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Original Research

Awareness of radiation exposure hazards among dental practitioners

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ABSTRACT:

Aim: surveys conducted on practicing dentists have shown fairly little acceptance of these dose reduction techniques among dental practitioners. The survey was designed to assess the awareness, concern and practice of radiation protection hazards in general dental practice in the region of Marathwada. **Material and method:** The questionnaire was a self-prepared distributed among general practicing dentists and collected back with their filled response. **Result:** Based on the results, we conclude that radiation awareness among dentists is need to be created.

Keywords: Radiation, dentist, awareness, hazards, protection

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INTRODUCTION

Radiation protection is almost as old as the invisible rays wasdiscovered by Wilhelm Röntgen on 8 November 1895. It follows that ionizing radiation can have some adverse effects on health, radiological procedures are now an accepted part of clinical practice, as the advantages for the patient far outweigh the risks of radiation exposure. [1]Dental radiographs are very important tools in the diagnosis of oral diseases and conditions. It helps to assist the dental practitioners to employ appropriate treatment regimen for a patients' who have any dental conditions, and plays a continual important role in dental practice. Hence its availability in most dental clinics is consideredasa crucial role. Radiation dosage from such dental radiographs like IOPA, RVG are low and are thought to be present a minimal risk. It is estimated that about 480 million dental radiographs are performed annually to diagnose the various diseases and accounting for approximately 15% of all diagnostic X-ray examinations.[3]Ionizing radiation is defined as a radiation which has sufficient energy to ionize biological molecules . Exposure to such radiation for human tissue is very harmful. X-rays which are widely used in diagnostic radiology in dental as well as medical fields are also a type of Ionizing radiation. [4] Most of the time, the deterministic injuries arise from the poor knowledge of dentist on radiation protection rules, the lack of quality assurance programs,surveys, the performance of wrong practices and the improper or no use of radiation protection tools.[2]

These hazards can be broadly categorized into the: Physical, chemical, biological, and psychological and mechanical . [5]In carrying out their professional work, Dental personnel are exposed to a number of occupational hazards like stress, allergic reactions, higher noise levels, percutaneous exposure incidents, radiation, musculoskeletal disorders, legal hazards *etc*. [6]Easy availability, overuse without proper knowledge, and lack of reinforcement of the radiation hazards facts have unknowingly resulted in overlooking of as low as reasonably achievable (ALARA) principles in many cases.[8]Therefore, there is a need to educate and make the dentists aware of these hazards and the methods of their prevention.

MATERIALS AND METHODS

A cross-sectional study was conducted to assess the level of radiation safety practices and awareness among 454 general dental practitioners in Marathwada region , Maharashtra, India. A questionnaire comprising 15 questions in clinical,

radiographic practice was formulated. The questionnaire was a self-prepared and specially designed for their study comprising of 15 questions;14 were close-ended and 1 was leading questions. The questionnaire was related to the radiation hazards of dental radiographs and radiation protocol in the form of multiple choice questions given to each of the participant. To prepare the questionnaire, a review of the literature was done and the various variables were determined. Information regarding demographic data such as age, sex, qualification, and number of patient per day was also obtained. After obtaining clearance from the ethical committee and institutional research , the questionnaire was distributed among general dental practitioners and collected back with their filled response. The period of recruitment anddata collection was between January and march 2022.

An online questionnaire (English) was distributed among 454 dental practioners via Google forms online/social media platforms. The data was filled using excel sheet and analyzed.Most dental practitioners in and around Parbhani district.

RESULT

Demographic data revealed out 457 filled forms [onlinereceived] 207 were male and 250 were females.

