	31.8	11	8.0	5.8	21	17.9	56	48.7	34	29.0	6	5.2	5.6		
Intervals	≥ 15		16-30		31-45		46-60		x	≥ 15		16-30		31-45		46-60		x		
Total score	24	17.4	97	70.3	16	11.6	1	0.7	22.4	24	20.5	72	61.5	19	16.2	2	1.8	22.9		

Table 3. Multiple correlation coefficients (R) of a full set of variables associated with occupational and demographic-family factors with chronic fatigue and multiple determination coefficients (100 R²)

Groups of fatigue symptoms	Knitters and			
	quality controllers		Assembly workers	
	R	100 R ₂	R	100 R ²
Decreased efficiency	0.904	81.7	0.845	80.1
Emotional disturbances	0.936	87.6	0.950	90.2
Sleep disturbances	0.925	85.6	0.908	82.4
Attention and memory disorders	0.895	80.1	0.906	82.1
Somatic changes	0.954	91.0	0.949	90.1
Total score	0.965	93.1	0.966	93.3

relations of the subject with her direct superior (Table 4b), the extent of support from other family members in house work (Table 4c) and also variables determining the health status of subjects (Table 4c).

Some of the variables appeared to be the factors which can increase fatigue only in the one group of women. In women employed in knitting departments chronic fatigue is caused also by the following factors: the magnitude of perceived physical load at work (Table 4a), bad organization of team work and demands concerning standards and methods of work performance (Table 4b). In the case of assembly workers chronic fatigue was found to be the effect of high demands on a team concerning standards and methods of work performance, bad relations of a team with their direct superior, and emotional atmosphere and bad interpersonal relations within a team (Table 4b). A long period of employment was also found to be a negative factor (Table 4c).

Among the results presented in Tables 4a, b and c as was already mentioned, quite many of the multiple regression coefficients bear the “-” mark. Therefore, it seems that there are also such variables that are correlated with a decreased level of fatigue. However, these variables usually have a mixed direction of effect: different for the investigated populations and different for tested groups of fatigue symptoms. Most often the period of time devoted to travelling to work and low standard of accommodation (Table 4c) seem to be positive factors.

DISCUSSION

The results obtained in this study demonstrate that intense chronic fatigue is not very common in women workers. A substantial increase in the level of fatigue was found only in a dozen or so percent of subjects (its evaluation was higher than 30 points). A negative opinion on the occurrence of chronic fatigue is most probably based on relatively frequent evidence of one group of chronic fatigue symptoms, i.e. somatic disorders. It should be noted however that the investigated populations of women were relatively young. Women below 25 constitute about 30% of subjects, and those above 45 numbered only a few. These were generally young workers employed at relatively new and modern factories. Most results would probably be different if the subjects were older, with longer employment periods and working in much worse conditions.



Table 4. The results of multiple regression analysis applied for chronic fatigue testing (regression coefficients -- unstandardized)

a) The influence of workload on fatigue

Parameters of independent variables	Groups of fatigue symptoms						Knitters and quality controllers						Assembly workers					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Mental load			-0.01	0.01	0.03				-0.01						-0.01			
Monotony			-0.02		-0.01	-0.04	-0.3						-0.01			0.01		
Conflicts					0.02			-0.02					0.02					
Time pressure		-0.01			-0.02													
Physical load		0.01	0.02	0.02	0.02	0.07			-0.02	-0.01		-0.06						

1 -- decreased efficiency; 2 -- emotional disturbances; 3 -- sleep disturbances; 4 -- attention and memory disorders; 5 -- somatic changes; 6 -- total score

b) Organizational climate of work

Parameters of independent variables	Groups of fatigue symptoms						Knitters and quality controllers						Assembly workers					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Organization of work	I. 0.18		0.09	0.06	-0.16								0.18					
Personal relations	G. 0.03			0.06	0.13	0.27							0.51					0.10
Demands as to the methods of work	I. 0.06	0.06	0.09		-0.05	0.15	0.08	0.06					0.08	0.06				
Relations with direct superior	I. 0.13		0.07	0.05	0.11	0.25	-0.10	-0.12	-0.13	-0.06			0.05	0.05	0.11			-0.47
Emotional atmosphere	G. -0.10	-0.16	-0.07	-0.06	-0.06	-0.19							0.03			0.06		0.22
Satisfaction with work		0.11	-0.07	0.06	-0.07	0.14	-0.06	-0.04	0.04	0.10	0.04	0.06	0.04	0.11	0.04	0.10	0.25	

