“ Knowlegde , Attitude and awareness of radiation hazards among patients visiting dental college- questionnaire based study ”

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Abstract:
Context Radiological tests are essential for the evaluation and treatment of several kinds of diseases in dentistry.
Aims and objective: To measure the general public's knowledge of the risks associated with radiological examinations and to raise awareness about radiation protection:
Settings and design - A questionnaire-based cross-sectional study was conducted amongst patients visiting the dental outpatient department.
Methods and Material: Our study population had 1500 adult male and female patients within the age of 20–70 years who visited the outpatient department were included in the study. Data was collected and subjected to statistical analysis using SPSS (Statistical Package for the Social Sciences) software. The chi square test was used to compare the frequencies of responses to each item with regard to age and gender.
Results : In our study 79.2% of the population has not attended hospital for an X-ray examination. Around 280 individuals had previously visited the hospital, 223 of them were aware of dental X-rays, implying that the majority of patients were not aware of dental X-rays.
Conclusions: From our study we found that patients had less knowledge about radiation protection and radiation hazards.

Key-words: Radiation hazards, Radiation protection,

Key Messages:

Introduction:

The ionizing and non-ionising radiation play important role in therapeutic and diagnostic modalities. Ionising radiation have hazardous effect on the human body [1]. Radiation doses from artificial sources that the general public is exposed to primarily originate from medical applications. This is due to a consistently rising demand for radiological exams, particularly

computed tomography (CT), which alone accounts for nearly half of the radiation exposure.[2] In dentistry radiography play an important role in diagnosing, treatment planning. Most commonly used radiographs in dentistry are Intra oral periapical radiograph, Orthopentrogam, lateral cephalogram, Waters view and Cone beam computed Tomography. Hazards caused by dental radiographs is very minimal, few studies in literature have shown thyroid cancer and breast cancer in females and melanoma in males.[3]

The effects of X-rays on people are the consequence of atomic-level interactions. There are two main categories into which these biological effects may be categorised.. They are Deterministic and stochastic effects.

When an effect occurs, it is said to be deterministic if the dose and reaction intensity are exactly proportionate. When the dose is sufficiently large these effects are seen in all individuals. Deterministic effects have dose limit in addition to which an impact is not seen. Stochastic effects, on the other hand, are those where the dose determines the change's likelihood rather than its severity. [4].

As there are no dosage limits, the stochastic effects put patients as well as employees at danger. and thus, having this in mind the decision to order intraoral and extraoral radiographs for a patient should only be made when the benefits of identifying an illness surpasses the danger of radiation harm.

Furthermore, the film speed, collimation, technique, exposure parameter, and protective barriers employed all have an impact on the amount of radiation exposure that a patient and operator get from dental radiographs.[5] Radiation protection is the main centre of radiology for safe imaging practice.[6] This needs the operator to have complete knowledge about radiation hazards and its protection protocols. The operating personal mentioned here includes a professionally trained radiologist, certified radiology technician, trainee (junior residential

doctors/ house surgeons). The present study was conducted to assess knowledge about radiation awareness among general population who visited our college.

Subjects and Methods:

The study was conducted during April to November 2022. The Ethics Committee gave its approval for the project. (approval number: SIDSEC 2022/3/2-26) and confirming the standards of the Declaration of Helsinki and its subsequent revisions. The cross-sectional questionnaire study/ analysis was initiated, conducted and directed among 1500 patients who visited Out Patient department of Oral Medicine and Radiology. Every participant gave their informed permission.The questionnaire was validated and pilot study was done. Statistical program for social sciences (SPSS) was used to evaluate the participant responses, which were then calculated and entered into a Microsoft Excel spreadsheet.

A sample size of 1500 was achieved using this formula N=Zα2 pq/ d2 Where Zα =1.96 at 95% confidence level P = estimate of the expected proportion =24.7% and d = desired level of relative precision (158%) With 95% confidence level and 95% power.

Chi-Square test was applied for statistical analysis. Patients, both males and females visiting department of Oral Medicine and Radiology with a wide age range of 15 to 75 years who are by choice willing to participate and answer the questionnaire after their written consent were included in the study. Patients requiring emergency treatment and medically compromised patients were excluded from the study. The questionnaire was prepared and asked to patients in regional language. Twelve questions were asked to the study participants. The participants were also asked to provide the demographic information which included age sex occupation.

Questionnaire asked to the study participants Question Yes No

Have you visited a hospital earlier?

Do you think dental X-rays are harmful?

Do you think X-rays can increase the risk of cancer?

Do you think cancer can results from repetitive exposure to X-rays

Do you think you should be told about need for X-ray?

Are you aware of X-ray safety measures like lead apron, thyroid collar?

Have you noticed symbol/sticker radiation hazards on the door before X-ray exposure?

