Study of Radiology Safety Awareness among Hospital Staff in a Tertiary Care Rural Hospital of Middle Gujarat, India

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ABSTRACT

Background: Several challenges with radiation protection and safe practice in radiology departments needs to be addressed as very few studies are done in this aspect in our country. Especially with regard to General radiology safety and those necessary radiation protection and hazards.

Objectives: To know the existence knowledge about radiology safety among Hospital staff. To create awareness about Radiology Safety among Hospital staff in tertiary care institution of Middle Gujarat, India.

Methodology: The Healthcare Professionals who are willing to participate will be included in this descriptive cross-sectional survey. Questionnaire to test knowledge of Hospital staff pertaining to radiology safety will be created. Google link will be created to share the questions to the Hospital staff. Participation will be voluntary. Minimum 100 response will be collected to analyse the data. Data will be analysed using response sheet in google form. The validity and reliability of the used questionnaires, which asked both specific and generic questions, had been established.

Results: The survey included 136 healthcare professionals in total. The majority of participants, who are often between the ages of 20 and 35, have excellent awareness of radiology Procedure as well as safety. Maximum were intern doctors (41.9%) followed by Junior resident doctor(27.9%).Majority Hospital staff having adequate knowledge regarding indication/contraindication as well as allergic reaction of contrast media used in various radiological procedure.

Conclusion: Depending on the professional duties, amount of training, and even country of healthcare practitioners, awareness and knowledge of radiation threats may vary. The current findings showed that the present group had a high level of awareness regarding radiation risks generally. The results of the survey show that there needs to be more focus on providing all medical workers with extensive and systematic training in radiation protection.

Keywords: *Awareness, Health care Professional, Safety*

INTRODUCTION

Radiology safety is a very crucial aspect of patient and hospital heath care staff work flow. General radiology safety is a broad spectrum which pertains to various radiological investigations including X ray, radiographic procedures, CT scan and MRI.[1,2] It is very important to train hospital staffs to ensure safe radiology practice. The best way to achieve this is to know the existing knowledge regarding the basic radiology safe work practice. There are several ways in which it can be done, but the most practical way is to create questionnaires. Answering the questionnaires is thought provoking and enhances the knowledge of participating staff. Responses generated will provide a basis to identify the areas where we can train them. To the best of our knowledge, inspite of extensive literature search we were not able to find studies addressing this concern.

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The aim of the study is to assess the level of awareness of radiation safety amongst the Healthcare Professionals in the Private Hospital of Vadodara.

METHODOLOGY

The Observational cross sectional study was undertaken at the Department of Radiology of Parul

Sevashram Hospital , Parul Institute Of Medical Sciences & Research, Parul University, Vadodara, Gujarat, India from March 2023 to April 2023.

The study used a descriptive, cross-sectional methodology using self proposed questionnaires to know the knowledge of radiology safety awareness in the private hospital of Gujarat's Vadodara district. The questionnaire was provided to the study population, Participation was be voluntary which included 136 healthcare professionals, who completed a closed-ended questionnaire. The questionnaire included statements for healthcare professionals which determine their awareness of radiology safety based on their observations.
All questionnaires link was send by E mail to all participants and responses were analyzed accordingly.

Inclusion criteria : Intern doctors, Junior Resident doctor, Nursing Staff, and Medical Officers of Parul sevashram hospital were be included in the study.

Exclusion criteria :

1)Radiology residents and technicians were not be included in the study.

2)All consultant of Parul Sevashram hospital were not be included in the study.

3)Staff not willing to participate in the study.

Study includes total 34 questions and all questions were mandatory. The questionnaires utilized in this study contained personal and generic inquiries, and their validity and data collecting were carried out impartially using completed checklists.

RESULT & DISCUSSION

Questionnaires:

1) Age/Sex

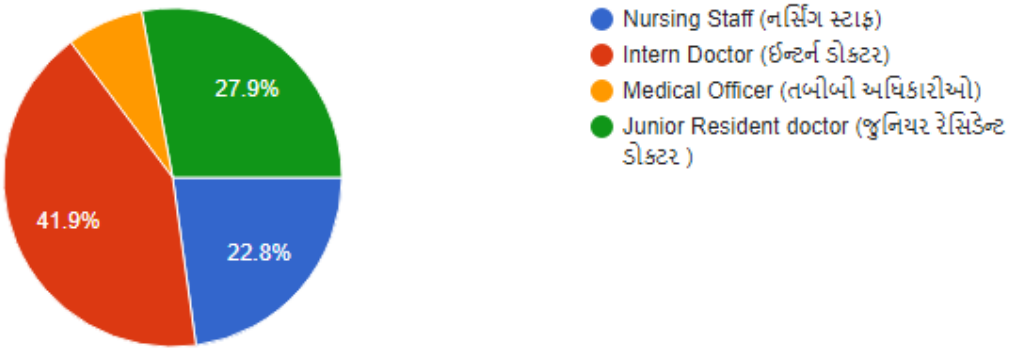
Mean age group of participants is 25 ± 5.5 year and Male :female ratio is 1.3:1

2) Name of Institute

All participants (100%)were belong to Parul sevashram hospital,Vadodara

3) What is your current position at Parul institute?