1. [96.7%] of dental practitioners were aware of radiation exposure hazards and only few [3.96%] of dentist were not aware of radiation exposure hazards**. [fig.1]**
2. [54.5%] of dentist uses RVG type of device to take x-ray , while [38%] use conventional X-ray film [IOPA] followed by [6.4%] uses OPG &remaininguses CBCT**.[fig. 2]**
3. [42.6%] of dental practitioners used 0.4 sec exposure time for the RVG device, while [11.2%] dentist used 1.4 sec exposure time for RVG device and [32.6%] of dentist used 0.8 sec exposure time for IOPA, while [13.6%] dentist used 1.8 sec exposure time for IOPA**.[fig. 3]**
4. [43.8%] of dental practitioners answered skin as most sensitive organ area to the radiation . [39.6%] answered lens of eye , while [4.9%] marked bone and [7.2%] marked nerve in questionnaire as sensitive area to a radiation.**[fig. 4]**
5. Most of the dental practitioners [81.6%] were aware that lead is used for protection against X-ray radiation, while [11.3%] dentist answered steel followed by [4%] zinc and [3.1%] copper as a barrier for protection against x ray radiation**.[fig 5]**
6. [40.8%] of dental practitioners were aware that 2mm thickness of lead barrier is needed while [31.8%] answered 1mm thickness of lead followed by [20%] 5mm thickness of lead barrier.[**fig 6]**
7. [66.3%] of dental practitioners were aware of 'position distance rule'to avoid direct exposure, While, remaining were not aware**.[fig.7]**
8. [58.4%]of dentist were aware of annual whole body radiation limit to worker while[41.6%] were not aware of annual whole body radiation limit**.[fig.8]**
9. Most of the dental practitioners {64.9%] used lead apron followed by [15.2%] were found to be using lead plate,[12.1%] used thyroid collar and [7.8%] used concrete wall for the radiation safety/protection. **[fig. 9]**
10. [39%] of the dental practitioners were not using any measuring radiation dose device in their practice, while [30.7%] were using TLD followed by [20.4%] used film badge and [9.9%] were using dosimeter as the measuring radiation dose device**.[fig. 10]**
11. [57.7%] dentist agreed that ionization can cause a cancer ,while[15.9%] dental practitioners not agreed and some [21.7%] were not sure about ionization can cause a cancer**.[fig.11]**
12. [65.9%] of dental practitioners agreed that in pregnancy x-ray can be performed but with protection, [22.6] of dentist not agreed that in pregnancy, x-ray can be performed[10.3%] marked we took X-ray in pregnancy without any protection. **[fig. 12]**
13. When we asked how many radiographs were advised by them approximately on a daily basis [38.9%] answered 5-10 radiographs , while [33.8%]advised approximately less than 5 radiographs and remaining advised more than 10 radiographs. **[fig.13]**
14. [41.5%] dental practitioners were using film holder to hold the film while taking radiograph in their practice while [36.6%] dentist instruct their patient to hold the IOPA film with their finger followed by [17.1%] dentist used a his/her own finger & [4.8%] used technician finger. **[fig. 14]**
15. Most of dentist [76.4%] reported they were aware of 'As low as reasonably achievable' principle [ALARA], while [23.6%] were not aware**.[fig.15]**

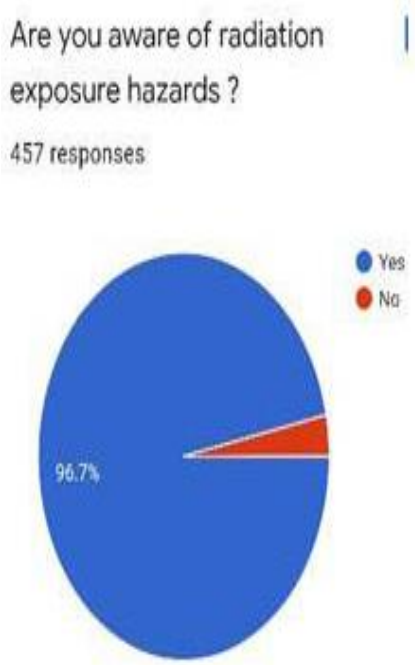
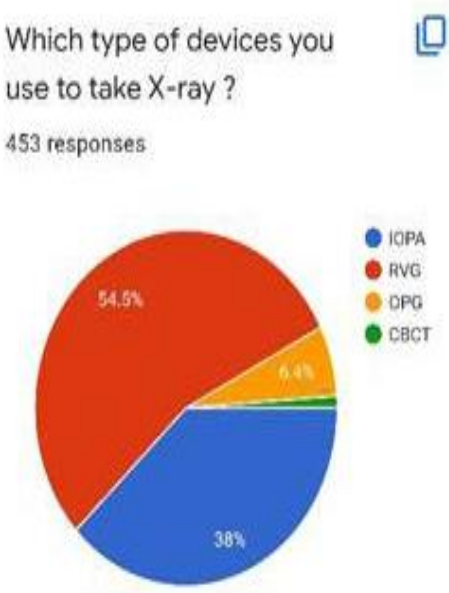


