

## The study of physical and psychological complaints and their related factors in computer users of an oil company in Abadan

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**Abstract:** Introduction: Nowadays computers have become an integral part of life and its use for practitioners has created new risks. The purpose of this study is to investigate the physical and psychological complaints of computer users of an oil company in Abadan. **Methodology:** 199 computer users were selected randomly. The data were collected through questionnaires and they were analyzed through SPSS 19 software and descriptive statistics methods. **Findings:** The most common eye complaints include blurred vision, vertigo when viewing the monitor, tearing when working with computers, eye irritation, dryness in eye and ophthalmic pain. The most frequent psychosocial complaints include, headache after using computer, failure to reduce the use of computer, sleep disorders resulting from using computer. The most common musculoskeletal complaints respectively include pain in shoulder, arm, wrist, neck, knee, fingers and waist. 51.3% of employees were working in unsuitable condition and 48.7% were working in suitable circumstances. **Results:** the results of this research indicate high rates of complications faced by computer users and the effects of non-ergonomic factors of the environment on the incidence of complaints and necessity of improving ergonomic workplaces.

[Afra A, Abedi HA, Ghodousi A, Farhadi S, Hojjati H. **The study of physical and psychological complaints and their related factors in computer users of an oil company in Abadan.** *Life Sci J* 2013;10(2s):132-138] (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 22

**Keywords:** computer, ergonomics, ophthalmic symptoms, psychosocial symptoms, musculoskeletal symptoms

### Introduction

The advent of computers has created a revolution in modern societies such that some have known its importance far more than the Industrial Revolution (1). Although the arrival of computer technology to developing countries accelerates the work and saves time, energy and resources, due to lack of attention to physical, mental and social properties of users, it has significant adverse effects on human, quantity and quality of work system efficiency(2). Today, computers are an integral part of work environments, especially administrative work. So making appropriate use of this device is very important for employees' health.(3) Mismatch and incongruity between the external environment and mental and physical abilities and characteristics of employees causes complications which will bring damage to many aspects of life such as undesirable condition of health and safety, low *productivity levels* and finally low efficiency (4).

Work is an important part of one's life(5). Presence in working environment and devoting a significant portion of time each day to working and

employment concerns and preoccupation has caused people to devote a great deal of time to work activities optionally and voluntarily without rest and recreation or being with family and friends. Thus, they undergo a lot of stress and their job causes physical and mental problems for them (6). The common consequences of job addiction are high levels of job stress and work- family conflict (7).

By the growing and widespread availability of the Internet, we have noticed a new kind of addiction, addiction to the Internet, which is a growing problem in the age of information (8). The internet in itself is a harmless tool, but overusing and abusing it will lead to the risk of internet addiction, which has created a major problem for mental health (9). The number of patients admitted to ophthalmology clinics, lamenting the irritation of eyes when working with computers is increasing (10). One of the most common physical complaints of computer users is related to vision problems. Some studies have shown that up to 40 percent of computer users every day exhibit eye strain symptoms (11). Several studies have also shown that about 75 percent

of computer users experience visual problems(12, 13). Computer vision syndrome is a collection of symptoms that occurs when working with computers, the most important of which are: eye pain, itching and redness of the eye, dryness in eye, blurred vision, double vision, headache and other related symptoms such as pain in neck, backache, and spine pain. Eye fatigue includes extensive symptoms such as headache, aversion to proceeding, eye pain etc. (14). When ocular symptoms are associated with video terminals and displays, symptoms of computer vision syndrome and eye fatigue symptoms largely overlap with each other (15). The risk of musculoskeletal disorders in computer users is high compared to other businesses (16). Harmful factors of workplaces varies depending on the nature of jobs and work processes and what is important in workstations working with visual display terminals is factors associated with body position while working (ergonomic factors) (17). The main goal of ergonomics is health and safety of all people in workplaces (2). Failure to observe ergonomic principles may result in several diseases (18). This study is conducted with the purpose of assessing the work environment with computers and computer-related disorders among computer users of an oil company in Abadan.

