RESEARCH ARTICLE

Effects of Radiation on Mothers with Alpha-fetoprotein Levels Screening During Pregnancy at Al-Najaf Province, Iraq

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ABSTRACT

Background: Radiation exposure of a pregnant woman, whether by radiological medical tests such as X-rays or other means, is considered one of the threats that threaten the life of the pregnant woman and her child, as there is a near association between fetal anomalies and exposure to it.

Aim: The study's main objective is to assess the knowledge of expectant mothers in the age group of 15 to 45 years about the risks of exposure to radiation for them and their fetuses during pregnancy.

Methods: The case-control study was conducted based on hospitals in two general hospitals and the primary care health sector in Najaf Governorate. The questionnaire included 150 pregnant women between the ages of 15 to 45 years.

Result: In our study, 85 (56.66%) of all mothers were exposed to radiation. They needed detailed information on radiation exposures, hazards, and any fetal effects.

Conclusion: Radiation's effect on the fetus is dictated by the gestational age, and the amount of radiation received.

Keywords: Fetus, Pregnancy, Radiation.

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INTRODUCTION

Radiation is a form of energy that originates from a source and passes through materials or space. It can be X-rays or radio-frequency.[1] Exposure to radiation through pregnancy has been shown to have increasingly harmful effects on the fetus's growth and effects later in life in various studies. Females are at danger of radiation exposure before pregnancy due to medical procedures, occupational exposures, and diagnostic and treatments. Since ionizing radiation poses no major risks, ultrasonography can be performed safely during pregnancy. Particles and electromagnetic radiation are examples of ionizing radiation (for example x-rays). Ionizing radiation exposure in the womb can be teratogenic, carcinogenic, or mutagenic.[2] X-rays are strong invisible rays that are sent to an examining body to see through it, such as the human body, metals, and luggage, and produce a picture that is commonly used for medical purposes in humans, detection of metal fractures, and examination of concealed items in baggage.[3] The gestational age determines the probability of radiation exposure during pregnancy when imaging and the dose are absorbed. The risks are highest during organogenesis and the early fetal phase, but they are slightly lower in the second and third trimesters.[4] We know most of what we know about radiation exposure to a fetus derives from "opportunistic" events throughout history.

Survivors of the Hiroshima and Nagasaki atomic bombings showed the dangers of exposing the fetus to radiation, the most prominent symptom being microcephaly at 100–200 mSv. Mental retardation (25–31 points per above 0.1 Gy), as well as growth retardation (lasting more than 0.25 Gy), were also found among the survivors (above 1Gy). Since the invention of X-rays, ionizing radiation has been used extensively for

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medical diagnosis.[5] An embryo can be killed by a dose as low as 100–200 mGy (10–20 rad). The fetal death threshold rises to 250–500 mGy (25–50 rad) shortly after, with the fetal death threshold increasing during pregnancy as the fetus grows. The fetal death threshold rises to 250–500 mGy (25–50 rad) shortly after, with the fetal death threshold increasing during pregnancy as the fetus grows. 34–18 weeks gestation, the average radiation dose needed to kill all embryos or fetuses is 5000 mGy.[6] Woman absorbs a radiation dose beyond the proposed NOAEL of 350-Malformations such as microcephaly, microphthalmia, growth restriction, and cataract after exposure to 500 mGy (35–50 rad) during 3–8 weeks of pregnancy.[7] The possibility for a fetus to be harmed by localized, minimal exposure to radiation, such as that obtained from an x-ray, can usually be avoided by wearing lead-containing vests (0.35 mm of lead) that protect a pregnant woman's abdomen and pelvis from penetrating x-rays.[8]

The embryonic yolk sac and the fetal liver produce the plasma protein alpha-fetoprotein (AFP). The presence of AFP in serum, amniotic fluid, and urine can be used as a screening test for congenital impairments, chromosomal abnormalities, and various other adult-onset cancers and diseases.[9] AFP has long been used in the clinical laboratory as a postoperative agent for tumor surveillance and a fetal defect marker based on gestational age, indicating its efficacy in detecting neural tube abnormalities and aneuploidies. There is currently a sizeable biomedical literature on the use of AFP During pregnancy; as a biomarker in human maternal serum, the detection of AFP levels in pregnant women's serum that are higher than average has been the subject of such investigations, multiple embryo and fetus congenital deformities are related to abnormal AFP levels. Neural tube defects and brain/spinal cord deformities were among the developmental conditions linked to abnormal AFP levels.[10]

MATERIALS AND METHODS

This study was conducted between January and February 2021 where a total of 150 pregnant women were surveyed for ages between 18 to 40 in the governorate of Najaf, who came to the Zahra Teaching Hospital, Al-Sajjad Teaching Hospital, and the Kufa Health Sector for health care. A questionnaire form was used to collect data from all of the pregnant. Study variables included Age, use of the phone or the computer, smoking pregnant, the child's father being a smoker, Previous pregnancy, and pregnant women's knowledge of radiation-induced diseases. The detection of AFP where done using 5 mL serum of pregnant women and by MiniVidas technique system was AFP detected.