Fig.1



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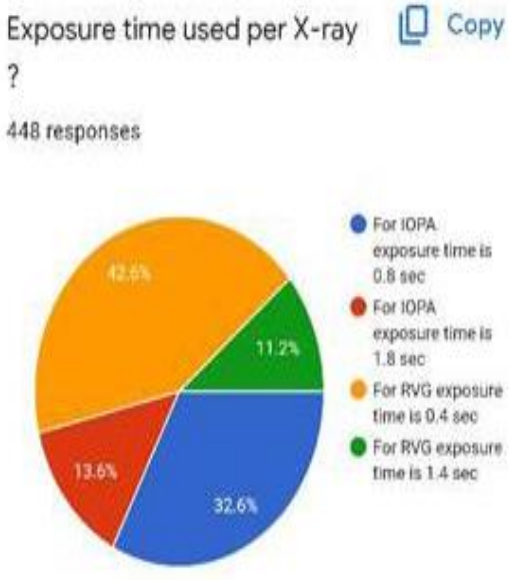

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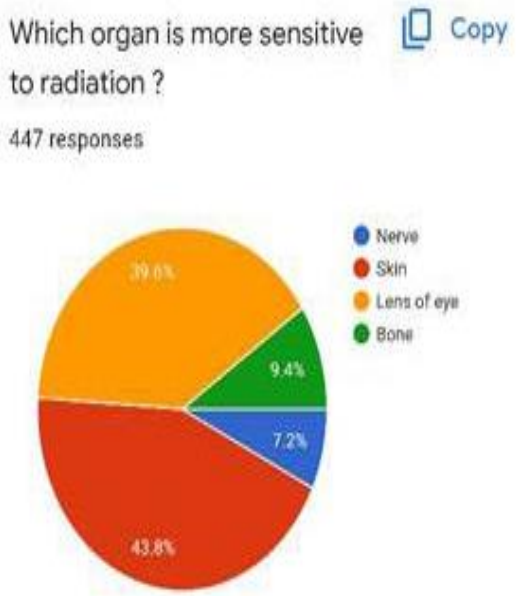

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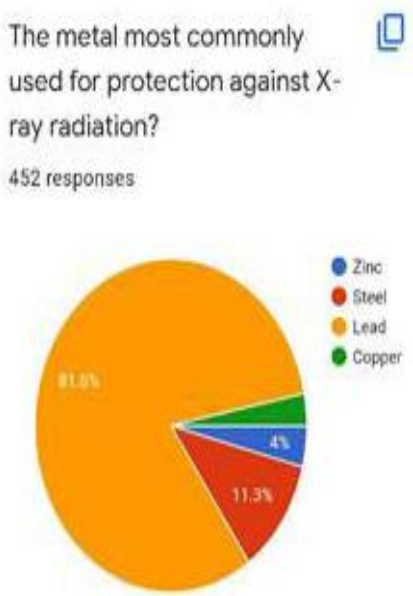
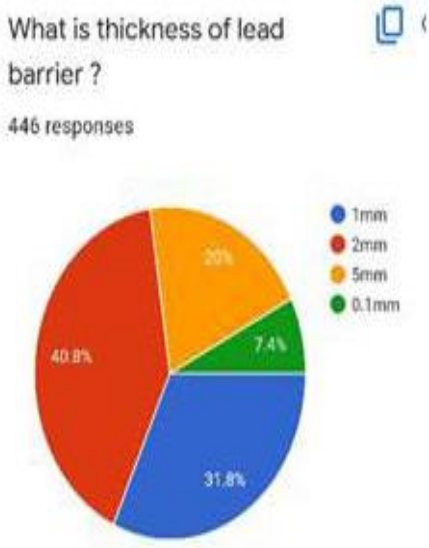