Did you doctor mention regarding radiation risks/ benefits to you ?

Was your signature consent taken before the radiographic procedure?

Results:

Our study population included 1500 people. There were 739 men and 761 women among them. Table 1 graph 2 shows the demographic information for the study participants. According to our findings, 79.2% of the population has not attended a hospital for an X-ray examination. Table 2 depicts the population's age distribution. Around 280 individuals had previously visited the hospital, 223 individuals were aware of dental X-rays, implying that the majority of patients were not aware of dental X-rays. Few patients believed dental X-rays were hazardous. Only 400 patients were informed of safety precautions such as a lead apron thyroid collar, which increased the risk of cancer in 449 individuals.

The overall frequency of the responses of the study population to the questionnaire is presented in Table 3, Graph no 3.

Discussion:

According to the study we conducted, patients had little awareness of radiation. Studies on radiation exposure throughout the years have revealed an increased risk of cancer, birth abnormalities, cataracts, and shortened life spans. Although inconclusive, the statement above may not be applicable to diagnostic dental radiography. Since there is no way to ensure there

is no danger, it is nevertheless allowed. [3,6]. The natural background and medical exposure which are man-made are the primary sources from which general population are exposed to radiation.

Radiation, while its many uses in the medical sector, can be dangerous and even fatal if not handled carefully. Diagnostic and interventional radiation practise requires careful attention to striking a balance between the benefits of improving human health and the hazards associated with radiation exposure to radiographers, patients, and the general public. [7]

In any healthcare setting, the treating physician who is in charge should explain to the patient the imaging method and the benefit versus risk of radiation which is very important step. All treating physicians should be aware of and adhere to the moral standard of benefit versus risk of radiation in their daily practices.

Some of the health care professionals refuse to give adequate information about the risks of radiation fearing that patient may decline the radiographic procedure which is required for diagnosing and treatment planning.[8]

Studies from around the world have shown that all medical professionals, including doctors, dentists, radiographers, technologists, and other paramedical workers, have a poor understanding of ionising radiation.[9]

A universal guideline of radiation protection, which has been suggested by the International Commission on Radiological Protection (ICRP), says that radiation protection is stationed on three principles: justification, optimization (as low as reasonably achievable (ALARA)), and dose limitation. This is the basis of radiation protection manifestos.

As Low as Reasonably Achievable, or ALARA, is an acronym for good safety practises that is also a legal requirement for all radiation safety programmes. Compared to CBCT, intraoral radiographs cause significantly less radiation.[1]

Radiation exposure has been linked to long-lasting developmental abnormalities, carcinogenic alterations, and even intrauterine mortality. In an emergency, radiological examination should be carried out carefully. The patient should be given protective gear such a thyroid collar and a lead apron.

As long as radiation safety precautions are taken, dental radiography is not harmful during pregnancy. A number of methods, including rectangular collimation, high-speed film or digital imaging, a lead apron with a thyroid collar, and radiographic selection criteria may significantly decrease radiation doses. The use of digital sensors or an F-speed film in conjunction with rectangular collimation was found to lower radiation exposure by a factor of ten for bitewing and whole mouth radiographs.[10]

When a pregnant woman has a radiological test, the foetus may experience harmful consequences such as long-term developmental abnormalities, carcinogenic alterations, and in extreme situations, intrauterine death. The best course of action is to avoid or delay radiological examinations during pregnancy. Radiation education for patients ought to fall under the purview of healthcare professionals.[11]

According to Sneha sharma Only 14.4% of the public knew about radiation awareness, study conducted by Bhavana Agarwal showed 48.46% of dentists, had poor awareness of radiation protection in dental radiology, while 49.07% had moderate knowledge.[3] Study conducted by Mahendra 65.7% participants who were persuing BDS (Bachelor of Dental Surgery) had inadequate knowledge about radiation safety and awareness.

According to Agrawal et al. 48.4% of general dentists in Rajasthan, India, had low understanding of radiation safety, whereas 49.07% had intermediate knowledge. Only 2.45% were knowledgeable about radiation protective procedures in dental radiology. [2,12]

According to Quinn majority of their study particpants were not aware of patient’s annual dose limit and radiosenisitivity of organs.[12]

Despite the fact that patients have undergone radiological procedure earlier very few were informed about the risks of exposure to radiation. Therefore, it is necessary for the radiologists to provide adequate knowledge about radiation to the patients.[4]

To determine public knowledge and attitudes on radiation awareness, very few studies have been conducted in the past. The study was carried out in single institution. A large sample size from many institutions and hospitals could have improved the results

According to our survey, fewer people are aware of radiation than is generally believed. Therefore, it is essential to inform the general population in a sufficient manner about radiation awareness.

