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Perception of Radiation Awareness among Patients in South Indian population– A Qualitative Study

Medical Science

KEYWORDS : Patient perception, radiation risk, ionizing radiation, biological effects of radiation, computed tomography (CT).

Rahul P Kotian	Assistant Professor, MSc. Medical Imaging Technology, Department of Medical Imaging Technology, Manipal School of Allied Health Sciences, Manipal University, Manipal
Suresh Sukumar	Assistant Professor, MSc. Medical Imaging Technology, Department of Medical Imaging Technology, Manipal School of Allied Health Sciences, Manipal University, Manipal
Sahana R Kotian	Assistant Professor, MSc. Medical Imaging Technology, Department of Medical Imaging Technology, Manipal School of Allied Health Sciences, Manipal University, Manipal
Leena R David	Assistant Professor, MSc. Medical Imaging Technology, Department of Medical Imaging Technology, Manipal School of Allied Health Sciences, Manipal University, Manipal

ABSTRACT

Increasing concern has recently been expressed in the literature that the patients undergoing diagnostic Computer tomography imaging and X-ray examinations have inadequate knowledge and awareness about radiation. The frequent use of Computed tomography and routine X-ray examinations for unnecessary indications is the most vital cause of increase in medical radiation exposure. Dose reduction techniques and radiation protection measures is a topic of public concern in which government should play a very important role. Radiologists and patients undergoing any radiological procedure involving ionizing radiation are becoming highly sensitized to the issue of radiation exposure from these diagnostic procedures. The attitudes and perceptions of these patients undergoing diagnostic imaging procedures that use ionizing radiation vary widely. Patients perception about radiation awareness strongly influence their consent or acceptance of any diagnostic imaging procedure. In this study we review the perceptions of radiation risk by laypersons i.e patients who have very little knowledge and awareness about the diagnostic procedure and X-ray examination for which they have been referred. Although the benefit vs risk ratio will outweigh the radiation risk involved in these X-ray and CT examinations but the patients awareness about radiation is a major concern in today's society.

Need of the study : The purpose of this study is to understand the perception of radiation awareness among patients in the South Indian population. Very less Qualitative research work has been taken up in this field, as a result such study will gain impetus in the near future.

Methods : The study was carried out in South India. Qualitative case study was conducted based on Non-Probability purposive sampling and in-depth interview was conducted at the Department of Radiodiagnosis and Imaging, Kasturba Medical College, Manipal among six patients who were referred for X-ray and CT examinations.

Results : An in-depth interview among patients in South India revealed their poor perception about radiation awareness.

Conclusion : This study has clearly demonstrated the poor awareness of radiation among patients in South India.

Introduction

Man-made sources contribute to 18% exposure to ionizing radiation (26, 30).Increasing concern has recently been expressed in the literature that the patients undergoing diagnostic Computer tomography imaging and X-ray examinations have inadequate knowledge and awareness about radiation in addition to the health professionals(25, 26, 27, 28).The attitudes and perceptions of patients undergoing diagnostic imaging procedures that use ionizing radiation vary widely (1). Patients perception about radiation awareness strongly influence their consent or acceptance of any diagnostic imaging procedure (1). Exposure to ionizing radiation during diagnostic imaging procedures carries small but real risks to children, young adults and pregnant women (3). ALARA (As low as reasonably achievable) has been a guiding principle for all imaging procedures involving ionizing radiation for decades (23). ALARA is also considered as a gold standard tool for radiation protection measures (24). Diagnostic imaging procedures use ionizing radiation which may or may not cause any adverse effects to the patients which again depends upon the amount of dose. Patient undergoing any diagnostic imaging procedure should be aware about the biological risk of radiation exposure. Ionizing radiation may cause genetic damage which in turn increases the risk of cancer (4). Ionizing radiation at low doses may also have cancer risks (5). Data acquired from atomic bomb survivors in Japan and victims of the Chernobyl nuclear accident in Ukraine show that comparatively smaller dose of radiation used in medical imaging could also increase the risk of cancer (6). The use of medical imaging to aid and help in diagnosis of illness and injury has tremendously increased during the past 2 decades. Computed Tomography (CT) examinations in the United states have increased from 26 million in 1988 to more than 70 million in 2008 (2). From previous epidemiological studies, the lowest dose of ionizing radiation which has a good evidence of carcinogenicity is between 10-50 mSv. The radiation exposure dose for one chest radiograph taken is 0.02 mSv and for an abdominal CT it is 9 mSv (7). The radiation dose received from one chest radiograph is less than that received from background radiation per day (8). In order to understand the perception of radiation awareness among patients, qualitative study among patients would help in better understanding the barriers and how to improve the radiation awareness among the patients. Focus group in qualitative study has shown to be particularly useful for formative research (9) and they also aid in understanding acceptability and potential barriers of radiation awareness among patients.The purpose of this research was to identify the factors and barriers regarding the radiation awareness among patients in South Indian population.