Fig.5



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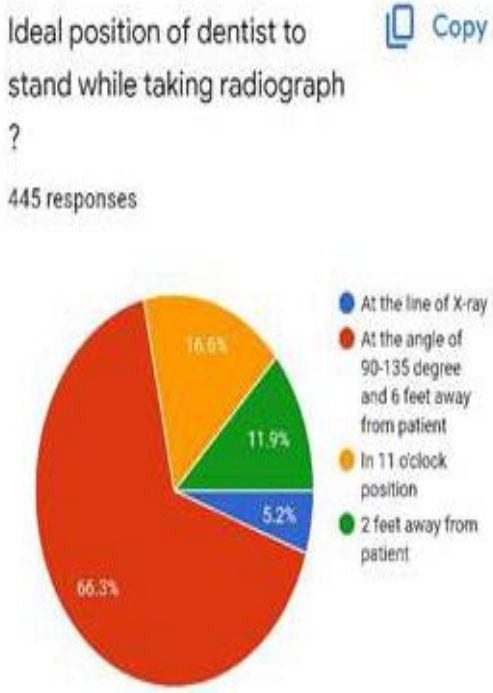

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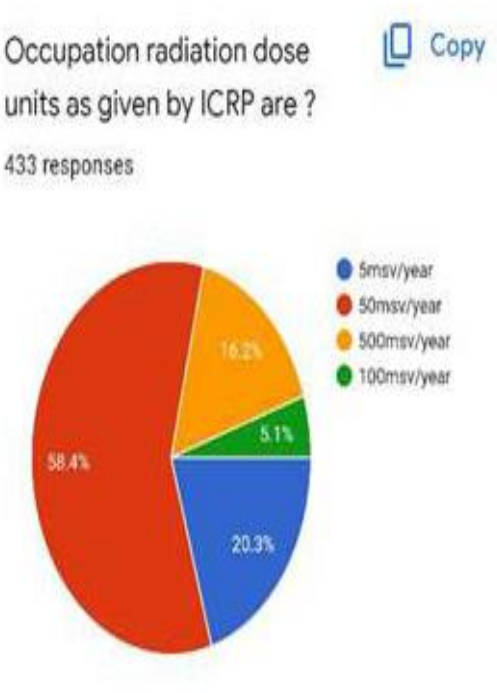
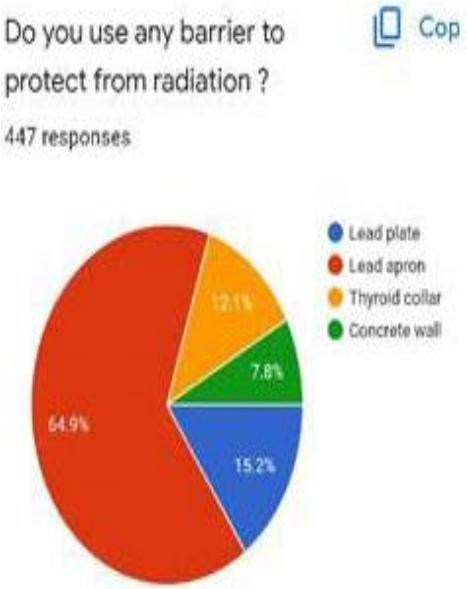