A. Nursing Staff
B. Intern Doctor
C. Medical Officer
D. Junior Resident doctor



Fig/Graph 1 : Showing current position at Parul institute

Among 136 participants Maximum were intern doctors (41.9%) followed by Junior resident doctor(27.9%).

4) How long have you been in Parul Institute?

A. less than 1 year
B. 1 to 3 years
C. 3 to 5 years
D. more than 5 years

Among 136 Responses, 37.5% were working from 3-5 year followed by 23.5% who working since 1-3 year.

5) Have you ever been involved in radiology department work, shifting patient to the radiology department or in assisting radiology procedure (like X-ray, USG, CT scan, MRI, DSA/Cath lab)?

A. Yes
B. No

Among 136 Responses, 118(86.8%) has Responded "Yes" it means that majority of participants were involved in shifting patient to the radiology department or in assisting radiology procedure.

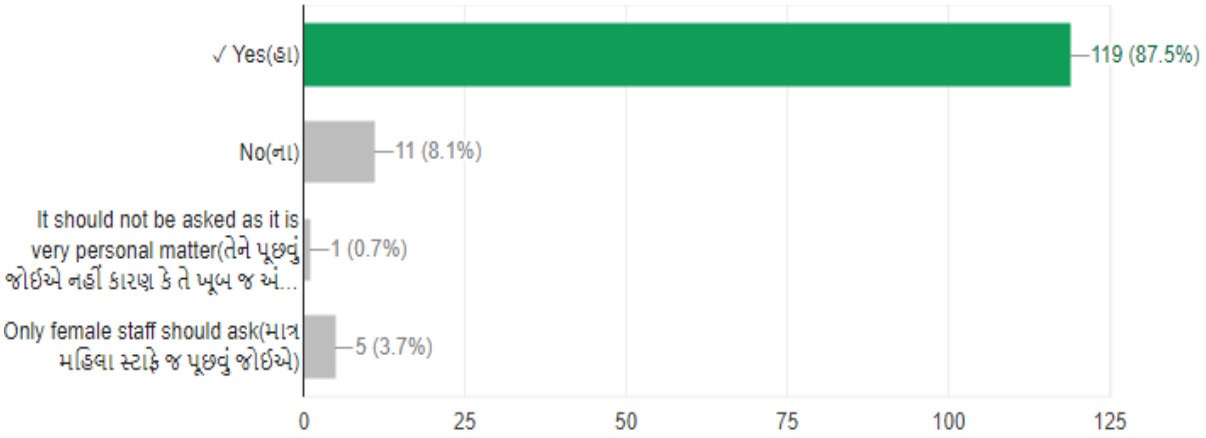
6) While sending young female patient of reproductive age group for X-ray/CT scan, should you ask about her last menstrual period date ?

A. Yes

B. No

C. It should not be asked as it is very personal matter

D. Only female staff should ask



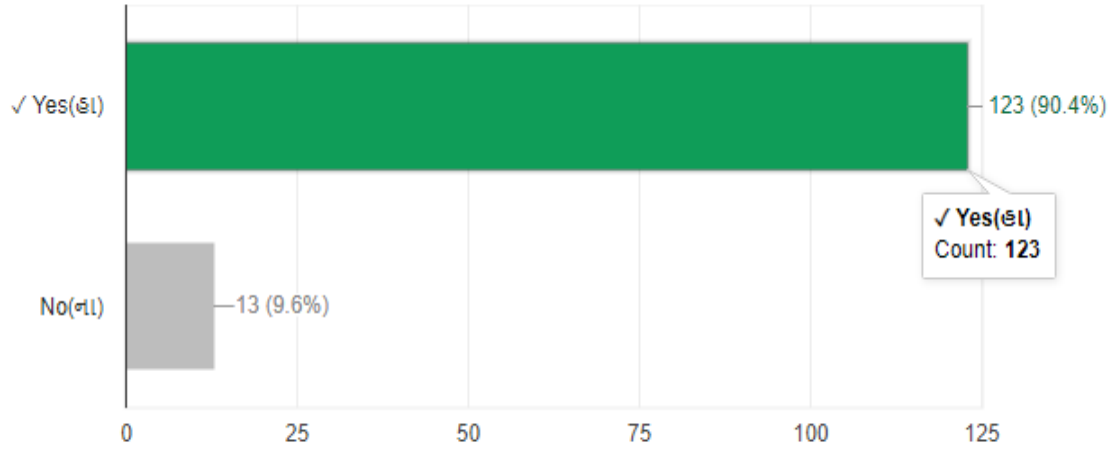
Fig/Graph 2 : Showing response Regarding menstrual history before radiology Procedure

