ORIGINAL ARTICLE

# USE OF RADIOLOGICAL DIAGNOSTIC MODALITIES IN TERTIARY CARE HOSPITAL – HOW DO THE CLINICIANS DECIDE ABOUT TYPE OF MODALITY AND CLINICIAN PERCEPTION REGARDING HAZARDS ASSOCIATED WITH RADIOLOGICAL IMAGING MODALITIES?

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**Background:** In the past few decades there is rapid advancement in technology and hence tremendous innovations in diagnostic imaging. This has increased our ability to diagnose illness and monitor response to treatment in a manner which was not previously possible. As compared to previous times, there is also more easy availability of these diagnostic imaging modalities in our hospitals. Therefore, easy and frequent availability harbour the risk of injudicious use of these tests as well. This study is conducted to know the views of consultants about it. **Methods:** This cross-sectional descriptive study was conducted in Ayub Medical Institute MTI from March 2021 to July 2021. The data was collected through a self-administered anonymous questionnaire. **Results:** A total of 250 clinicians participated in the study with 54% males. Majority of them (n=140) 56% answered that consultants on round and on duty in OPD decide special radiological investigations for the patients. Most of them (90%, n=225) were aware of radiation hazards in CT, X-rays and fluoroscopy. **Conclusion:** The referring physicians working at MTI ATH Abbottabad have enough basic knowledge regarding the practice of radiological modalities but were unaware of specific health hazards and radiation doses to the patients associated with the use of these imaging modalities.

**Keywords:** Radiological modalities; Hazards; Clinician; Perception; MTI-ATH.

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## INTRODUCTION

The word radiology is derived from radiations. The term radiation means energy that is obtained from a source and passes through a medium or space. Heat, light and sound are types of radiations.[1] In a study conducted by Hassan Javed *et al* in 2019, it was concluded that there is unnecessary use of radiological investigations as perceived by radiologists in their study.[2]

This unnecessary use of radiological investigations was attributed to inadequate knowledge, inappropriate attitude and lack of training of physicians to refer patients to radiological resources. Radiations are utilized in different fields such as for therapeutic and diagnostic purposes. Radiological modalities used for diagnostic purposes and therapeutic interventions include radiography (X-Rays), ultrasound, computerized tomography scan (CT-Scan), magnetic resonance imaging (MRI) and nuclear imaging (scintigraphy), positron emission tomography (PET scan). Out of them few modalities (X-Rays, CT, nuclear imaging) work with and contain ionizing radiations and pose a direct radiation induced health hazard to patients. However, this harm is radiation dose related. The conventionally described different health risks due to imaging related radiations are cancer development (like leukaemia), cataract formation, risk to foetus when antenatal mother is exposed. The mechanism of injury is radiation induced alteration in genes and damage to DNA.[3,4] It has been found in different studies and is an established fact that radiation exposure during antenatal period caused malformation of child at birth and leukaemia in early childhood two times more as compared to adults.[5] As from above discussion and given references it is evident that the use of radiological modalities is not free from radiation hazards and ill effects to human health, therefore these should be exercised in very judicious and careful way.

## MATERIAL AND METHODS

The study was conducted in Ayub Teaching Hospital Abbottabad. A total of 250 consultants were interviewed through a self-administered questionnaire. Ethical approval was obtained, and confidentiality of data was assured and ensured. The data was analysed through SPSS-10.0. Frequencies

and percentages were used to describe categorical variable.

## RESULTS

The respondents included faculty from assistant professors to professors. Majority (54%, n=135) were male. The female contribution was 46% (n=115). Majority of consultants (n=140, 56%) advised special radiological investigations and residents were not directly allowed to decide about special investigations for patients. Most of them (90%, n=225) were aware of radiation hazards in CT, X-rays and fluoroscopy and did consider this aspect while describing radiological investigations containing ionizing radiations. However almost none of them were aware of estimated radiation doses associated with a specific radiological imaging study. Most of clinicians (n=200, 80%) considered it important that referral information should be provided to radiologists for meaning interpretation of radiological imaging studies. Many of them were of the opinion that it will be of further advantage if the choice of imaging study for patient under consideration is discussed with radiologist along with clinical notes and the clinical queries.

## DISCUSSION

Diagnostic radiology and medical imaging are the most rapidly expanding filed of medicine. Currently the radiological modalities include X-rays, fluoroscopy, CT scans, MRI, ultrasound, nuclear imaging and PET scan. This descriptive cross-sectional study was conducted in MTI-ATH Abbottabad. Majority of participants were male. All the participants took part voluntarily. Majority of the consultants and in most of the wards it is practiced that consultants advise radiological tests (fluoroscopy, CT scan and MRI) directly. The other common and routine radiological investigations are advised by senior residents. The clinicians have adequate knowledge about imaging modalities and have positive attitude. Most of the clinicians are aware and at least know the modalities which carry harmful ionizing radiations. They have poor knowledge about details hazards and specific doses given by specific radiological studies. These results are almost in accordance with the study of Salaam et al who concluded in their study that the physicians in their hospital had adequate knowledge and positive attitude about radiology.[6] These results of our study are in contrast to the results of Gunalp M *et al* who found that in a university hospital emergency department, the knowledge of radiological modalities was inappropriate.[7]

In a study conducted by Osward Bwanga *et al*, only 35.3% and 13.2%, of the respondents identified MRI and USS as having no radiation dose investigations respectively.[8] This contrasts with the findings in our study where almost 90% of the responders knew the modalities having ionizing radiations and those (MRI, USS) having no ionizing radiations. This difference in the findings may be due to the fact that there was no MRI scanner at the hospital in Zambia where Osward Bwanga carried out his study unlike our study where a fully functional state of the art MRI machine is available. The other reason may be exposure of the doctors during their post graduate training for their CPSP mandatory rotation in radiology.

Our study results showed that the clinicians were unaware of the specific radiation doses received by patients during a specific radiological investigation. This is in consonance with the studies by Lee *et al*[9] and Arslanoğlu *et al*[10] who demonstrated that most physicians were unable to provide an accurate estimate of the relative radiation dose of commonly performed radiological investigations.

Limitations of the study are that we could not use a comprehensive questionnaire for fear of lack of response. Nonetheless the results are useful to create awareness among relevant individuals.

## CONCLUSION

Clinicians at MTI-ATH Abbottabad have adequate and satisfactory preliminary knowledge about radiological modalities and have positive attitude in practicing and utilizing the available services. It will be of further patient advantage if clinicians are given more information specially regarding received radiation dose during a specific radiological study.

**Recommendations:** This is a small group study and only conducted in one tertiary care hospital, therefore larger multicentre studies are required before generalizing the results. Workshops at institutional level can be arranged to give more information to clinicians regarding safe and effective use of radiological modalities.

**Conflict of interest:** None

## AUTHORS' CONTRIBUTION

AA: Study design, data collection and data analysis. FA: data analysis, literature review, LK: Data compilation and literature review, IA: Data analysis and literature review.

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