



KNOWLEDGE ATTITUDE AND BEHAVIOR OF DENTAL SURGEONS REGARDING DENTAL X-RAY EQUIPMENT

Owais Saghir¹, Muhammad Ali Akbani^{2*}, Zara Mehreen³, Aisha Kousar⁴, Asad Farooq⁵, Sumbul Shaikh⁶

¹BDS, MSc, Resident, Consultant Dentist, Aga Khan Health Service, Karachi, Pakistan

^{2*}BDS, Masters of Science in Oral Medicine, Dental Consultant, Western Dental Hospital, Karachi

³BDS, MDS, Assistant Professor, Liaquat College of Medicine and Dentistry, Karachi, Pakistan

⁴BDS, FCPS, Assistant Professor Liaquat College of Medicine and Dentistry, Darul Sehat Hospital, Karachi, Pakistan

⁵BDS, MDS, Associate Professor and Head of Department Science of Dental Materials, Liaquat College of Medicine and Dentistry, Karachi, Pakistan

⁶BDS, Consultant Dentist at Western Dental Hospital, Karachi, Pakistan

***Corresponding Author:** Muhammad Ali Akbani

*BDS, Masters of Science in Oral Medicine, Dental Consultant, Western Dental Hospital, Karachi
Email: drakbani@gmail.com

Abstract:

Ionizing radiation through dental radiography is an identified and possibly modifiable risk factor. There is a constant need to understand the latest trends in dental radiography and the knowledge of dental practitioners towards it.

Objective: To determine the knowledge attitude and behavior of dental surgeons regarding dental x-rays equipment.

Method: A cross sectional survey was done. Among the available sampling frame of registered dental surgeons in province of Sindh that is 5656, a sample size of 360 above was calculated using open epi software. Questionnaires were collected from May 2015 till July 2015. Convenience sampling was done in three hospitals of Karachi. Inclusion Criteria was Dental surgeons registered with PMDC using X-ray units in their daily practice. Exclusion Criteria was those dentist who did not have X-ray facility in their offices.

Result: A total of 363 questionnaires were filled. Regarding knowledge of x-ray equipment regarding Cone type, 84.6% used long cone, only 2% used short cone and about 13% didn't know about cone length. The technique use to take x-ray about 65% use parallel angle, 17% use bisecting angle and 18% use both types of techniques. The speed of film 56% used D speed film 14% used E speed film and 28% don't have any idea about speed of film. Pakistan Nuclear Regulatory Authority is a known authority for 53% and about 45% don't know about Pakistan. Regarding attitude of dental surgeons that during routine dental exam when they take x-ray 56% during routine checkup and follow-ups and 1.9% didn't know when to take x-rays. About the attitude of dental surgeons that during routine dental exam when they take x-ray 56% during routine checkup and follow-ups 43.8% when dentist can observe carious lesions. In third molar impaction or infection 80% dentist prescribe OPG x-ray 17% prescribe opg when more than 2 carious teeth 1.9% didn't know when to prescribe an opg x-ray. How many periapical x-ray dental surgeon did on daily basis 39.9% said less than 5 x-rays 14% said less than 10 x-rays, 33% said 10 to 15 x-rays, 11% said 15 to 20 x-rays. Behavior of Dental Practitioners

towards Dental x-rays. Regarding film holder was used during x-ray by 40% of practitioners, 59% didn't used film holder and 1% didn't know about its use. Walls of x-ray room covered with lead 29% said yes 39% said no 31% didn't know about it. About 62% said yes that during x-ray Lead apron and thyroid collar were used during x-ray 37% did not used lead apron and thyroid collar.

Conclusion: In conclusion, the results indicate that for minimizing any unnecessary radiation, attempts should be made to improve dentists' knowledge about radiation dose reduction. Since knowledge and education have strong direct effects on dentists' Behaviour, post graduate education courses must frequently be held by dental faculties to refresh the dentist's knowledge of the radiographic procedures and to inform them about the new technologies.

