

The Effects of Ergonomic Stress on Fitness for Work

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Abstract

Background: Occupational ergonomic stress may have effects on physical condition and caused disease. Fitness for work of disorders and diseases are important subject in this situation. Objective of this study was to determine the effects of ergonomic stress on fitness for work of physical diseases.

Methods: It was a study. The people who were employed in different industries were participated in this study. Groups were followed for physical diseases. These groups were exposed to ergonomic stress; one to two risk factor(group 1), three risk factors (group 2), four or more risk factors for psychological stress (group 3). Diseases were diagnosed and fitness for work was determined. Data were analyzed with SPSS 16.ANOVA, Chi-2, Exact test and relative risks with considering $P<0.05$ as significant level.

Results: The all of the physical diseases were the most in group 3 with four or more ergonomic stress risk factors, specially for dyslipidemia the relative risk was 35.76(18.22-70.14) and for cardiovascular disorders the relative risk was 2.10(1.93-2.29). Group 1 had the lowest physical diseases.

Conclusions: Stress was a risk factor for physical diseases and must be considered in determination of fitness for work.

Keywords: Physical diseases, Fitness for work, Ergonomic stress.

Introduction

Occupational ergonomic stress may have effects on physical condition and caused disease. Fitness for work of disorders and diseases are important subject in this situation.

Diseases and disorders are prevalent in the society.(1) Some of their risk factors are in the workplace and must be prevented.(1,2)

The main etiology for many of the diseases physical and environmental factors (1). But in recent studies we showed the another etiology that was not well known (1,2). This etiology was psychological risk factor or stress. (3,4) Job and workplaces had risk factors for health and well being. (5-7) These were physical, chemical, biological, mechanical, ergonomics and psychological.(8,9)

Psychological stress had effects on human body especially on recent stress specific organs was injured such as cardiac arrest, bowel habits disturbances,

sweating well, tremors .(10) But in long time stress we had not documented disorders, some researchers studies about it and found the important results.(11-14)

Assadi and coworkers reported physical disorders related to work stress in firefighters and workers in industries. Their study showed the effects of stress on blood pressure, triglycerides, low density lipoprotein (LDL) , high density lipoprotein, hearing, cardiovascular disorders and renal diseases. Assadi SN showed the relationship between job stress and physical disorders in women reproductive system.

Kang K and coworkers studied the association between the occupational stress and physical disorders and well being of male workers.(15)

Giasvand M and coworkers showed the cardiovascular disease and its risk factors in relationship to stress of shift works (16). Some researches demonstrated the association between job stress and cardiovascular diseases and hypertension (17). There were also some studies about the dyslipidemias in workers related to psychological stress (18,19).

Padma V and coworkers showed health problems in exposure to psychological stress(20).

Researchers demonstrated the effectiveness of mental wellbeing on treatment of disorders.(21)Zhang J demonstrated the effects of stress on lipid profiles.(22) Other study worked on stress of environment that was a harmful for the human being (23). Some studies was showed the effects of job stress on metabolic syndrome and diabetes (23,24).Health programs for stress and job modifications were necessary and occupational health team could be helped the workers (25,26).

Objective of this study was to determine the effects of psychological stress on fitness for work of physical diseases.

Methods

Study Setting: different industries.

Study design and Study population: it was a study with follow up which was performed on people who were employed in different industries. The people who were employed in different industries were participated in this study. Groups were followed for physical diseases. Simple random sampling method was used with $\alpha= 0.05$, power= 80 , P1=20% and P2= 40%, the calculated study population.

These groups were exposed to psychological stress; one to two risk factor(group 1), three risk factors (group 2), four or more risk factors for psychological stress (group 3). Psychological stress was calculated with standard questionnaire and checklist. These from generic job stress questionnaire and work environment scale checklist and determined types, scores and grades.

Data was collected with physical examination and a checklist including history, determination of diseases and risk factors. According to type of risk factors exposure the study population was divided into 3 groups. Groups were followed for diseases and disorders such as: gastrointestinal disorders, skin diseases, hypertension, dyslipidemia, cardiovascular disorders, musculoskeletal disorders, respiratory disorders, allergies, renal disorders, hearing loss and disorders, blood disorders and cancers. Fitness for work of participants with diseases was determined.

The Inclusion criteria were people who worked in different industries with at least 3 years work experience in the same work. The exclusion criteria were having the related disease before beginning this job and having the positive family history.