RESULTS AND DISCUSSION

Table 1 show the demographic characters where There is a statistically important difference between the two groups had been found in the study of the studied group, at all comparisons at ($p < 0.05$). The primary cause of radiofrequency-electromagnetic fields damage to the head is cell phones. The public discussion of the health hazards of use of phone or computer radiation The potential connection between cancer, the cardiovascular system, and the immune system has gotten a lot of attention. The assessment of health risks on reproductive health, such as abortions, has received less coverage.[11] Figure 1 shows that the nutritional status of the mother during pregnancy is a significant factor in the birth outcome.[12] Maternal anemia was linked to a lower gestational age and birth weight, and a higher risk of a small-for-gestation baby, particularly when maternal hemoglobin was less than 80 g/L. To boost neonatal outcomes in this population, maternal anemia must be addressed immediately.[13] Figure 2 show the diseases caused by radiation and their effects on human in general and mothers primarily, a higher risk of cardiac failure is attributed to a younger age of exposure, a longer treatment time, a higher radiation dose, a greater volume of heart irradiated, procedure, and source. This risk can also be increased by the presence of CAD risk factors or chemotherapeutic agent exposure. It is worth noting that the way mediastinal irradiation is delivered has changed dramatically in the last 20 years.[14] Figure 3 shows the effects of X-ray on the fetus. X-rays are a form of electromagnetic radiation used to visualize an object. It has both benefits and drawbacks in humans. Exposure to 100 mGy radiation during the first two weeks of pregnancy may result in the embryo's death. 5000 mGy, on the other hand, will kill nearly all human embryos or fetuses before they reach 18 weeks of gestation. Atomic bomb survivor data showed that for fetuses 8 to 15 weeks' gestation, an IQ score decline of about 25 to 31 points

Table 1: The research population's socio-demographic characteristics

Parameter	*Pregnant mothers*	*p-value*
Number	150	-
Age	29 ± 8.43	-
Smoking	Yes = 0 NO = 150	0.00001
Phone or computer use	Yes = 89 NO = 61	0.003
Eat healthy meals	Yes = 144 NO = 6	0.001
Reproductive diseases	Yes = 51 NO = 99	0.0023
Previous pregnancy	Yes = 105 NO = 45	0.01
Your knowledge about X-rays	Yes = 50 NO = 100	0.012
Radiation harms to the fetus	Yes = 85 NO = 65	0.004
Examination of the fetus with ultrasound	Yes = 124 NO = 26	0.003
Diseases caused by radiation	Yes = 59 NO = 91	0.007

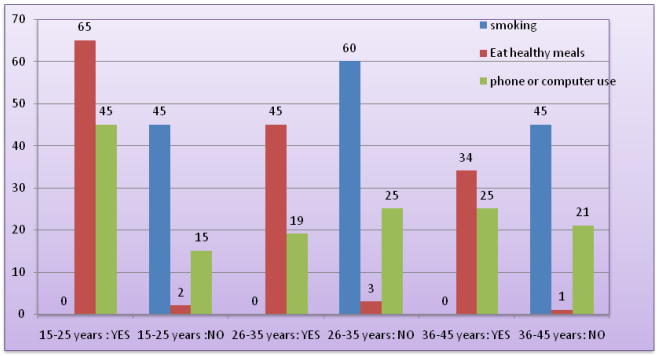

Figure 1: Number of the participant females according to age groups.

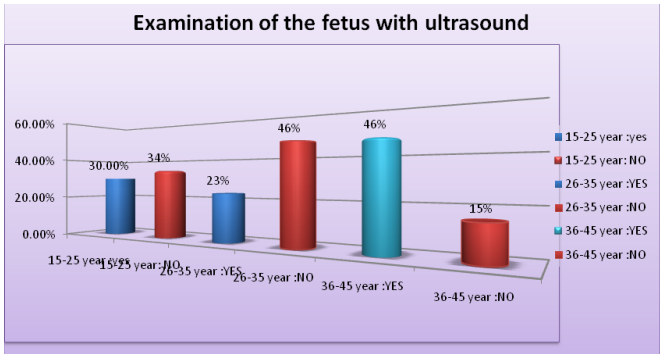

Figure 2: The percentage ratio of examination of the fetus with ultrasound in participant females.