INTRODUCTION:

Radiographs and other imaging techniques are used to diagnose and monitor oral diseases. They also monitor dentofacial development and the progress or prognosis for any treatment. Radiographic examinations can be performed using digital imaging or conventional techniques. Detailed description of low dose radiation techniques described for the diagnosis of disease, treatment planning and follow up care of patients has been proposed as guidelines with regard to use of radiography in dental practice[1]. Some issues addressed in these guidelines relate to x-ray equipment and imaging systems as well as exposure time. Technical advances in x-ray equipment and imaging systems coupled with increasing use of E speed films instead of previously used D speed films have allowed significant reduction in radiation doses and exposure time.[2,5]

X-rays and gamma rays both are types of high energy (high frequency) electromagnetic radiations. They are packets of energy having no charge or mass (weight). These packets of energy are known as photons. These rays exists in an unstable ionized form and have potential to be degraded rapidly. Ionized molecules are unstable and quickly undergo chemical changes. If a living cell is exposed to these ionizing radiation repeatedly over a period of time it can lead to mutations (changes) in the cell's DNA this may lead to malignant changes. The amount of damage caused in the cell is related to the dose of radiation it receives.[1]

Considering the issues discussed in previous paragraphs many researches have been conducted to date, one study conducted in Belgium about the knowledge of dental radiography and radiation protection, dental surgeons' filled questionnaires regarding the radiological equipment and the techniques they used for intraoral radiography. The results clearly indicate the need for continued education on this subject [4]. Many studies have been conducted to evaluate dental practitioner's knowledge about x-ray equipment which are explained below.

A research was conducted to determine the dentist's knowledge about dose reduction techniques, of radiographic equipment and quality of dental radiographic service in general dental practice in Turkey its. Results indicate that for minimizing any unnecessary radiation, attempts should be made to improve dentists' knowledge about radiation dose reduction techniques (9)

Survey of private dental offices in Belgium and gain knowledge and attitude of Belgian dentists towards quality care in radiography and radiation protection. A questionnaire was distributed among 700 Belgian dental offices, which were included based on demographic data and the use of intraoral radiographic equipment. An elaborate educational program in dental radiography is a prerequisite. Furthermore, recommendations could help to attain a change in attitude towards the use of ionizing radiation in order to meet European guidelines.(6)

Information on the types of panoramic x-ray equipment used in NHS dental practice and whether dentists satisfy the legal requirements for safety, to determine which practice personnel take panoramic radiographs and to assess the prevalence of the practice of 'routine' panoramic radiography among NHS dentists. While some aspects of this study give reassurance about the prevalence of good practice (7)

A research to examine the association between dental x-rays the most common artificial source of ionizing radiation and the risk of intracranial meningioma Exposure to some dental x-rays performed in the past, when radiation exposure was greater than in the current era, appears to be associated with an increased risk of intracranial meningioma.

During the radiographic processing in a dental office or clinic, residues are formed which must follow their proper handling and discarding, aiming to minimize the environmental impacts. The chemical residues presenting risks to either the human health or the environment should be submitted to specific final treatments. [16]. The effluents coming from radiographic processing comprise solutions with high concentrations of silver and other chemical substances highly toxic to the environmental health [15]

The literature on possible harmful effects of professional diagnostic exposure for dentists is not consistent. Some epidemiological studies show no increased cancer induction in the dentist population, 10, 11 other studies show a higher prevalence of thyroid 5 and breast cancer, 12 in female dentists and of melanomas in male dentists. 14, Although it could be assumed that radiation dose levels in dental practice are relatively low, one should consider the cumulative effect of repeated exposures. There should be a striving for the implementation of proper decision and selection criteria for radiography in private dental offices and for radiological quality assurance.

The basic aim of this study to gain complete information about the knowledge attitude and behavior of Dental surgeons regarding dental radiography as clearly the objective of the study is to determine the knowledge attitude and behavior regarding dental x-rays

MATERIALS AND METHODS:

STUDY DESIGN:

A cross sectional KAP survey.

STUDY SETTING:

In all 363 questionnaires were collected from May 2015 till July 2015. Convenience sampling was done in three hospitals namely Baqai medical and dental college, Jinnah medical and dental college and Dow international medical and dental college.

SAMPLE SIZE:

Out of the available sampling frame of registered dental surgeons in province of Sindh that is 5656, a sample size of 360 above was calculated using open epi software at 95% confidence interval.

SAMPLING TECHNIQUE:

Non probability convenience sampling was used for the current study.

INCLUSION CRITERIA:

- 1- Dental surgeons Registered with PMDC.
- 2- Those who are working in clinics of hospitals or in private practices and they also have X-ray units in there practice.

EXCLUSION CRITERIA:

- 1- Those dentist who did not have X-ray facility in their offices were excluded from the study.