Exposure assessment: all exposures assessed and calculated the risks. Other work exposures were kept in the standard levels. Job stress was assessed in

organizational; change, inadequate communication, interpersonal conflict, conflict with organizational goal, career development; lack of promotional opportunity new responsibilities beyond level of training, unemployment, role; role conflict, role ambiguity, inadequate resources and authority to accomplish job, task; quantitative and qualitative overload and under load, responsibility for the lives, low decision-making and workplace environmental fields. The validity and reliability of checklist were checked with specialists' opinions and also with performing a pilot study with correlation coefficient 95%. The participants were examined by author using a checklist, physical exams and clinical tests results of blood examination.

For statistical analysis, data were analyzed with SPSS 16. Chi-2, Exact test, ANOVA, P value less than 0.05 was considered for significant levels and relative risks were calculated with confidence interval 95% .

Ethical consideration; the study was implemented with the consent that was obtained from all the participants.

Results

The study participants were divided into 3 groups based on psychological stresses.

The all of the physical diseases were the most in group 3 with four or more psychological stress risk factors, specially for dyslipidemia the relative risk was 35.76(18.22-70.14) and for cardiovascular disorders the relative risk was 2.10(1.93-2.29). Group 1 had the lowest physical diseases. The age, work duration, body mass index were showed not significant differences between study groups but stress score and stress risks were showed significant and the greatest in group 3. (P<0.05) .

Participants in group 2 had the highest age, group 3 had highest work duration and body mass index (BMI) but had not significant differences.(P<0.05) These are in table1.

The highest number of persons with diseases and disorders such as: gastrointestinal disorders, skin diseases, hypertension, dyslipidemia, cardiovascular disorders, musculoskeletal disorders, respiratory disorders, allergies, renal disorders, hearing loss and disorders, blood disorders and cancers were the highest in group 3. Group 1 had the lowest number of diseases. These items are demonstrated in table 2.(P<0.05)

The relative risks for gastrointestinal disorders was 1.54(1.06-2.23) , hypertension was , dyslipidemia was 35.76(18.22-70.14) , cardiovascular disorders was 2.10(1.93-2.29) , respiratory disorders was 1.59(1.13-2.23) were the highest risks in group 3, after these, in group 2 the relative risk for cardiovascular disorders was 1.42(1.34-1.50). In group 3 the relative risks for hypertension and cardiac care unit admission was 1.41(1.33-1.48). Table 3 shows the relative risks in different groups. By using the logistic regression, these were had significant differences.

Fitness for work was determined for all of patient until end of treatment and also then if it was necessary.

Discussion

According to our findings, The all of the physical diseases were the most in group 3 with four or more psychological stress risk factors, specially for dyslipidemia the relative risk was 35.76(18.22-70.14) and for cardiovascular disorders the relative risk was 2.10(1.93-2.29). Group 1 had the lowest physical diseases.

Group 3 was known for the highest psychological stress score and risk factors and group 1 was known for the lowest one between three groups.

Other studies found the same as these and showed the special effects of psychological stress on lipid profile and cardiovascular system. (15, 16). Psychological stress had effects on different part of the body, we thought it

affected on all of them from skin disorders to causing the cancers.

It seems that psychological stresses that were emphasized on vital and non vital organ systems. These were more prominent on vitals. In this study researcher showed that group 3 had the most frequency of diseases and disorders gastrointestinal disorders, skin diseases, hypertension, dyslipidemia, cardiovascular disorders, musculoskeletal disorders, respiratory disorders, allergies, renal disorders, hearing loss and disorders, blood disorders and cancers. This group had the highest score for stress 75.02 ± 0.22 and stress risk factors 4.01 ± 0.02 . Other studies had demonstrated the effectiveness of stress on well being and health.(20-22).

The highest numbers of people with dyslipidemias were highest in group 3, it mean that there were hypertriglyceridemia, hyper cholestrolemia with hyper low density lipoprotein more than other groups. In contrast group 1 had the lowest number of these conditions and disorders in this study. The effects of stress on blood lipid profiles had been demonstrated in other researches (19,22).

After deleting the effects of work duration, age, body mass index, the risk of diseases had significant difference. The risk of diabetes, metabolic syndrome and related diseases was demonstrated in other studies too.(25,26)

Fitness for work of diseases must be done and occupational physicians with occupational health team could be consulted. Non suitable situations and risk factors must be modified.

The physician should not ignore this important item in health system. Modifying the workplace was necessary and then employee could be allowed for work.

According to the results of this research, researcher believes that job analysis must be done for all risk factors

such as: physicals, chemicals, mechanicals, biological, ergonomics and psychology by using the instruments, devices, checklists and questionnaires. In other studies were worked on determination of risk factors and modifying them if necessary.