Among 136 Responses, 119(87.5%) has Responded "Yes. And only 0.7% has respond that It should not be asked as it is very personal matter that is indicative of higher degree of awareness among hospital staff.

6)Do you explain patient about removal of metallic jewellery during x-ray ?

A. Yes

B. No



Fig/Graph 3 : Showing response Regarding removal of metallic jewellery during x-ray

Among 136 Responses, 123(90.4%) has Responded "Yes it means Majority of participants were aware of it.

7)Do you sensitize patient about possible radiation exposure during X-ray and CT scan?

A. Yes

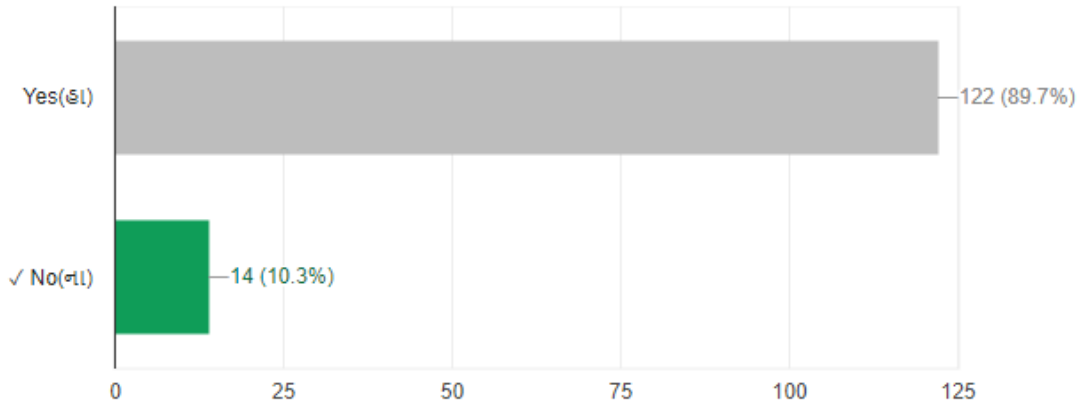
B. No

Among 136 Responses, 109(80.1%) has given correct Response.

8) Do you take consent before sending patient for radiology procedure (X-ray procedure, CT scan and MRI)?

A. Yes

B. No



Fig/Graph 3 : Showing response Regarding Consent before radiology procedure.

Among 136 Participants , 122(89.7%) staff were aware of it .only 14(10.3%) does not know it.

9)Do you take appointment from radiology department before sending indoor patient for CT scan and MRI?

A. Yes
B. No
C. Not needed

Among 136 Responses, 123(90.4%) has Responded "Yes it means Majority of participants were aware of it.

10)Do you explain patient about need of full urinary bladder for KUB and pelvic sonography?

A. Yes
B. No
C. Not needed
D. We donot have time to explain

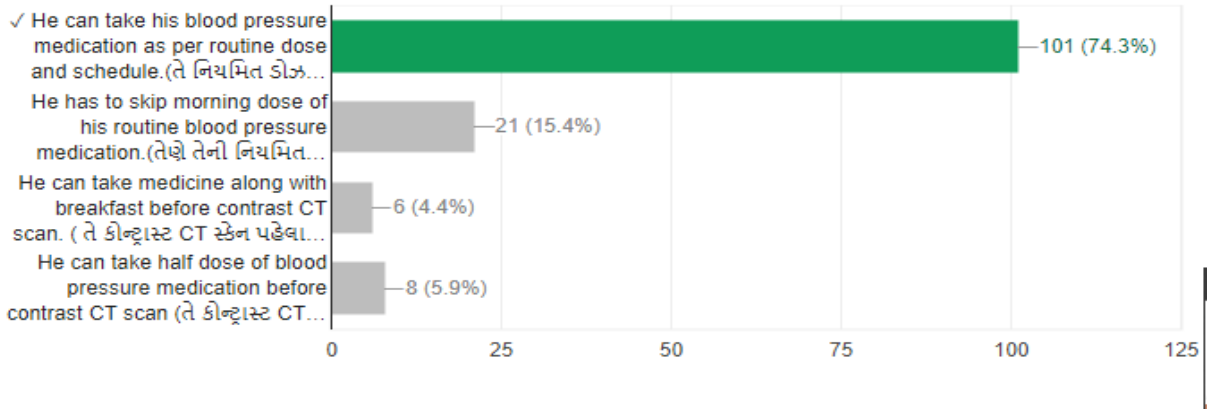
Among 136 Responses, 128(94.1%) has Responded "Yes. 115(84.6%).participants knows that fasting required for ultrasonography of gallbladder.