### Methodology

In this correlational study, 199 computer users in an Abadan oil company were randomly selected. Entry criteria for this study included: Using computer continuously for at least 6 months, at least 1 hour a day and age less than 60 years old. Exclusion criteria for individuals included unwilling to continue, a history of physical and mental illness. Researcher-made questionnaire of demographic characteristics, psychosocial, effects, ocular complications, musculoskeletal disorders, and the standardized list of assessing workplace with computers for data collection were used. In order to validate the data collection tool, content validation method was used. Thus, after the study of literature and consulting supervisor and advisor, collection instruments were adjusted and content was reviewed and evaluated by a number of faculty members of Khorasgan Islamic Azad University in order to examine the adequacy of questionnaire used for assessing the targets. After collecting opinions, corrections and changes in questionnaires were applied. Demographic questionnaire included questions about age, sex, height, weight, date of birth, level of education, profession, occupation, length of time working with computers, computer experience, working hours per week, working hours per week with computer, job rotation and the rate of rest. A list for assessing workplaces with computers included 31

questions related to standard working conditions, chairs, keyboards, input devices, monitor, work areas, and accessories for computers, which were completed by the researcher and the users according to each user's working conditions and it was concluded based on the criteria of OSHA (Occupational Safety and Health Administration). Questions were answered by "Yes" or "No" or "it is irrelevant". If the answer to the question was "Yes", it was rated "1", meaning that the point of the question was present. If the answer was negative it was rated zero and if the question was irrelevant (non-functional requirements) it would be ignored. Questionnaire of psychosocial effects resulting from using computers, included questions related to family and friend complaints of the rate of using computers, unsuccessful efforts to reduce use of computers, sleep disorders after using computers, feelings of confusion without a computer, staying away from gathering to work with computers, preference to work with a computer instead of dealing with important issues, headache after using computers. To determine psychosocial effects, score of 0 to 7 was defined as without complaint, 8 to 17 as slight symptoms, 18 to 27 as mild complications and above 27 as severe symptoms. Visual complaints questionnaire included questions on the use of computer per week, experience with computers, presence and severity of ocular symptoms such as a feeling of pressure around the eyes, feeling of dryness and burning eyes, feeling of heavy eyelids, tearing, vertigo and headaches while working with monitors, diplopia and blurred vision, replacing words or lines, near and far vision problems, need to massage the eyes, eye pain and drowsiness. The musculoskeletal disorders questionnaire included a form to report musculoskeletal pain in different body areas in the past 12 months and 15 questionnaires were related to musculoskeletal disorders in 15 separate musculoskeletal areas including neck, shoulder, shoulders, arms, elbows, forearms, wrists, fingers, hands, waist, buttocks, thighs, knees, legs, ankles and toes. Each questionnaire consisted of seven questions and each person completed it according to the pain report in the initial form. Data were analyzed through SPSS version 19 statistical software and chi-square test.

### Findings

The study sample consisted of 199 patients eligible for the study, including 78 women (1/39%) and 121 men (8/60%). Most of the individuals were between the ages of 31 and 40 (36.6%). The maximum amount of experience with computer, was more than 8 years (28/1%) and the maximum hours of work with computers was between 21 and 40 hours (51.3%) per week. Investigation of rest times