Conclusion

The participants had inconsistent knowledge about radiation hazards and protection. Patients should be informed regarding side effects of radiation. From our study we found that people need to be educated regarding radiation. There should be need for good conversation among health care professional and patients. It is very essential that medical professionals are well trained to convey the risks of radiological imaging in easy words that can be clearly understood by the patient. We also suggest that brochure can be made available to patients which will help patients to understand about doses received from each radiographic imaging modalities

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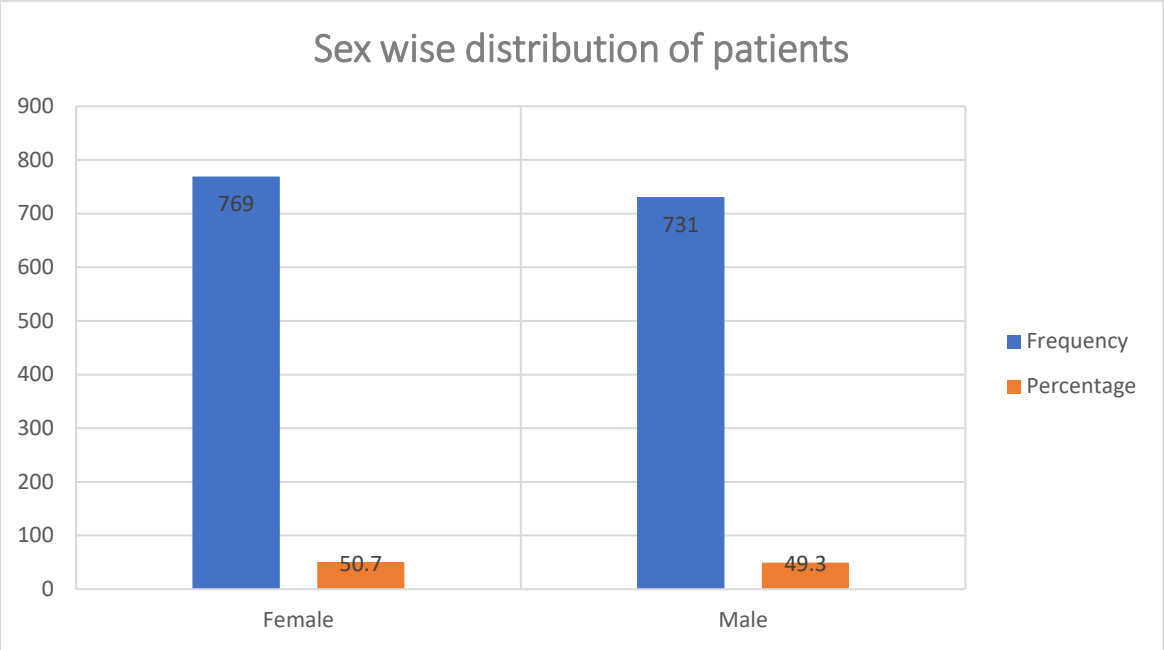
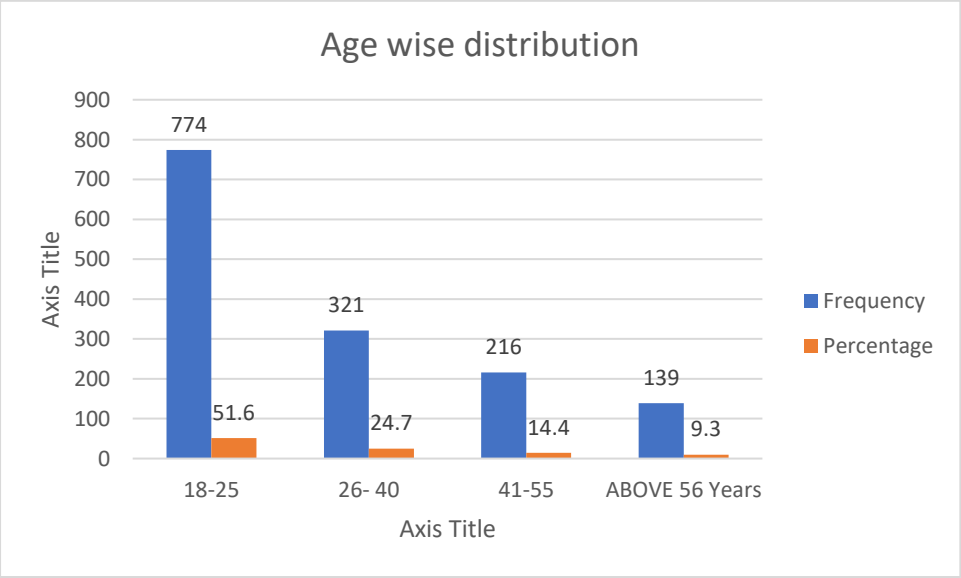
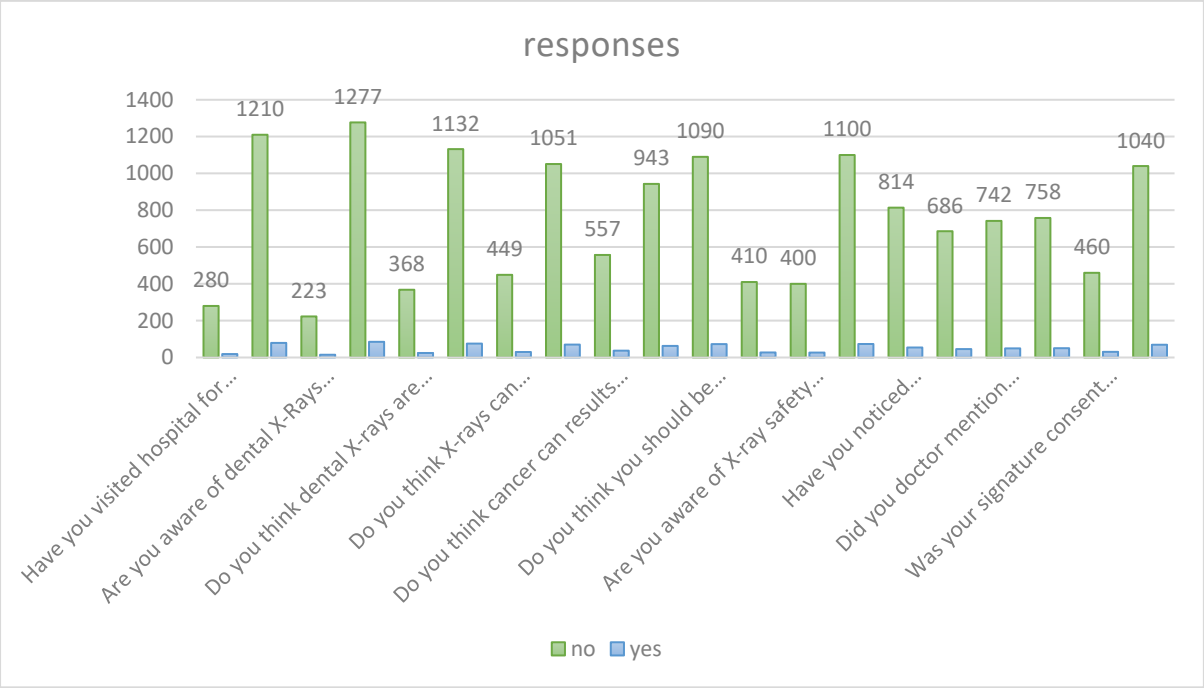