fig.8



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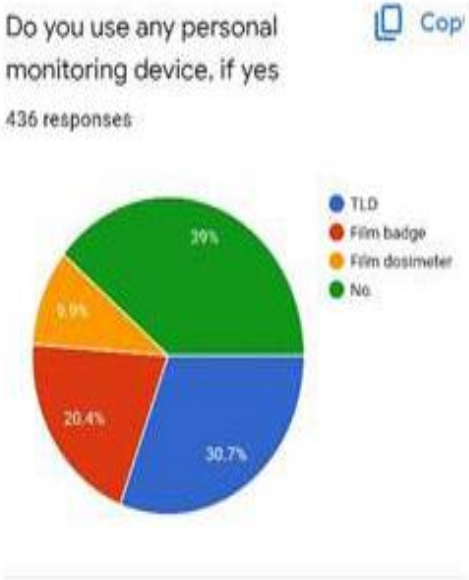


fig.10

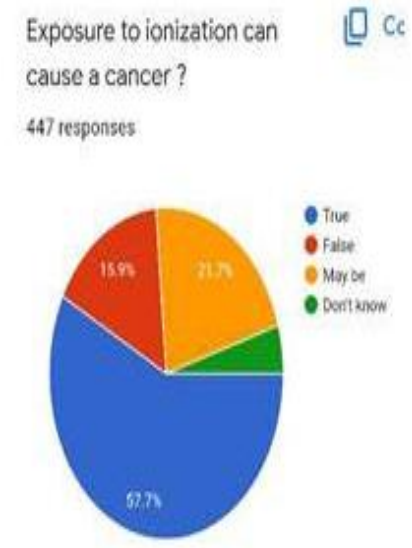


Fig.11

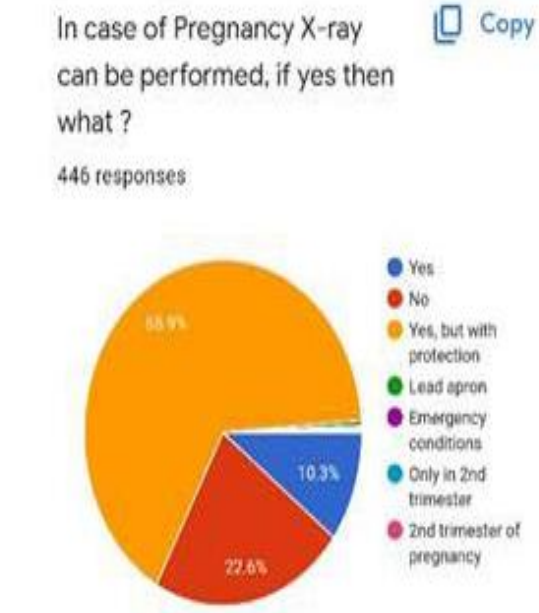


fig.12

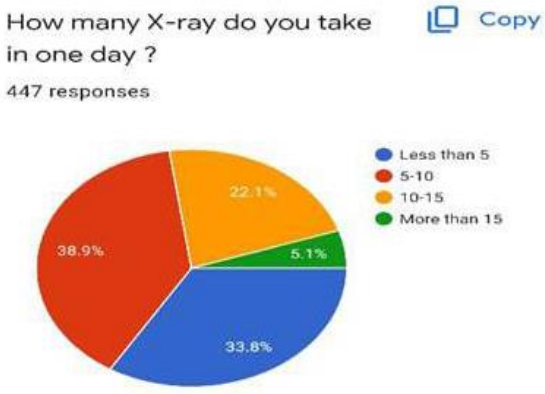
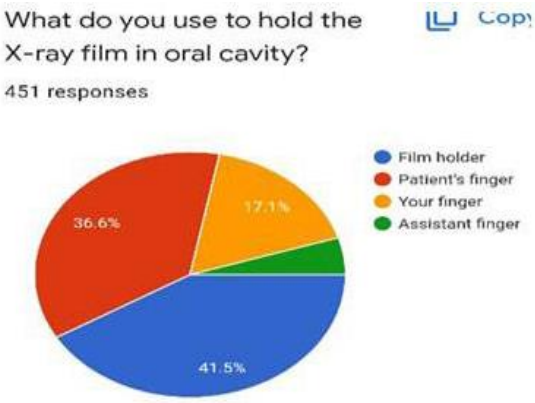
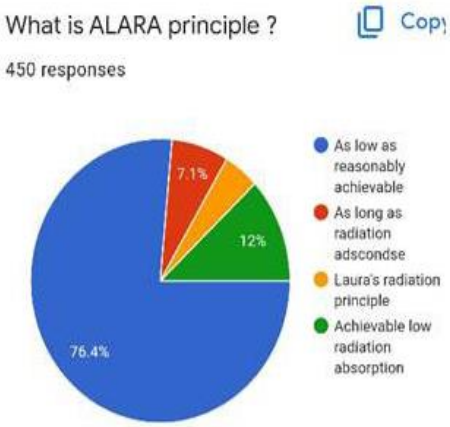