DATA COLLECTION:

Data collection was done by self-administered questionnaires which were distributed among participants. In the questionnaire other than socio-demographics, details were asked about the knowledge, attitude and practices of intraoral radiographic machine used for intraoral radiography. (4)

STATISTICAL ANALYSIS:

Statistical analysis was done on SPSS 16

RESULT: The results were calculated as frequencies. Frequencies of sociodemographic is explained in table 1

| VARIABLES SOCIODEMOGRAPICS AGE | FREQUENCY n | TOTAL n% |
|-----------------------------------|-------------|----------|
| 20-25 | 1 | .3 |
| 26-35 | 269 | 74.1 |
| 36-45 | 93 | 25.6 |
| 46-65 | 363 | 100.0 |
| GENDER | | |
| Male | 121 | 33.3 |
| female | 242 | 66.7 |
| Total | 363 | 100.0 |
| MARTIAL STATUS | | |
| single | 223 | 61.4 |
| married | 138 | 38.0 |
| widowed | 2 | .6 |
| Total | 363 | 100.0 |
| LEVEL OF EDUCATION | | |
| Graduate | 87 | 23.9 |
| postgraduate | 276 | 76.0 |
| Total | 363 | 100.0 |
| MODE OF PRACTICE | | |
| Private | 22 | 6.1 |
| Government | 201 | 55.4 |
| Both types of practice | 7 | 1.9 |
| Hospital | 53 | 14.6 |
| Medical and dental college | 80 | 22.0 |
| Total | 363 | 100.0 |
| DESIGNATION | | |
| Assistant and associate professor | 97 | 26.7 |
| Demonstrator/lecturer | 231 | 63.6 |
| House Officers | 35 | 9.7 |
| Total | 363 | 100.0 |

A total of 363 forms were filled in which 33% were males and 66.7% were female respondents. There were 23.9% dental graduates and 70% were postgraduate trainees and post graduates.

TABLE 2 shows knowledge of dental surgeons regarding X rays

| KNOWLEDGE | FREQUENCY n | TOTAL n% |
|--|-------------|----------|
| Do you have x-ray in your clinic | | |
| Yes | 363 | 100.0 |
| the KV on which you take your x-ray | | |
| Adjust accordingly | 173 | 47.7 |
| 40-50KV | 65 | 17.9 |
| 60-80 KV | 125 | 34.4 |
| Total | 363 | 100.0 |
| Cone type of your x-ray | | |
| long cone | 307 | 84.6 |
| short cone | 8 | 2.2 |
| don't know | 48 | 13.2 |
| Total | 363 | 100.0 |
| which type of technique you utilize while taking X-ray | | |
| parallel angle technique | 238 | 65.6 |
| bisecting technique | 62 | 17.1 |

| | | |
|---|-----|-------|
| both | 63 | 17.4 |
| Total | 363 | 100.0 |
| The speed of periapical film used | | |
| E | 52 | 14.3 |
| D | 206 | 56.7 |
| don't know | 105 | 28.9 |
| Total | 363 | 100.0 |
| do u know about Pakistan nuclear regulatory authority | | |
| yes | 194 | 53.4 |
| don't know | 159 | 45.5 |
| Total | 363 | 100.0 |
| Is your diagnostic radiation apparatus and area of use licensed by PNRA | | |
| yes | 127 | 35.0 |
| no | 100 | 27.5 |
| don't know | 136 | 37.5 |
| Total | 363 | 100.0 |
| Which type of film you use for your X-ray | | |
| automatic processing | 238 | 65.6 |
| self-processing | 99 | 27.3 |
| don't know | 26 | 7.2 |
| Total | 363 | 100.0 |
| You installed your x-ray equipment since | | |
| 5 years | 162 | 44.6 |
| 10 years | 167 | 46.0 |
| 15 years | 26 | 7.2 |
| more than 15 years | 8 | 2.2 |
| Total | 363 | 100.0 |
| Intraoral radiographic machine works at | | |
| 4mA | 65 | 17.9 |
| 10mA | 155 | 42.7 |
| DONT KNOW | 143 | 39.4 |
| Total | 363 | 100.0 |