Explanations: I. - individual; G. - group

c) Extra-work situation

Parameters of independent variables	Groups of fatigue symptoms						Knitters and quality controllers						Assembly workers					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Family situation	0.09						0.11						-0.13					
Neighbourhood		-0.47	-0.85		-0.52					1.51								
Home appliances	-0.11						-0.17											
Mechanical home equipment				-0.21														
Number of persons in one flat			-0.47															
Time for travel to work			-0.03	-0.04		-0.14	-0.07						-0.04	-0.08	0.03			-0.12
Time devoted to house work daily	-0.32		-0.24		0.65								0.30	-0.20				
Resting time	-0.27		-0.25		0.32								-0.14	-0.29	-0.36	-0.30		-1.29
Help from family members	0.65				0.42	1.45							0.97					
Nature of emotional relations in a family		-0.26		-0.28			-0.74									0.28		
Emotional tensions	0.65		0.55	1.23	0.68	2.61							0.99	0.84		0.53		2.68
Subjective evaluation of health	0.46	0.43		0.42	0.91	2.26	0.84						0.38	0.58		0.64	1.36	3.77
Age	-0.08		0.07		0.06													
Period of employment			-0.07			-0.09							0.05	0.05		0.06		

It was also found that according to subjective evaluation, the magnitude of various loads encountered both at work and at home is not always associated with an increased level of chronic fatigue. Such factors as bad living conditions, poorly equipped homes, and long distances from home to work, which are regarded as negative do not actually have an absolutely negative significance. One thus cannot always predict with certainty the consequences of objective loads and burdens.

Emotional tensions associated with personal problems were always found to be a negative factor in the production of chronic fatigue, in both populations tested. The level of this factor's influence is also quite high. This result is in accordance with early studies on chronic fatigue, dating from World War II. This kind of fatigue was then associated with emotional stress (9). This result is additionally supported by the quite frequently observed effect of variables associated with the organizational climate of work, which in turn is related to emotional tensions.

It is worthy of notice that some variables (especially occupational factors) had a different impact on women's fatigue in two examined groups. One of them is physical workload. In the case of knitters and quality controllers physical workload seems to be a negative factor namely it increases the level of fatigue (regression coefficient with mark "-"). In the case of assembly workers the same variable has got a positive influence since it reduces the level of fatigue. It should be remembered that physical workload measurement was based on a subjective and global evaluation of physical effort during work. Evaluation of workload does not differentiate types of effort (6). This one, however was different for two examined groups of women workers. In the case of assembly workers static effort was a main source of fatigue, while among knitters more important was heaviness of work; energy cost. The type of effort could be a factor which was a source of differences between the groups in the impact of physical workload.

Similarly was the influence of physical workload on women's fatigue which was evaluated for a working day. The physical workload of knitters and quality controllers was connected with the frequency of submitted symptoms of physical fatigue and also the intensity of physical symptoms of fatigue. The physical workload of assembly workers was first of all associated with an increased frequency of weariness and drowsiness (7). Thus, the differentiation of the influence of physical workload on women's fatigue in two examined groups is consequent. This difference can result from various kinds of effort during work, but also various situations (10). This clear difference between these two groups of women appears especially in the time budget. Assembly workers had got more time only for themselves and larger possibilities of resting which protected them against fatigue accumulation.

The same tendency occurs in the case of some organizational (social) climate factors – especially the emotional atmosphere at the workplace. A bad emotional atmosphere was a factor connected with a lower fatigue level both in the work day and chronic fatigue of knitters and quality controllers. Conversely, among assembly workers – the worse the emotional atmosphere the higher the level of fatigue. So, the direction of influence of various organizational climate factors can differ in the two examined groups of workers because of differences in work organization (4).

The work of the women which are employed in the knitting department does not impose cooperation and interdependence upon persons who belong to a master team, workers are paid for individual jobs. The work of assembly workers, conversely is a team-work (a team is a crew at an assembly belt) and paid per job



for the whole team. Such a situation means that members of the crew show different approach to their work. When one of the workers does not do her part, the other workers must work faster or wait for her. This situation provokes tensions and dissatisfaction. The emotional atmosphere in assembly workers' crews was worse than in the first group. The lack of good cooperation of assembly workers can be a factor which increases women's fatigue. The fatal atmosphere in knitters and quality controllers' crews gives a possibility of individual isolation from the group. It can however be a positive factor which makes for better organization of one's own work. It also can help in the better concentration of attention only on one's place of work.

The values of significant regression coefficients were quite differentiated, those associated with workload measures were the lowest, while those associated with family and home situation were the highest. This demonstrates the level of influence of particular variables in the process of production of chronic fatigue. The presented regression coefficients were not standardized, but they can be compared in view of similar ranges of scales used for evaluation of variables.

ACKNOWLEDGEMENTS

This work has been carried out within the framework of CPBR Project no. 11.11. "Occupational Medicine".

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Received for publication: February 20, 1991

Accepted for publication: October 6, 1992