Aims and Objectives

- To understand the perception of radiation awareness among patients in the South Indian population.
- To understand the need for improving patients awareness about ionizing radiation.

Methods

The study was carried out in South India. Qualitative case study was conducted based on Non-Probability purposive sampling and in-depth interview was conducted at the Dept of Radiodiagnosis and Imaging, Kasturba Medical College, Manipal among six patients who were referred for X-ray and CT examinations. Interview was conducted in the South Indian local language Kannada. This interview was later translated into English before coding the data into separate themes.

Study Design

Qualitative case study based on in-depth interview.

Study Sample

Patients referred to the Radiolgy department for X-ray and CT

examinations were chosen for in-depth interview.

Sample Size
In-depth interviews were conducted among 6 patients referred to Radiology department for routine X-rays and CT scans.

Sampling Technique
The patients for in-depth interviews were selected by purposive non-probability sampling method.

Ethical considerations
- Informed voluntary written consent was obtained from the participants of the study.
- Information shared by the patients will be strictly used only for research and educational purpose.
- Ethical clearance was obtained from the Kasturba Medical Hospital and College Institutional Ethical Committee.

Instrument
An In-depth interview was done to find out the awareness of radiation among patients undergoing diagnostic imaging procedures. In the process efforts were also made to receive suggestions and inputs from the patients as to how to improve radiation awareness among them.

The patients feedback or patient's guide included the following main points:
- Perception about x-rays.
- Description about the harmful biological effects of radiation in X-ray and CT imaging.
- Sugggestions on how to further improve patients awareness about radiation.

Procedure
Patients awaiting their CT scans or X-ray examinations were approached and those who were willing to give their consent for participation were recruited for the study. All interviews were carried out privately within the hospital campus. The patients were assured that their identity will not be leaked. To facilitate the interview process an in-depth guide was developed. Semi-structured interviews were scheduled to document the information derived from the observation of the informed consent process. All the interviews were recorded on a smart phone after obtaining consent to have a more detailed information provided by the participants. A framework analytical approach was used for data analysis. Before this the recorded Kannada interview was translated into English and was converted into a written word document before decoding the data. Framework analytic method involves many sub steps which includes data correlation, identifying a specific theme, indexing and mapping them and then finally sorting them and placing them in their appropriate theme. Once all the interviews were coded, segments of text that were related to a common theme were merged together to form the themes for analysis.

Results
The main emerging themes of analysis are described.

Details of Patients Interviewed
A total of 6 patients were interviewed for this study. All patients interviewed were from South India and the interviews were carried out in Kannada.

Table 1: Details of Patients Interviewed

No	Age	Gender	Profession
1.	45	Female	Housewife
2.	50	Male	Business
3.	42	Male	Electrician
4.	65	Male	Farmer
5.	62	Male	Retired
6.	28	Male	Business

Themes of analysis
- Awareness of radiation (Benefit vs risk of radiation).
- Information provided by treating physicians to the patient.
- Perception of discussing health concerns with doctors
- Patient friendly guide and booklet on radiation awareness.

Awareness of radiation (Benefit vs risk of radiation)
Patients have very poor awareness about x-rays, how is it used for their imaging, how it is produced, how it reacts with the body.The perception what patients have about radiation is that x-rays are not at all harmful to them. During an in-depth qualitative interview with the patients it was observed that the patients are not aware whether the diagnostic imaging is beneficial for their treatment or not. It was also found out that certain patients were referred for CT scans unnecessarily where the diagnosis of their illness could have been done by non-ionizing ultrasound scans. Patients stated that X-ray is the only method to detect their illness and without it they cannot be cured. We also encountered a patient who had come for a review X-ray after he had a fracture a month ago who stated that his treatment would have been impossible without X-ray radiation. We also recorded some minute beliefs of some patients which states that X-rays produces electric current in the body and it does not pass through the body . It was also found that some patients were aware that X-rays should not be used for pregnant patients but were unaware about the reason. It was reported by the patients that they are not aware about benefit vs risk involved in their diagnostic imaging procedures. To conclude the patients had poor awareness about radiation.

Information provided by treating physicians to the patient
Most of the patients who were interviewed reported that they have no clue about why X-ray was taken for their illness and what is the treating physician suspecting. The patients also have no information regarding the type of diagnostic procedure for which they have been referred and came to know about the type of imaging procedure only after the examination was done. Moreover treating physicians also do not provide information whether the imaging examination uses ionizing or non-ionizing radiation. One patient also stated that the lack of communication between the patients and the referring physicians can be one of the major cause of lack of information. Secondly, the heavy workload and the number of patients visiting each physician has also increased which makes it very difficult for the physicians to explain things in detail for each and every patient he added. Overall no information was provided by the treating physicians to the patients.