11)Is 4 hour fasting required for ultrasonography of gallbladder?

A. Yes
B. No

12)A patient with high blood pressure admitted in medicine ward has been appointed for contrast CT scan at 9 a.m. next morning. He has been instructed for NBM after 12 midnight. Which of the following statement is true ?

A. He can take his blood pressure medication as per routine dose and schedule. He has to skip morning dose of his routine blood pressure medication
B. He can take medicine along with breakfast before contrast CT scan.
C. He can take half dose of blood pressure medication before contrast CT scan



Fig/Graph 3 : Showing response of participants for anti hypertensive medication.

Among 136 Responses, 101(74.3%) has correct Respond that He can take his blood pressure medication as per routine dose and schedule. He has to skip morning dose of his routine blood pressure medication. Finding of our study does not match with the study done by Fatemeh Ghanian et al.[7]

13)25-year-old female with normal and regular menstrual cycle history, now having 2 months of amenorrhea. She presents with complaint of cough. She asked your opinion regarding further investigation. Which of the following statement is true?

A. Patient should undergo chest X-ray.
B. Patient should undergo CT scan of chest.
C. Urine pregnancy test (UPT)has to be done before sending patient for X-ray/CT chest
D. If she is married she can safely undergo chest X-ray

Among Among 136 Responses, 111(81.6%) has correct given correct response that Urine pregnancy test (UPT)has to be done before sending patient for X-ray/CT chest.

14)Which of the following is true regarding radiation safety in portable x-ray

A. **The staff has to maintain safe distance from x-ray machine**.
B. There is no radiation risk in acquiring portable x-rayIt is ideal to vacant the entire ward and whole staff should be waiting outside the ward until portable x-ray is taken.
C. It is sufficient to put curtains for radiation safety.

Only 69(50.7%)knows that staff has to maintain safe distance from x-ray machine.128 (94.1%)of participants were aware to wear apron in Radiology Procedure room and that indicates adequate knowledge of the staff regarding radiation safety.

15)Patient is on AMBU bag mask ventilation and is in CT scan acquisition room. You are accompanying the patient and providing ventilation. Is it mandatory for you to wear lead apron?

A. Yes
B. No

16)20-year-old male had undergone laparotomy surgery. Before shifting patient for ultrasonography at 8th postoperative day, which of the following regarding dressing is true?

A. **Patient's dressing should be removed for better visualization of abdomen on ultrasonography**.
B. Patient's dressing should not be removed as it may increase the chances of infection
C. Patient should be sent to the ultrasonography room after fresh dressing
D. Patient's written consent should be taken prior to dressing removal

only 69(50.7%)staff knows that Patient's dressing should be removed for better visualization of abdomen on ultrasonography

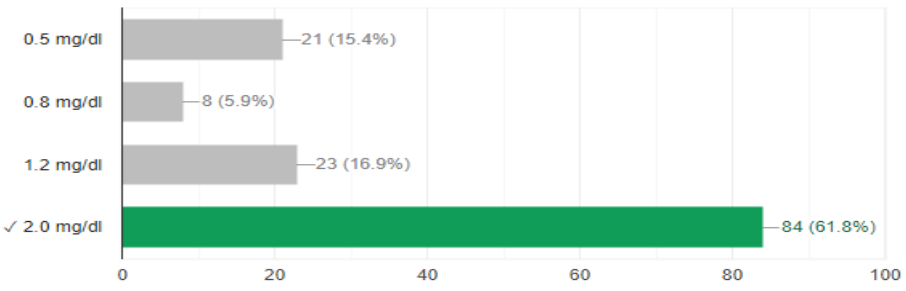
17)Which of the following CT scan does not require NBM status?

A. CECT abdomen.
B. CECT brain
C. NCCT brain
D. CT angiography

only 86 (63.2%) knows that NCCT brain does not require NBM status.

18)At which of the following value of serum creatinine(mg/dl), contrast CT scan is not advisable?

