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Exposure to X-Ray and Fecundity at the Radiographer

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Annotation: Fecundity, is refers to ability of achieving pregnancy and the probability to achieve a live birth, including all steps that leads to form embryo, beginning from fuse of the gametes (sperm fertilize the oocyte) forming zygote and all early stages of embryo ending to fetus. the fertility may be effected by factors which leads to declines. Medical devices such as x-ray devices can be considered from these factors. Exposure to high doses of x-ray may be effect on fertility, but low doses may be not. This study aimed to clarify the impact of the x-ray on fecundity. A population sample (radiographer) was recruited in this work, they are different in personal characteristics but they are similar in working conditions and they were exposed to almost the same doses of x-ray.

Keywords: radiographer, fecundity, exposure, x-ray, men fertility.

Introduction

All steps of human reproductive functions from gametogenesis (female and male) to the embryogenesis, they are on which fecundity depends on [1]. There are many factors that can effect on the fertility such as genetic (genetic mutation) and environmental including radiation. Many sources of ionizing radiation involved devices of x-ray, may be effect on the fertility and ability to pregnancy (from fuse the gametes to early embryo), also may be effect on offspring[2]. The ionizing radiation such as x-ray is used in many medical fields (standard radiation, nuclear medicine examination, dual energy x-ray absorptiometry (DEXA), and computed tomography

(CT) scanners), where it help in diagnosis and treating many cases. In some of these examinations may be used high doses of x-ray such as computed tomography scanners (CT scanners), for the purpose of reaching the examination and obtaining the desired results. These examination that are used the x-ray with high doses may effect on sperm cells, and thus effect generally on the fecundability of the male and the ability to fertilize[3].

When the male exposed to x-ray for long time, that may be effect on the spermatogenesis (on the activity, morphology, and concentration), this in turn, effect on the ability of sperm to fertilize the oocyte, but this depend on the amount of radiation (time and duration), the effect increases with increased exposure to the radiation, it means the low doses of the radiation does not effect on fecundability [4].

In animal such as mice, ionizing radiation showed that it has an effect on the sperm DNA and on the development of the early stage of embryo[5]. But effect of ionizing radiation (x-ray) on the sperm DNA has been little studied among human[6]. Regarding the effect of the ionizing radiation (x-ray) on the DNA of the sperms, sperms cells are lowest possibility to the occurrence DNA damage after exposure to ionizing radiation, requires high doses of x-ray to occurrence such of this damage, this means that the low doses of x-ray (standard radiation) have no effect on the DNA sperms [7]. Occurrence of the damage on the sperms DNA depend on doses of the ionizing radiation (x-ray doses)[8]. Radiosensitive of the sex germ cells (sperms) for the potential the occurrence of DNA damage is the lesser compared with somatic cells[9,10].

There is no any evidence of a long-term effect of x-ray with low doses on a man`s fertility and his ability to have children. We do not know that there is a study that has proven that the x-ray with low doses can affect a males when exposed to it[3]. Did not potential relationship between man`s primary infertility and exposure to ionizing radiation(x-ray) [11]. the first study that had discussed the relationship between ionizing radiation (x-ray) and fecundibilty was in 2006 [3]. Little been studies that touched on the extant of the effect of the ionizing radiation on fecundability [12]. The results of one the studies have shown that there is no potential relationship between the man`s fecundity and medical x-ray examination (low doses)[3].

The biological effects of the ionizing radiation, as well as their effects on living organisms depend on the size and duration of the doses, also depend on the conditions of irradiation. So, the high doses of ionizing radiation may cause negative results such as infertility, whereas the low doses of ionizing radiation (standard radiation) does not cause this[13,14].

There are studies, suggested the low doses of the ionizing radiation may cause positive results, It means that exposure to these doses (low doses of x-ray) which are beneficial for the living organisms[15].

In the present study, showed the low ionizing radiation dose (x-ray), is not effect on the fecundability. Whereas, the high dose of the ionizing radiation may cause problem such as mutation and infertility. Standard radiation in the medical examination that used every day, these devices of x-ray don’t cause problem to the radiographer because they are may exposure to low doses of radiation. This study took a number of radiographer, also called as medical radiation technologists, radiologic technologists, diagnostic radiographers, and radiology technologists[16] and studied their situation in terms of childbearing. The result, all the staff was have children (two and more), and they did not suffer from infertility. This means that they were not affected by the radiation that they were exposed, it did not affect their fecundability.