In this study after deleting the work duration, body mass index and age effects, the risks of diseases were significant. Researchers studied about the burnout syndrome that could be a caused of hyperlipidemia among employees (19). Job stress had many items for measuring. Organizational stress was an important factor and included changing in the organization or factory, inadequate communication in the factory or institute, interpersonal conflict in system; it was between coworkers, conflict with organizational goal; it was between worker and institute, career development risks; lack of promotional opportunity new responsibilities beyond level of training; it was a harmful one, unemployment, role risks; role conflict; it was in some jobs for example head of workers or head nurses, role ambiguity, inadequate resources and authority to accomplish job, task risks; quantitative and qualitative overload and under load, responsibility for the lives, low decision-making and workplace environmental fields; it were physical ,ergonomics items. Other studies used questionnaires and checklist as the same as this study.

Author found that the psychological stress was an important risk factor for gastrointestinal disorders, hypertension, dyslipidemia, cardiovascular disorders, musculoskeletal disorders, respiratory disorders. Examination and tests in occupational medicine had a nice situation. These disorders could be prevented by periodic examinations and fitness for work examinations. One study demonstrated the effect of prevention on well being (26).

The author of this article recommended to the occupational physicians and occupational health team, must be assessed the risk factors in the workplaces specially psychological stress and tried to modified the workplaces, they should be examined personnel in periodic examinations and fitness for work. Fitness for work must be considered by physical and psychological health.

Psychological stress could be resulted from family problem and environmental exposures, occupational physicians might be paid attention to them too.

Conclusions: Stress was a risk factor for physical diseases and must be considered in determination of fitness for work.

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Legend Tables

Table 1: Means of risk factors amounts and comparison between three groups.(P<0.05)

Group Variable	Group 1 μ±SD	Group 2 μ±SD	Group 3 μ±SD	P
Age (yrs)	34.09±8.53	34.99±5.66	34.90±6.46	0.95
Work duration(yrs)	6.01±2.42	10.21±4.13	10.54±5.22	0.050
Body Mass Index (kg/m ²)	25.01±0.01	25.54±3.28	25.66±3.44	0.90
Stress Score	25.01±0.10	50.02±0.20	75.02±0.22	<0.001
Stress Risk Factors	2.01±0.01	3.02±0.01	4.01±0.02	<0.001

Table 2: Frequencies of diseases and comparison between three groups. (P<0.05)

Groups Diseases	Group 1 N (%)	Group 2 N (%)	Group 3 N (%)	P
Gastrointestinal disorders	1(0. 1)	1(0. 1)	3(0. 3)	0.04
Respiratory disorders	1(0. 1)	2(0. 2)	4(0. 4)	0.03
Skin disorders	0	1(0. 1)	2(0. 2)	0.04
Cardiovascular disorders	1(0. 1)	3(0. 3)	10(1.0)	0.01
Cardiac care unit admission	0	2(0. 2)	8(0. 8)	0.01
Hypertension	2(0. 2)	5(0. 5)	20(2. 0)	0.001
Dyslipidemia	80(8.0)	180(18.0)	320(32.0)	0.001
Musculoskeletal disorders	2(0.2)	3 (0.3)	5(0.5)	0.04
Impairment and disability	0	0	2(0.2)	0.03
Hearing disorders	1(0. 1)	2(0.2)	4(0.4)	0.03
Blood disorders	0	1(0. 1)	2(0.2)	0.04
Cancers	0	0	1(0. 1)	0.04
Renal disorders	0	2(0.2)	6(0.6)	0.03

Table 3: Relative risk of diseases between three groups. (P<0.05)

Group Diseases	Group 1 RR(CI)	Group 2 RR(CI)	Group 3 RR(CI)
Gastrointestinal disorders	1.06(0.84-1.41)	1.28(1.06-1.56)	1.54(1.06-2.23)
Respiratory disorders	1.08(0.84-1.40)	1.30(1.08-1.55)	1.59(1.13-2.23)
Skin disorders	-	1.01(0.71-1.41)	1.25(1.20-1.59)
Cardiovascular disorders	1.30(1.24-1.36)	1.42(1.34-1.50)	2.10(1.93-2.29)
Cardiac care unit admission	-	1.01(0.79-1.30)	1.41(1.33-1.48)
Hypertension	1.04(0.63-1.71)	1.23(0.84-1.80)	1.41(1.33-1.48)
Dyslipidemia	1.13(1.04-1.29)	1.77(1.49-2.09)	35.76(18.22-70.14)

Musculoskeletal disorders	1.08(0.84-1.42)	1.28(1.06-1.56)	1.59(1.13-2.23)
Impairment and disability	-	-	1.23(1.12-1.61)
Hearing disorders	1.01(0.70-1.40)	1.40(0.88-2.25)	1.25(1.21-1.68)
Blood disorders	-	1.04(0.76-1.40)	1.27(1.03-1.57)
Cancers	-	-	1.25(1.02-1.56)
Renal disorders	-	1.06(0.83-1.43)	1.28(1.06-1.55)