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Original

The Prevalence of Chronic Fatigue Syndrome in Radiotherapists

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Abstract

Background: Ionizing radiation is one of the hazardous agents in the work place. It can cause serious and irreversible damage to the people exposed to it. Working in such environments can also causes chronic fatigue syndrome (CFS). The aim of this study was to investigate the prevalence of CFS in radiotherapists. **Methods:** This study selected all men and women exposed to X-ray as the exposed group and nurses working in the same hospital as the control group. The sample size was considered of 46 radiotherapists and 46 nurses. Data on demographic characteristics and chronic fatigue syndrome were collected by the questionnaire. **Results:** The mean CFS score in all participants was 10.64±4.77. About 17.39% of them had fatigue syndrome. There was no significant difference between two groups in terms of fatigue syndrome (p=0.47). radiotherapists with more than 20 image taking per day had higher mean CFS; however, this relationship was not statistically significant (P>0.05). **Conclusion:** Chronic fatigue is multifactorial phenomenon in health care personnel. Workload is more important factor in development of chronic fatigue in radiotherapists.

Keywords: Chronic Fatigue Syndrome; Radiotherapists; Nurses; Occupational Exposure

Introduction

Since creation, human has been exposed to the ionizing and non-ionizing radiation. By the development of science and technology in the medical field, energy production, industrial field, educational and research field, various devices working based on ionizing radiation have been used extensively. Application of such instruments caused increased exposure to ionizing and non-ionizing radiation.[1-3] Ionizing radiation includes (alpha and beta) particles and a narrow region of electromagnetic field (Gamma and X radiation). The ionizing radiation is known as one of the most serious physical hazardous agents in the work environments that may cause irreversible, and even non-treatable damage to the workers.[4] X-ray is an ionizing electromagnetic radiation with a wavelength of 0.001-1 nanometer with extensive use since its discovery.[5] The most important characteristics of the X-ray is its penetration power and ionizing the environment that enables it to pass through solid and liquid environment.[6, 7] Despite usefulness of ionizing radiation in medical diagnosis, it is hazardous for the of patients and radiotherapists working in radiology wards.[8] Application of X-ray in medicine requires

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special occupational precautions for radiotherapists. Prolonged exposure to ionizing radiation can cause different types of damages, including cancer, chromosomal abnormalities, cataract, skin lesions, and chronic fatigue syndrome (CFS).[9] It can cause serious adverse effects on the whole body that may even arise in future generations.[10] Exposure to high dose of ionizing radiation can also affect hematologic and central nervous system.

CFS is one of the adverse effects of exposure to X-ray. CFS is considered as a syndrome with symptoms, such as chronic fatigue, memory loss, sleep disorders, sore throat, muscle and joint pain, cough, photophobia, night sweats, and depression. These symptoms may last for at least 6 months and even for several years.[11] Extreme fatigue is the one of the main sign of this syndrome, which may develop instantly or gradually.[12] Chronic fatigue can occur in both genders, at any time, and across different races and social classes. It is even observed in children and adolescents.[13] Studies on the prevalence of CFS in 1989-1993 showed that about 5 to 8 person per 100,000 in American adults suffer from this syndrome. However, the diagnosis of this syndrome is not easy and calculation of its prevalence is difficult.[14] Therefore, this study was conducted to determine the prevalence of CFS among radiotherapists and nurses working in hospitals affiliated to Shahid Sadoughi University of Medical Sciences in Yazd. [15]

Methods

This study recruited all men and women working in hospitals affiliated to Shahid Sadoughi University of Medical Science, who were exposed to X-ray as the exposed group and nurses working in the same hospitals as the control group. The whole study population was investigated. The population size was considered 46 for the exposed and 46 for the control groups. The nurses considered as the control group because they had 3 work shifts, like radiotherapists. Data was collected by a questionnaire containing two sections: the first section evaluated demographic characteristics, such as age, sex, and work shifts. The second section was the CFS assessment questionnaire. The questionnaires distributed to the radiotherapists and controls. Before this a written and verbal consent were given by participants. The study also was in accordance with The Declaration of Helsinki. The study also was approved by institutional ethical board.[16, 17]

To assess chronic fatigue syndrome, Chalder Fatigue Scale developed by Chalder et al6.was used. It includes 14 questions for assessing two subscales: mental symptoms (the first 7 questions), and physical symptoms (the second 7 questions). Chalder scale has been used in several studies on the epidemiology of the CFS.[18, 19] Validity and reliability of this scale were investigated by Chalder et al (1993).[6] by using the clinical symptoms index. The sensitivity and specifity were estimated to be 75.5% and 74.5%, respectively. Internal consistency coefficient for questions was 0.85, and 0.82 for mental and physical fatigue questions respectively. This scale was first translated into Persian by Nasri and its reliability and validity have been studied in Iran.[20] After data collection, the data was entered into SPSS V.18. The distribution of the data at first step was checked. In the case of violation from normal distribution, the non-parametric tests were employed. Mean CFS scores were compared in both groups via mean comparison tests. The correlation analyses were employed to investigate the correlation between CFS and participant's characteristics.

Results

About 63% of exposed group (radiotherapists) were male, 80.4% were married; and 41.3% had regular weekly physical activity. Most of exposed subjects were working in the radiology department (87%), and 65.2%, according to the self-report, did not have second jobs. 87% of radiotherapists were working in shift. About 8.7% of them were in morning shifts, 4.3% in evening shifts, and the rest in alternative shifts. 73.9% of radiotherapists were working higher than 8 hours per day. In terms of work experience,

34.8% had under 6 years, 32.6% had 6-12 years, and 32.6% had more than 12 years of work experience.