Table 2 interprets the knowledge of dental surgeons regarding x-ray equipment 47.7% adjust accordingly, 17.9% did on 50KV, and 34.4% did on 60-80KV. Cone type of x-ray 84.6% used long cone only 2% used short cone and about 13% didn't know about cone length. The technique use to take X-ray about 65% use parallel angle, 17% use bisecting angle and 17% use both types of techniques. The speed of film 56% used D speed film 14% used E speed film and 28% didn't have any idea about speed of film. Pakistan Nuclear Regulatory Authority is a known authority for 53% and about 45% don't know about Pakistan Nuclear Regulatory Authority and only 35% has license from Pakistan Nuclear Regulatory Authority. Type of film used for processing in x-ray about 65% used automatic processing, 27% used self-processing and 7% don't know about film processing. Age of x-ray equipment 44% had x-ray equipment since 5 years, 46% had x-ray equipment since 10 years and 7% had x-ray equipment since more than 15 years %.

Table 3 Attitude of Dental Practitioners towards Dental X-Rays.

| Attitude | FREQUENCY n | TOTAL n% |
|---|-------------|----------|
| During routine dental exam when you take x-ray during routine checkup and follow-ups when you can observe carious lesions | 204 | 56.2 |
| Total | 363 | 100.0 |
| When do you prescribe OPG X-ray third molar impaction or infection | 292 | 80.4 |

| | | |
|--|-----|-------|
| more than 2 carious teeth | 64 | 17.6 |
| dont know | 7 | 1.9 |
| Total | 363 | 100.0 |
| How many periapical xray you do on daily basis | | |
| less than 5 | 145 | 39.9 |
| less than 10 | 54 | 14.9 |
| 10 to 15 | 122 | 33.6 |
| 15 to 20 | 42 | 11.6 |
| Total | 363 | 100.0 |

Table 3 gives us idea about the attitude of dental surgeons that during routine dental exam when they take x-rays 56% during routine checkups and follow-ups 43.8 % when dentist can observe carious lesions. In third molar impaction or infection, 80% dentists prescribe OPG x-ray 17% prescribe OPG when more than 2 carious teeth were present, 1.9% didn't know when to prescribe an opg x-ray. How many periapical X-rays dental surgeons did on a daily basis 39.9% said less than 5 X-rays 14% said less than 10 X-rays, 33% said 10 to 15 X-rays, 11% said 15 to 20 X-rays.

Table 4 Behavior of Dental Practitioners towards Dental X-Rays.

| Behaviour | FREQUENCY n | TOTAL n% |
|--|-------------|----------|
| How frequently you change your X-ray developing solution | | |
| once a week | 274 | 75.5 |
| after two weeks | 78 | 21.5 |
| after three weeks | 11 | 3.0 |
| Total | 363 | 100.0 |
| Do you utilize film holder while taking x-ray | | |
| yes | 148 | 40.8 |
| no | 214 | 59.0 |
| don't know | 1 | .3 |
| Total | 363 | 100.0 |
| Walls of x-ray room cover with lead | | |
| yes | 107 | 29.5 |
| no | 142 | 39.1 |
| don't know | 114 | 31.4 |
| Total | 363 | 100.0 |
| Lead apron and thyroid collar use during x-ray | | |
| yes | 226 | 62.3 |
| no | 137 | 37.7 |
| Total | 363 | 100.0 |

Table 4 Behavior of Dental Practitioners towards Dental X-Rays. How frequently x-ray developing solution is changed 75% said once a week, 21% after two weeks 3% after three weeks. Film holder was used during x-ray by 40% of practitioners, 59% didn't used film holder and 1% don't know about its use. Walls of x-ray room covered with lead 29% said yes 39% said no 31% don't know about it. About 62% said yes that during x-ray Lead apron and thyroid collar were used during x-ray 37% did not used lead apron and thyroid collar.

DISSCUSION:

The goal of intraoral and extra oral imaging is to produce high-quality images of the oral structures with a minimum radiation exposure (1). There is very little data available on dental radiology, within oral radiology; it has been shown that dentists have incomplete knowledge of radiological guidelines in present study as Cone type of x-ray 84.6% used long cone only 2% used short cone and about 13%

didn't know about cone length. The technique use to take X-ray about 65% use parallel angle, 17% used bisecting angle and 18% used both types of techniques The speed of film 56% used D speed film 14% used E speed film and 28% didn't have any idea about speed of film. Pakistan nuclear regulatory authority is an authorized body licensing for the safety of x-ray equipment and the premises where equipment is placed about 45% dentist didn't have knowledge about this body. In our study, the dental practitioner's knowledge about the details of radiographic equipment which they used were insufficient because they may be less likely to adopt techniques. Dentists should continuously evaluate the quality of the images produced in their offices. For intraoral radiography, the attitude of dental surgeons that during routine dental exam when they take x-ray ,56% during routine check-ups behaviors of Dental Practitioners towards dental x-rays. There is need for further implementation of radiation protection principles among general dental practitioners.