indicated that 41% of users with the highest frequency were taking break once a day. 69/8% of users did not reportsimilarjobs and the survey of job rotation indicated that 56.3% of users did rotate their job. Among the participants in this study, BMI was in the normal range, with the highest frequency of 45/6 percent. In terms of education, 17/4% of participants had diploma, 19/8 percent, credit, 50/4% BA degree and 12/4 percent had MA. According to the assessment of working conditions at the workstation, 29/2% of participants in research were working in suitable conditions and 70/8% of them were in poor working conditions. Throughout the review of working conditions the following issues were considered: to keep head and neck straight, and avoid bending them forward or back ward, to prevent rotation of the head and neck to the side, to keep the upper part of body perpendicular to the ground, to keep arms perpendicular to and shoulders parallel with the ground, to hold hands and wrists straight in one direction, to hold thighs parallel with the ground, to use footrest, and labor and rest period. Assessing sedentary job including filling lumbar by chair, suitability of surface of seat, lowpressurebehind theknees,sufficient curvature of the edges of the seat, fulcrum of elbow indicated that 48/2percentof the participants in the research were working in appropriate conditions and 51/8 percent had poor working conditions. According to evaluation of conditions ofusingkeyboards andinput devices, 95% of participants were working in suitable conditions and 5% were working in poorly designed circumstances. In this section, suitable size of desk to put all the devices on it, placing the mouse on the right side of the keyboard and its availability, the size of keyboard and not putting the hand or wrist on its sharp edge were considered. Assessment of workplace indicated that it is designedin such a waythat 18/6% of participants were workingin appropriate conditionsand81/4percentinpoor working conditions. Assessment of workplace with monitors included the following issues: monitor being placed in a horizontal position proportion to user's position, distance from the user's monitor, non-rotation of head and neck to use computer, lack of reflection on the monitor. In evaluating accessories the following issues were mentioned: the existence of paper rack, measure, distance and height of paper rack, use of ankle fulcrum and how to place phone on the desk and resultsshowed that24/6% of the participants were using the accessories in appropriate conditions and 75/4 percent were using the min in appropriate conditions. Moreover, the evaluation of the issues such as the existence of enough space for thighs between the seat and computer desk, enough space to put feet under the desk, being suitably near the

keyboard indicated that the workplace has been designed in such a way that 72/3% of participants in the study were working in suitable condition and 27/6% were working in inappropriate condition. In general survey, the adjustability of required equipment and lack of technical defect was evaluated and results showed that 52/8% of the devices were safe and customizable and 47/2% were not in this way. Table (1) displays absolute and relative frequency of samples based on ergonomic assessment of workplaces with computers. According to findings of psychosocial study, computer usersanswering thequestion, "Is there any time when you have todeal withimportant issues but instead you prefertobe entertained by computer?" with the frequency of31/7percent, those answering "Doyou have triedbutfailedto reduce thetime usingyourcomputer?" with the frequency of 30/7percent, and those answering "Do you have sleep disorders due to using computer late at night?" with the frequency of 29/1% had the most complaint. Table (2) represents absolute and relative frequency of samples in terms of psychosocial complications. After examining the relationship between demographic and psychosocial complications it was revealed that there exists statistically significant relationship between these complications and hours of work, hours of workwithcomputers, rest andeducation. In surveying ophthalmic complaints, depending on the severity of each symptom it was scored from 1 to 10. The most common eye complaint was related to blurred vision which covers 44/2% of users. About 41/7% of users complained of vertigowhenlooking at themonitor, 38/7% of tearing, 38/2 % of eye irritation, and 38/2percentcomplainedof feelingdry eye, which were the main complaints of users. There was a statisticallysignificant relationship between eye complaints and age, hours of work with computer (table 3), ergonomic workingconditions, chairs and monitors (table 6). The prevalence of musculoskeletal disorders among the study participants was reported respectively with the highest frequency in shoulder regions (53/8 percent), arms (52/3 percent), wrists (46/2 percent), neck (44/2 percent), knee (39/7 percent), fingers (36/5%) and back (35/7 percent). Table 6 shows the relationship between musculoskeletal disorders and ergonomics.

## Results and Discussion

Complaints related to problems caused by bad manners and body position when working also problems in the musculoskeletal and visual systems have so far been the most complaints among computerservicestaff. Most physical problems people are suffering from are due to improper design of workplace and poor compliance (and in many cases