Fig.13



• fig.14



• fig.15

DISCUSSION

The level of knowledge among dentists regarding radiation protection was found to be weak. There was a lack of awareness about radiation protection hazards for their patients as well as for their own protection.

In a study conducted by Shahab et al., the majority of dentists included in study were not able to select ideal position and equipment so as to reduce exposure of their patient to secondary radiation.In our results, we found that many of dentists were not using certified dental X-ray units and relying on cheaper dental X-ray machines from local manufacturers. This neglect has arisen due to lack of awareness regarding the radiation protection hazards and not due to economical constraints among the dentist.

Conventional films require more radiation dose to produce images as compared toThe digital intraoral receptors. The present study shows 54.5% of dentists used digital system while remaining still adhere to analog receptor system. A study from Spain reported that 19.3% dentists preferred digital radiography with yearly increase of 4%.[9]

The results of the present study showed that [22.6%] considering that it is absolutely contraindicated to take dental radiographs for a pregnant female and [65.9%] dentist took X-ray with protection. A previous study was done byArnout EA found to be consistent with our result. [11]

Radiographic film (or any image receptor) should not be held by the patient or the dental professional in the oral cavity. In the present study, (41.5%) dentists used film holder during exposure; however, in studies conducted in Lucknow by Amanpreet K[10] and in Coorg byAsha, Veena SN,[12] 70.5% and 78% of dentists, respectively, used film holder during exposure. Our study shows [17.1%] of the operators themselves stabilized the intraoral image receptor like RVG and IOPA film, and [4.8 %] dentist used assistant finger to stabilize the film ,which is in close agreement with the study conducted in Turkey by Ilgüy D,[13] where 16.8% of the dentists held the image receptors. Our study showed that 36.6% of the patients held the image receptor using their digits during the radiographic exposure accounting for additional exposure of the digits against the rule of ALARA.[15]

In our study, we found that many of the dentist [66.3%] were aware of position distance rule.[7]15.2% were found to be using lead barriers while 64.9% used lead aprons and 7.8% was using a concrete wall.The study conducted byB. S. Aravind,[16] revealed that many of the dentist (28.3%) followed exclusively the “position distance rule” while 22%

were found to be using barrier which is made up of lead. Sixteen percent used lead aprons in their practice, and 33.3% have used a combination of safety techniques such as lead apron and lead barrier.[16]

Based on the results, we conclude that radiation awareness among dentists need to be created .Similarly, during under graduate training & in curriculum increased awareness and elaborate teaching of radiation protection measures in dental practice should be incorporated & made , mandatory & need to undergo a final questionnaire based tests to fulfill the course.awareness among dentists need to be created . according to study conducted by Furmaniak KZ, also suggested that there need to be improvement which should be results indicate the need for improvement in dental radiology training at universities. Also, the Dentist Final Examination (LekarskoDentystycznyEgzaminKoncowy), which is obligatory to pass before starting ´ dental practice, should include more questions from the dental radiology field, especially radiation safety topic[17].

CONCLUSIONS

Awareness about radiation protection measures can be made during institutional level or seminars should be conducted to educate the dental practitioners regarding the detrimental effects involved with the cumulative dose of radiation.

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