CONCLUSION:

In conclusion, the results indicate that for minimizing any unnecessary radiation, attempts should be made to improve dentists' knowledge about radiation dose reduction techniques as at present RADIOLOGY is not taught as a subject in undergraduate level it should be taught as separate subject in undergraduate level and After graduation dentists should update their knowledge by attending meetings and by latest researches. Getting undergraduate radiological education is no guarantee of a lifetime's professional competence. Since knowledge and education have strong direct effects on dentists' Behavior, post graduate education courses must frequently be held by dental faculties to refresh the dentist's knowledge of the radiographic procedures and to inform them about the new technologies.

REFERENCES:

1. White SC, Heslop EW, Hollender LG, Mosier KM, Ruprecht A, ShROUT MK. Parameters of radiologic care: an official report of the American Academy of Oral and Maxillofacial Radiology. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2001; 91: 498–511.
2. Tugnait A, Clerehugh DV, Hirschmann PN. Radiographic equipment and techniques used in general dental practice. A survey of general dental practitioners in England and Wales. *J Dent* 2003; 31: 197–203.
3. Ludlow JB, Platin E. Densitometric comparisons of Ultra-speed, Ekstaspeed and Ekstaspeed Plus intraoral films for two processing conditions. *Oral Surg Oral Med Oral Pathol Oral Radio Endod* 1995;79: 105–113.
4. JKM Ap, *Dentomaxillofacial Radiology* (2010) 39, 113–118. doi: 10.1259/dmfr/52763613
5. Kullendorff B, Petersson K, Rohlin M. Direct digital radiography for the detection of periapical bone lesions: a clinical study. *Endod Dent Traumatol* 1997; 13: 183–189.
6. 1. Radiation. Accessed at www.acr.org/About-Us/Media-Center/Position-Statements/Position-Statements-Folder/ACR-Statement-on-Airport-Full-body-Scanners-and-Radiation on February 10, 2015
7. Price C. Sensitometric evaluation of a new E-speed dental radiographic film. *Dentomaxillofac Radiol* 1995; 24: 30–36
8. D I'lgü'y*, M I'lgü'y, S Dinc,er and G Bayırlı *Dentomaxillofacial Radiology* (2004) 33, 334–339 q 2004 The British Institute of Radiology <http://dmfr.birjournals.org>
9. R Jacobs*,1, M Vanderstappen1, R Bogaerts2 and F Gijbels1 *Dentomaxillofacial Radiology* (2005) 34, 222–227 q 2005 The British Institute of Radiology <http://dmfr.birjournals.org> Eklund
10. Eklund G, Izikowitz L, Molin C. Malignant tumours in Swedish dental personnel: a comparative study with the total population as well as with some specific occupational groups. *Swed Dent J* 1990;14: 249–254.
11. Miyaji CK, Colus IM. Cytogenetic biomonitoring of Braziliandentists occupationally exposed to low doses of X-radiation *Pesqui Odontol Bras* 2002; 16: 196–201.
12. Wingren G, Hallquist A, Degerman A, Hardell L. Occupation and female papillary cancer of the thyroid. *J Occup Environ Med* 1995;37: 294–297.

13. Eriksson M, Hardell L, Malker H, Weiner J. Increased cancer incidence in physicians, dentists, and health care workers. *Oncol Rep* 1998; 5: 1413–1418.
14. Rix BA, Lynge E. Cancer incidence in Danish health care workers. *Scand J Soc Med* 1996; 24: 114–120.
15. Marcos André dos Santos da Silva¹ Oswaldo Serra dos Santos-Neto¹ Jefson Moraes Amorim¹ José Bauer² *RSBO*. 2012 Jul-Sep;9(3):260-55.
16. Brasil. Ministério da Saúde. Agência Nacional de Vigilância Sanitária (Anvisa). Serviços odontológicos: prevenção e controle de riscos. Brasília. Série A. Normas e Manuais Técnicos; 2006.