Graph 1



Graph 2


responses
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1277
368
1132
449
1051
557
943
1090
410
400
1100
814
686
742
758
460
1040
Have you visited hospital for...
Are you aware of dental X-Rays...
Do you think dental X-rays are...
Do you think X-rays can...
Do you think cancer can results...
Do you think you should be...
Are you aware of X-ray safety...
Have you noticed...
Did you doctor mention...
Was your signature consent...
no
yes

Graph 3

Table 1

Sex wise Distribution

Sex	Frequency	Percentage
Male	731	49.3
Female	769	50.7

Table 2

Age wise Distribution

Age group	Frequency	Percentage
18-25	774	51.6
26- 40	321	24.7
41-55	216	14.4
➢ **56 Years**	139	9.3
Total	1500	100

Table 3

SL NO	QUESTIONS	RESPONSE	FREQUENCIES PERCENTAGE
1)	Have you visited a hospital earlier?	YES NO	280 (18.7) 1220 (81.3)
2)	Are you aware of dental X-rays for treatment?	YES NO	223 (14.9) 1277 (85.1)
3)	Do you think dental X-rays are harmful?	YES NO	368 (24.5) 1132 (75.5)
4)	Do you think X-rays can increase the risk of cancer?	YES NO	449 (29.9) 1051 70)
5)	Do you think cancer can results from repetitive exposure to X-rays?	YES NO	557 (37.1) 943 (62.9)
6)	Do you think you should be told about need for X-ray?	YES NO	1090 (72.7) 410 (27.3)
7)	Are you aware of X-ray safety measures like lead apron, thyroid collar?	YES NO	400 (26.7) 1100 (73.3
8)	Have you noticed symbol/sticker radiation hazards on the door before X-ray exposure?	YES NO	814 (54.3) 686 (45.7
9)	Did you doctor mention regarding radiation risks/ benefits to you?	YES NO	742 (49.5) 758 (50.5)
10)	Was your signature consent taken before the radiographic procedure?	YES NO	460 (30.7) 1040 (69.3)