non-compliance) of work devices with the physical characteristics of individuals (19). The results of research on ergonomic situation indicated that 48/7% of participants are working in good condition and 51/3 percent of them are working in poor condition. The study conducted by Rasoul Zadeh et al (2) showed that 77% of posts were working in unacceptable situations and almost none of those participating in the study had acceptable postures and they had all occupational potential for growing musculoskeletal disorders. Heidari and Raiei Imam's study (20) indicated that in 65% of cases, anthropometric dimensions were not congruent with specifications of equipment and furniture and the recommended values were not considered. In the study of Chubine et al, the ergonomic assessment of workplace revealed that the first priority was corrective actions for more than half of the employees (53/3 percent) and corrective actions must be performed soon as possible for them (21). In our study, the highest rates of poor conditions is related to monitors, accessories, and ergonomics of workplace, which is due to inappropriate desk height, the location of the monitor, inappropriate distance between monitor and user, lack of space for feet under the desk, inappropriate location of telephone and other office supplies on the table, inappropriate location of monitor in proportion to windows, the position of the mouse and paper rack. Most of the users with the frequency of 51/8% were moderately suffering from psychosocial complication due to working with computer and it can be concluded that there is the problem of computer and Internet addiction among employees. Complaining about failed attempt to reduce the time of using computers, headache and insomnia as a result of using computers can also be due to working overtime, taking responsibilities more than capacity, tiredness, and too many eye movements. Similarly, in somnia can be caused by the effect of magnetic fields on melatonin secretion and the result in impact on sleep cycle. The study of Labbafinejad et al (22) showed that employees who work every day with VTD longer than others are more prone to sleep disorders such as waking up early, restless sleep and problems during sleep, especially difficulty in sleeping, staying awake at night and being sleepy during the day. Askari and Nouri (23) in their study reached the conclusion that job addiction can increase anxiety, depression, physical symptoms and generally can decrease general health. Our study results showed that the rate of working hours, hours of work with computers, rest, and education has effect on psychosocial complications. The study of Nastizayi (24) revealed that the general health of those users who are addicted to internet is at greater

risk than those who are not. But addicted and regular users of the Internet are located physically in the same situation and impairment of social functioning in both groups was not significantly different. Young (25) in a study conducted on internet addiction, concluded that people with higher socioeconomic status, and those with higher education, are more prone to internet addiction disorder. In the other study (26) he examined 496 cases of Internet users and indicated that 80 percent of respondents who were addicted to the Internet, spent 38 hours per week of their time on the Internet for non-working affairs. This is important in terms of management. That is in a 40-hour work week, Internet addict works just 2 hours a day and during the week 95 percent of his/her time and resources is spent on his/her severe addiction to the internet and computer.

In this study, most ophthalmic complaints included blurred vision, dizziness when looking at the screen, tearing, burning eyes, and dry eyes. Dehghani et al (27) reported that the most common ophthalmic symptoms were related to eye irritation and tearing with 79 percent, dryness in the eyes with 66 percent, and tiredness in eyes when working with computers with 64/8 percent. Mvskhvset al (28) in their study concluded that the prevalence of dry eye with 65/5% is the most common complaint among computer users. In the study of Bysvas et al (29) it is reported that the rate of dry eye in the user group was 68/5% and in control group it was 47/7%. The results of this research also showed that there is a statistically significant relationship between symptoms of eye and age and hours of work. In the study of Manavyat et al (30) the time when users were using computer during the day was significantly correlated with visual complaints, but age and gender were not significantly related to ophthalmic complaints. The study of Samavati et al (10) revealed that the rate of daily work with computer and increase in annual working time with computers has effect on increasing computer eye syndrome, which is statistically significant. Furthermore, in our study, there was a statistically significant relationship between visual complaints and ergonomic working conditions, chair and monitor. In the study of Manaviat et al (30) the position of computer such as inappropriate distance between monitor and eye, visibility alignment, improper placement of the light source relative to the monitor had a significant correlation with the severity of ocular symptoms. According to the Occupational Safety and Health America (31) in a study, ten to fifteen percent of patients who were referred for routine examination of the eyes complained of headache and eye fatigue caused by working with computer and workplace conditions such as ambient lighting, monitor quality and suitability of user seats