Table 1. Prevalence of chronic fatigue syndrome based on demographics in the case and control groups

Variable		Chronic fatigue syndrome			
		Positive		Negative	
		Radiotherapist n(%)	Nurse n(%)	Radiotherapist n(%)	Nurse n(%)
Exercise	Regular	5(%12.50)	6(%11.54)	21(%52.50)	18(%34.62)
	Irregular	2(%5.00)	3(%5.77)	12(%30.00)	25(%48.07)
Job Satisfaction	No	6(%15.00)	9(%17.31)	18(%45.00)	30(%57.69)
	Yes	1(%2.50)	0.00	15(%37.50)	13(%25.00)
History of stress and depression	Yes	3(%7.50)	6(%11.54)	10(%25.00)	10(%19.23)
	No	4(%10.00)	3(%5.77)	23(%57.50)	33(%63.46)
History of disease	Yes	1(%2.50)	1(%1.92)	4(%10.00)	9(%17.31)
	No	6(%15.00)	8(%15.38)	29(%72.50)	34(%65.39)

Table 2. Correlation between chronic fatigue syndrome and the study variables

Variable	The correlation coefficient	The significance level
Age (years)	0.04	0.74
Work experience (years)	0.02	0.82
Body mass index (kg/m2)	0.13	0.22
Working hours (hours)	-0.18	0.08
Physical fatigue	0.90**	0.00
Mental fatigue	0.77**	0.00

**significant level of 0.01

Table 3. Summary of t test results for comparison of mean variables between the groups

Variable	Radiotherapist	Nurses	*p-value*
Physical fatigue	5.97 (0.63)	6.02 (0.39)	0.95
Mental fatigue	4.25 (0.38)	4.94 (0.29)	0.15
CFS score	10.22 (0.91)	10.96 (0.54)	0.47

In control group 71.1% were female, 76.1% were married and about 46% had weekly physical activity. Most of control subjects were working in the emergency department and critical care unit and the least in the infectious ward. 73.9% reported having no second jobs. In control group 34 individuals were working in shifts, including 26.1% in morning shifts, 6.5% in evening shifts, and 67.4% in alternative shifts. 35 individuals were working more than 8 hours per day. In terms of work experience, 54.3% had 6-12 years of work experience. Overall mean CFS score in the exposed group was 10.64 ± 4.77. In total in the exposed group 17.39% had fatigue syndrome (7 radiotherapists and 9 nurses). While 82.61% (76 cases) did not have CFS (33 radiotherapists and 43 nurses). Table 1 shows general characteristics of exposed and control subjects in term of CFS score.

No significant difference was observed between radiotherapists and nurses in terms of CFS score (P = 0.47) (Table 2). Comparison of mean CFS score in radiotherapists in terms of number of images showed higher mean CFS scores in those taking more than 20 images per day.

Table 3 shows the correlation coefficient between CFS score and studied variables. There was significant correlation between the levels of physical and mental fatigue in the participants and CFS score.

Discussion

In this study, we investigated the prevalence of chronic fatigue syndrome (CFS) in radiotherapists (exposure to X-ray) working in the university hospitals. Higher level of fatigue was observed in the control group (nurses), compared with the exposed group (radiotherapists), which was not statistically different. The justification of this finding is that nurses work constantly during the shifts, and deal with patients that will put them under psychological and physical pressure. On the other hand, radiotherapists allocate about 2 hours during their shifts to imaging patients and are not in close contact with patients; thus, they are less likely to be psychologically damaged. The findings

of the study also showed fatigue in radiotherapists and in those exercising on a monthly basis, indicating that people with less physical activity tend to have higher fatigue that will be reflected in their career.[21] Also, the mean fatigue score was higher in those with average to low job satisfaction. we found an increased level of fatigue in nurses in comparison with exposed group. We can point out that different measurement tools, different study objectives, differences in research populations, and multiple statistical methods can result in such finding in our study.

Another finding of the present study was the higher prevalence of chronic fatigue syndrome in married nurses. This point has not been previously considered in the literature that the higher frequency of chronic fatigue syndrome in the married nurses that may be due to greater family pressure and added responsibilities of the marital life to the professional responsibilities.[22] Also, the increased level of depression and stress in nurses, compared to radiotherapists, was another finding of the present study. It implies that nurses are in closer contact with patients' conditions that may affect them.[23] However, more detailed studies are needed in this area. In a study by Jason et al., work-shifts had a direct and strong effect on fatigue, increased disease, and decreased function.[24] Inappropriate health and work conditions in hospitals, heavy responsibilities, and different responsibilities of nurse in the medical team, increased number of patients, intensive work-shifts, job insecurity, and increasing psychosocial problems can be the reasons for the increased prevalence of chronic fatigue syndrome in Iranian nurses. In the study by Lowry, sex was an important predictor of chronic fatigue syndrome.[25] which also is consistent with our finding. We found that women had more fatigue than men.

Due to the high prevalence of chronic fatigue in occupational environments, it is suggested that organizations try to prevent chronic fatigue in their personnel in order to increase the performance of their employees, increase the productivity of the organization, and provide a healthy work atmosphere.

Our work has several weaknesses that should be considered for future works. Future studies should select more accurate and more appropriate study populations. Future studies should also recruit larger sample size to increase the accuracy of the results.

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