Methods

Study subject

A population sample (radiographer) was recruited from different hospital and different regions from Iraq. The investigator randomly selected group of radiographer approximately (70) with different age, between 25 to 60 years of the age, work in x-ray department in hospital for different

times, were selected from more than hospital in different region in Iraq. For check eligibility for inclusion, the radiographer was eligible for inclusion in this study if he worked with radiation devices in x-ray department more than five year.

All of them were parents of more than one child, as they all of them married after working in the x-ray department. That is, they gave birth to children during the working in x-rad department and during exposure to radiation (with/without protection). Some of them have two children and others have three children, but most of them have more than three children, with different and varying ages. Some of them have children after the age of 40^{th}.

The number of the radiologic technologists was (70), they were chosen from various specialized hospitals, their ages ranged between 25 years to 60 years. the younger was 25 years old, worked in the x-ray department for five-year at least, the older was 60 years old, worked in the x-ray department at least for 30 years, were worked with protection, but some time worked without protection which leads to direct exposure to radiation. The vast majority of them worked for long time in x-ray department (up to 15 years and more)

A few of them were suffer from some simple problems may be attribute it to exposure radiation, but these health problems may discussed in another study, in this study we discuss the effect exposure radiation on the fecundity.

This study was approved by the relevant ethics committees, the Advisory Committee for Information Processing in Health Research, and the National Information Commission for Action.

Table 1: number and doses of x-ray examination daily and monthly

Type of x-ray examination (organ)	x-ray dose		No. examination (daily)(≈)	No. examination (monthly)(≈)
	K.V. (≈)	M.A.S.(≈)		
Skull	60	25	4	104
PNS	60	25	3	78
Cervical spine	60	15	7	199
Dorsal spine	65	50	4	101
Lumber spine	70	60	7	201
Sacral spine	60	50	1	27
Pelvis	65	40	1	30
Hip joint	60	30	2	58
Thigh	60	20	2	56
Knee joint	55	5	10	265
Leg	55	5	4	113
Ankle joint	50	5	5	139
Foot	50	4	4	110
Hand	50	4	4	115
Wrist joint	50	3.5	5	141
Forearm	55	4.5	3	80
Elbow joint	55	4	4	112
Humerus	60	8	3	79
Shoulder joint	60	20	5	131
Chest	70	10	15	375
Abdomen	75	45	3	75
total	1245	435	96	2589

Result and discussion

In this study choice approximately (70) of the radiographer or radiologic technologists, medical radiation technologists, diagnostic radiographers, and radiology technologists[16] that worked in

x-ray department in different hospitals and different region in Iraq, choice them with different age, most of them more than 30 years and worked in x-rag department more than 10 years, they worked in x-ray devices with protection, but some time without protection. The medical staff (radiographer) who works on radiation sources (x-ray devices), they are exposed to ionizing radiation[17]. Daily, were they worked at least 100 x-ray exam to different organ of the body with different dose. This routine lasts for 6 days a week, and it continues at the same pace during the month. For example, the total number of examine of the knee joints was (10) per day, and was (265) in month. the total number of examine of the lumber spine was (7) per day, and was (201) in month. And, the total number of examine of the chest was (15) per day, and was (375) in month. Also, the total number of examine of the wrist joints was (141) per month. The total number for all examine per day was (96). The total number of all examine in the month was (2589), as shown in the table (1). In the light of these data, During their work, they were certain that they exposed to x-ray with low doses. workers on x-ray devices may exposed to low doses of x-ray radiation[18]. However, their fertility was not affected, No evidence to effect the low dose of x-ray on the fertility [18]. high dose of x-ray may causing detectable sperm DNA damage, while the low doses are not [19].

The result of this study were, All of them were parents of more than one child, as they all of them married after working in the x-ray department. That is, they gave birth to children during the working and during exposure to radiation (with/without protection). Some of them have two children and others have three children, but most of them have more than three children, with different and varying ages. Some of them have children after the age of 40^{th}. The youngest was 25 years old while the oldest was approximately in 58 years old

Conclusion:

- In this study, was concluded that the exposed to low doses of x-ray may don't effect on fecundity against the high doses.
- majority of the medical staff (radiographer) are parents.

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