were involved increasing or reducing these symptoms. In the present study the relation between eye symptoms and ergonomic working conditions, chair and monitor may be due to unsuitable chairs, improper use of suitable chairs, unsuitable distance between monitor and user, improper lighting condition, improper placement of the light source relative to the monitor, light reflection, undiagnosed reflective errors. Musculoskeletal problems directly impose significant economic costs on the health system and indirectly they can even be considered as the main factor in reducing output of work (32). In this study the most prevalent disorders were observed in areas of scapula, arm, shoulder, wrist, neck, knees, fingers and back. The results also showed that 24/3 percent of workers under investigation were referred to doctor due to musculoskeletal problems and users were taking a rest usually due to shoulder and knee problems. This shows that, as the working place is improved and corrective actions are performed, attention to factor risks of these areas is important. The results of this study and that of Choobineh et al (21) are in agreement, which stated that in waist, neck, shoulders, back, knees and wrists were the most prevalent symptoms among office workers. The study of Klasman et al (33) showed an annual incidence of symptoms in computer users, respectively, in neck, shoulder, wrist and elbow/forearm. Karan and Maki (34) indicated that the maximum complaints of pain are related to neck, scapula, shoulders, wrists and waist, and there are minimal complaints related to the areas of the elbow, for arm and fingers. In this study the examination of the relationship between musculoskeletal symptoms and demographic characteristics revealed that pain in arms, elbows, fingers and ankles significantly connected with hours of working with computers, pain in neck with education and time of working with computers, pain in fingers with rest, pain in back with hours of working with computers and age. Ranasing et al (35) in their study indicated that rest and variety of work were identified as effective factors which had impact on psychosocial disorders. In a study done by Eltayb et al (36) rest time and

duration of work were among the effective factors which had influence on prevalence of musculoskeletal symptoms. In study of Bastani and Lahmy (37) factors which were associated with prevalence of musculoskeletal disorders were: the history of musculoskeletal disease prior to working with computer, years of employment, lack of alternation in type of work, individual behavior and improper posture while working. In the study of A'lam Alhodayi (38) factors such as age, work experience and education were associated with the extent of injury. In the study of the relationship between musculoskeletal symptoms and ergonomics, a statistically significant relation was observed between pain in neck and status of chair and monitor, between pain in wrist and feet and work surface, between pain in finger and working condition and surface of environment, between pain in back and seat position. Ortiz Hernandez and colleagues (39) in their study stated that using mouse, prolonged sitting at work, improper physical position are risk factors which increase the incidence of musculoskeletal disorders. In the study of Ranasyng et al (35) improper design of workplace, the position of computer, bad posture and non-standard workplace have been identified as factors which have effect on musculoskeletal disorders. Altayeb et al (36) indicated that workplace equipment, computer position, posture of head and neck, and improper body gesture during work have effect on the incidence of symptoms. The study of Klasman et al (33) demonstrated that the most important features in workplaces which have influence on musculoskeletal symptoms are work table height (93 percent) and lack of reflection of screen (60 percent). The major ergonomic problems in this research are unsuitable posture and inappropriate design of monitor and accessories position. Thus, to improve working conditions and user safety, performing ergonomic intervention programs in workplaces and training users in ergonomic principles when working with computers can play a role in preventing and reducing the incidence of complications.

Table (1) frequency and relative frequency of samples in terms of ergonomics

Inappropriate		Appropriate		Indices
relative frequency	Frequency	relative frequency	Frequency	
70.8	141	29.2	58	Evaluation Conditions
51.8	103	48.2	96	Evaluation Work sitting-chair
5	10	95	189	Evaluation and keyboard input devices
81.4	162	18.6	37	Evaluation Monitor
75.4	150	24.6	49	Evaluation accessories
27.6	55	72.4	144	Evaluation Level work
47.2	94	52.8	105	Evaluation General

Table (2) frequency and relative frequency of samples In terms of psychosocial complications

relative frequency	Frequency	Statistical Indicators
8.5	17	No complaints
36.2	72	Mild side effects
51.8	103	Moderate effects
3.5	7	Severe effects

Tables (3) related to the physical and psychosocial effects of ergonomics

Musculoskeletal pain		Psychosocial effects		Eye complaints		Complications Ergonomics
P	$\chi^2$	P	$\chi^2$	P	$\chi^2$	
0.035	9.845	0.52	8.57	0.00	144.8	Working conditions
		0	6	1	3	
0.046	8.347	0.06	7.18	0.03	8.514	Chair
		6	1	7		
0.650	1.643	0.49	2.37	0.53	2.183	Keyboard
		9	1	5		
0.146	5.378	0.71	1.36	0.02	9.866	Monitor
		4	2	5		
0.227	4.340	0.03	2.26	0.16	5.067	Workplace
		5	0	7		

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1/8/2013