Perception of discussing health concerns with doctors
An in-depth review with patients also revealed a very valid point of discussing of health related issues by the patients with their treating physician. During interview some of the patients committed that they don't even bother to ask the treating physician about their present illness and why they have been referred to the imaging department. Here again the role of the treating physician is to discuss the health related issues with their patients and justify the use of imaging diagnosis which will be helpful for their further treatment. Overall the perception of discussing health related issues with doctors is very poor among the patients.

Patient friendly booklet and guide on radiation awareness
During our qualitative in-depth interview patients suggested to maintain a guide or booklet explaining the basics of medical imaging and information about all diagnostic imaging procedures. Patients also suggested to include the radiation doses of all diagnostic procedures including x-rays in layman's terms and to correlate these values with cancer risk. Patients have insisted to provide these booklets to all treating physicians of the hospital and these booklets should be kept in all patient waiting areas. Overall patients have suggested to create a concise manual on medical imaging diagnostic examinations which will help the common men to know their risk involved in diagnostic imaging.

Discussion
The observations and findings from this study revealed the poor

awareness of radiation among patients in South India. According to the guidelines laid by radiation safety bodies, the patients undergoing any diagnostic imaging procedure have the right to know the amount of dose he or she receives during the imaging procedure and the patients should be aware about radiation. The patients undergoing diagnostic CT and X-ray examinations has very poor knowledge about radiation. The treating physician should explain the imaging procedure to the patient and explain the benefit vs risk of radiation which is very essential in any healthcare setup. Benefit vs risk of radiation is a topic of moral ethics which all the treating physicians should be aware and follow in their day to day practice. The treating physician should always compare the benefit vs risk involved in any diagnostic imaging procedure before prescribing any imaging tests. This practice has been enforced by the International and National Radiation safety bodies. Various studies conducted worldwide have documented poor awareness and knowledge among medical doctors, dentists, radiographers, technologists and other paramedical staff about ionizing radiation (19, 20, 21). A recent retrospective study conducted revealed an increase in leukemia and brain cancer in children who underwent multiple CT scans at ages younger than 15 years receiving a dose of 10 mGy (11). A study conducted in Port Harcourt reported that 60% of the patients were not explained about the diagnostic procedure by the radiation worker (12). In one of the studies conducted in United Kingdom estimated a 100-250 deaths each year from cancer which is directly related to medical radiation exposure (13, 14). Similarly a study conducted in United States stated that the approximate number of deaths attributable to CT was 700-1800 during a year (15). Recently the high speed MDCT technology enables faster scanning and creates more defined images and applications but at the same time the referring physicians CT scan requests have increased by 20% unnecessarily (16,17) and similarly 30% of all pediatric CT scans could have been easily be avoided by a non-ionizing imaging techniques (18). Published surveys report that 93% of patients referred for a CT examination do not receive any information about the biological risks associated with their investigation (16). This study also highlights the deficiency of treating physician which might hamper the expected benefits compared to the risks involved in diagnostic imaging. Therefore this study not only emphasizes all patients to improve their knowledge and awareness about radiation but also advises all treating physicians to update their knowledge on all the latest imaging modalities using ionizing and non-ionizing radiation. Explaining about the diagnostic imaging procedure to the patient should be considered as vital by every treating physician. The treating physician should be very well updated in the recent trends in radiation protection. Patient education about radiation should be the responsibility of the treating physician (22). An in-depth interview with patients revealed many factors which lead to the poor awareness of radiation risks among patients. In terms of strengths of the study, Qualitative methods like in-depth interview is a very useful tool to evaluate the patients perception of radiation awareness. This method also improves the validity of minute findings in a very healthy conversation with the patients, as it is an open ended approach. The only limitation of this study was that we were not able to conduct focus group discussions with the patients as they were not willing to wait for longer duration as they were already ill and have come for their treatment. Further research in these types of study should conduct focus group discussions and further address issues in more depth.

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Conclusion
This study has highlighted the poor awareness about radiation among patients in South India. In conclusion education is the most important factor to create awareness among patients and prevent unnecessary radiological examinations. Improving of awareness among patients will help them in reducing their lifetime cancer risk from ionizing radiation. In the education system the government has a very important role and responsibility to start giving information about radiation from primary school itself. National Radiation protection committee has the responsibility to publish and deliver informative brochures to the general public and at last the radiologists and the imaging technologist should organize meetings, workshops, cme's, conferences and even live TV programs. After our qualitative interview we concluded that the overall awareness of radiation among patients is very poor.

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