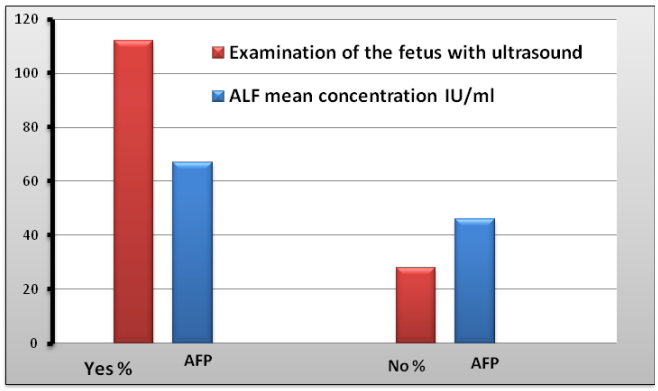

Figure 5: The mean concentration of Alpha-fetoprotein (AFP) IU/mL and examination of fetus with ultrasound percentage in studied groups.

per 1000 mGy, while above, would lead to a 40% risk of serious mental retardation.3 Individuals who work in radiology and have a medical history with X-ray exams have an increased risk of developing MS, according to case-control studies in the Swedish population.[15]

Table 2 shows the mean alpha-fetoprotein (AFP) IU/where no statistically significant differences were detected at the researched groups' research at all comparisons at ($p > 0.05$). in this study, we measure AFP in the first and second trimester, where there are no significant changes in AFP concentration for a female who is pregnant. During pregnancy's second trimester, measuring maternal serum AFP has remained beneficial in showing for aneuploidies and neutralising tubes

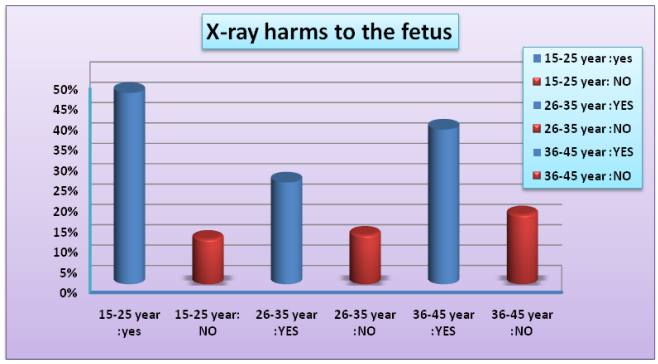

Figure 3: The percentage ratio of examination of the fetus with X-ray participant females.

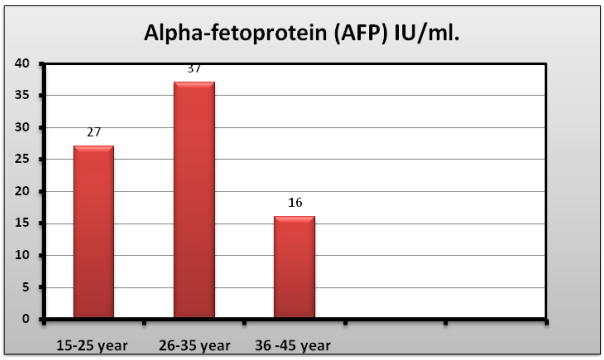

Figure 4: The mean concentration of Alpha-fetoprotein (AFP) IU/mL in studied groups.

Table 2: The mean concentration of Alpha-fetoprotein (AFP) IU/mL among pregnant women and control.

	Mean ± SD		
Variable	*Pregnant women NO (150)*	*Control NO (25)*	*p-values*
Alpha-fetoprotein (AFP) IU/mL	39.4 ± 13.2	27.2 ± 11.6	0.09

abnormalities. The concentration of AFP has increased among smokers compared to non-smokers, according to a recent study. Cigarette smokers had 11 percent higher serum AFP than non-smokers at 11–13 weeks. In most previous studies of second-trimester pregnancies, smokers' serum AFP was 2–6% higher than non-smokers'.[16] The ultrasound and other radiation effects appeared between pregnant and control groups for AFP concentration, as shown in Figures 4 and 5.

CONCLUSIONS

Show the demographic characteristics for which a statistically significant difference was discovered in the sample of the analyzed population, at all comparisons with ($p > 0.05$). The number of pregnant women with expectations about radiation risk was 65 (43.3) of all pregnant women. The study showed the effects of radiation on pregnant mothers. The primary cause of radiofrequency-electromagnetic fields damage to the head is cell phones. The gestational age and radiation dose determine radiation's effects on the fetus.

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