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CONDITION OF OBSERVING THE PRINCIPLES OF RADIATION PROTECTION IN RADIOLOGY CENTERS IN SISTAN AND BALUCHESTAN PROVINCE OF IRAN

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ABSTRACT

Objective: One of the most important complications of imaging with X-rays is genetic effects and carcinogenic nature of these radiations. For this reason, various guidelines in the field of ionizing radiation protection have been done from national and international organizations in the recent decades. This study aims to investigate the amount of observing the principles of radiation protection in Sistan and Balouchstan radiological centers.

Materials and Methods: in this descriptive study, a checklist was provided based on the recommendations done by the institute for the principles of radiation protection of Iran Atomic Energy Organization and then 10 diagnostic imaging centers was evaluated to determine the value of observing the principles of radiation protection according to this checklist.

Findings: considering the centers under study, 10% of them did not have protection shield in reproductive glands; all the centers were benefitted from leaden hood, but these leaden hoods were used only in 60% of the centers for the protection of one accompanier; no outdated films were used in the centers and film badge was used in all centers for the radiation monitoring of the personnel. Of the centers under study, 20% of them were involved in their activity without using air conditioning device. 10% of the centers were devoid of entrance warning signs, but the sign of radiation zone was installed in all centers. In 10% of the concerned centers, the entrance door of the radiography room was not completely closed, but more leaden partition was used for more protection against radiation in the time of portable radiography. There was no leaden glass in 50% of the regarded centers, but no leaden glass was also used in the imaging process of the centers that have leaden glasses.

Results and Discussion: although observing the radiation protection in the concerned centers is satisfactory, these protection principles were not completely observed in all centers, which the observation of protective principles can be promoted through the orderly observation and controlled by the relevant authorities and holding the classes of protection against radiation.

Keywords: radiation protection; X-rays; radiology.

INTRODUCTION

Radiation is one of the factors about which most studies have been done regarding its morbidity effects, though there are many points regarding

how the radiation affects living organisms which must be clarified, but the mechanisms by which radiation damages living organism's cells and

molecules have been studied and recognized more than other damaging agents. The observed effects of radiation are generally divided into two random and non-random categories in which the biological effects of the radiations are often fall into the non-random effects category. To turn up the non-random effects into the living organisms, the rate of radiation on the living organisms should be exceeded from a special minimum; otherwise, the above effects will not be revealed. The other category of the effects of radiations is the genetic effects which are created in the individual's sexual cells due to the change in the DNA structure and these effects cannot be seen in the person being radiated at, but it will be visible in the next generations and the children of those persons.

To review these effects on people, "Genetically Significant Dose" will be used. GSD depends on the radiation caused by received dose by gonads and the person's age. Accordingly, when a person ages over 50 years is placed under radiation who has naturally a little chance for a childbirth has a little role in GSD population, and conversely, giving radiation to children's genitalia is mostly contributed in GSD population. In the annual report delivered in 1972, Bier estimated that GSD caused by Rontgen rays in America can be reduced up to 50% by applying coatings and shields for the sexual glands (1). For this reason, for the protection of reproductive glands against radiations, leaden shield are used which is led to the reduction of exposure of reproductive glands and the reduction of the probability of genetic effects occurrence, and of course, using contact shields has more effects on reducing sexual glands spectrometry (2). Finally, the most important complication regarded in the diagnostic radiology

centers is the radiation's random complications, especially genetic effects and carcinogenic effects of the radiation, for these complications are resulted from direct effects of radiation on the genetic cells which are subsequently created after being received low radiation dose and there is no radiation dose that can be called safe dose (3). That's why, to prevent from individual's unwilling exposure, observing the radiation protection principles in radiology sectors are seems necessary.

MATERIALS AND METHOD

In this sectional and descriptive study, first; a suitable checklist based on all the radiation protection principles designed and then the checklist was completed by interview and observation with referring to the regarded centers.

FINDING

Of the concerned centers of radiology under study, all of them had suitable leaden hood to be used, but these hoods were used only in 60% of centers for patient protection. On the other hand, 80% of the centers under study were benefitted from reproductive glands shields, but only 30% of these shields were used for patient protection. All the regarded centers used film badges for controlling personnel dose. They also use warning sign of exposure zone, but none of the radiology centers have specific mechanical devices to make the patient standstill in its due time. Finally, all the centers under study used leaden partition for the protection against X-rays while using portable radiography device.

Table 1: observation of radiation protection principles in 10 radiology centers in Sistan and Baluchestan province

	Rate of observing standard principles in the centers under study(%)
Existing reproductive glands shield	80%
Existing leaden shield	100%
Using leaden hood for the patients	60%
Using out of date films	0%
Using film badges for all the personnel	100%
Existing air conditioning device	80%
Using air conditioning device while working	80%
Using no entrance warning sign	90%
Using radiation zone warning sign	100%
Closing up completely the radiography room door	90%
Closing up completely the controlling room door	70%
Adopting the diaphragm optical field and radiation field	40%
Using reproductive glands shield for patients protection	30%

RESULTS AND DISCUSSION

One of the most important protection points is to use special shields for the protection against reproductive glands, especially regarding in toddlers and children, because despite the fact that 80% of the centers are benefitted from reproductive glands shield, only 30% of the centers under study unfortunately use the shields for the patient's protection against reproductive glands, and given that the probable changes made in the DNA of the reproductive cells in the person being exposed to will be manifested in their children and the upcoming generations, considering this protection point is highly important. On the other hand, if the personnel does not use film badge, their received dose cannot be monitored and if the protective tips do not observe, their dose will be reached higher than determined Dose Limit (4). Fortunately, film badges are used in all the radiological centers under study to monitor the individual personnel dose.

Regarding the fact that leaden hood is used for the companions in the needed time, despite the fact that all the centers under study have leaden hood, only 60% of these leaden hoods are used for the protection of those accompanying patients that worth being thought about.

Entrance warning sign equipped with a lamp above the entrance of radiography room should be installed to be lightened in the time of patient's exposure and hence prevent from entering the patients and personnel in the time of doing radiography. Fortunately, this sign has been used in 90% of this center. On the other hand, the special sign of the danger of ionizing radiations exposure must be installed above the radiography room entrance, for the patients or the companions are gathered besides radiography room without being noticed at, and this cause they are exposed to; moreover, this problem can be exacerbated and the received dose can be increased if the radiography room entrance door is opened (5). Fortunately, exposure zone warning sign has been used in 100% of the concerned centers and the radiography room entrance door was completely closed up in 90% centers which are hereby led to reducing referent's exposure. On the other hand, having been done quality control test, it has been found that optical field and X-ray field are not completely adopted to each other in 60% of the centers, which this causes the zones that are not seemingly faced with X-rays with regard to optical field are not involved in radiation field in the time of exposure and doing radiography in practice and

even sometimes sensitive organs of the patient are unwillingly exposed.

Finally, observing the radiation protection principles in the regarded centers are evaluated satisfactorily; however, to observe more the protection principles, orientation classes can be hold for the radiation protection principles and an optimal use of protection devices and facilities in the radiology centers can be recommended.

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