A. 0.5 mg/dl
B. 0.8 mg/dl
C. 1.2 mg/dl
D. 2.0 mg/dl



Fig/Graph 4 : Showing response regarding contraindication of CT scan

84(61.8%) staff was aware that if serum creatinine level is More than 2 mg/dl , CT scan can not be done.

19)For routine contrast CT scans, what is NBM period?

A. 1 to 3 hours
B. 4 to 6 hours
C. 7 to 9 hours
D. 24 hours

89(65.4%) were aware regarding NBM status before contrast CT scans.

20)Regarding intravenous contrast media used in CT, which of the following is true?

A. It can be given only if liver function test is within normal range
B. CT can never be performed if patient is allergic to iodinated contrast medium.
C. It is mandatory to have 7 days gap if CT scan with contrast is performed already
D. Major route of excretion of iodinated contrast medium is through kidneys

Only 59(43.4) staff was aware of dye (contrast medium)that is used for CT scan.

21)While patient is undergoing x-ray, regarding door closure what is true?

A. Door should be open as patient waiting outside are supposed to know that what is happening inside
B. Door should be kept open so that technician can manage outside crowd
C. Door should be kept closed for safety of patient and relatives waiting outside
D. It should be as per patient's preference whether to keep door open or close.

Majority 107(78.7%)participants knows hazard of radiation so during x ray procedure door should be closed.

22)Following regarding lead apron is true?

A. Accompanying staff in the CT acquisition room can wear according to CT study undertaken
B. All patient should wear lead apron to reduce radiation dose irrespective of CT study.
C. Relative accompanying the patient in CT acquisition room needs to wear the lead apron.
D. Lead apron is only needed when accompanying staff/relative/technician is pregnant

23)CT acquisition protocol is decided by

A. CT technician
B. Radiologist
C. Consultant who advised CT scan
D. Patient

71(52.2%) give correct Response that CT acquisition protocol is decided by Radiologist..

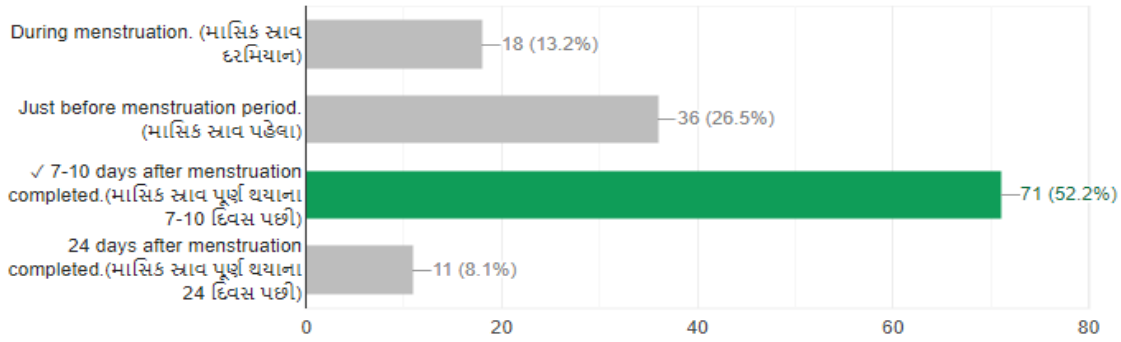
24) Mammography should be avoided in

A. Patient with suspected breast malignancy.
B. Lactating mother
C. Patient with high risk factor for breast cancer as it uses ionizing radiation.
D. Elderly female.

77(56.6%)staff knows that Mammography should be avoided in Lactating mother. Similar finding was obtained in study done by G. Compagnone et al[8] and it shows 54% staff having knowledge regarding mammography.

25) It is ideal to perform mammography on which day of menstrual cycle?

A. During menstruation.
B. Just before menstruation period.
C. **7-10 days after menstruation completed**.
D. 24 days after menstruation completed.



Fig/Graph 5 : Showing response of staff for mammography

.Only 71(52.2%) participants have knowledge that mammography should be performed on 7-10 days after menstruation completed.**(Fig/Graph 5).**

26)For USG guided intervention procedure, which of the following investigation is not required?

A. PT/INR.
B. Platelets.
C. aPTT
D. Serum bilirubin

79(58.1%) responded correct answer that Serum bilirubin does not Require for USG guided intervention procedure.

27)For MRI, which of the following is not a contraindication?

A. Cardiac pacemaker.
B. Brain neurostimulator
C. Metallic implant.
D. Breast silicone implant.

70(51.5%) knows that Breast silicone implant is not a contraindication for MRI.

28)Regarding performing CT scan in pregnancy, which of the following is true?

A. CT scan should never be performed irrespective of indication as CT scan is absolutely contraindicated
B. Risk to fetus is maximum at 32 weeks of pregnancy
C. It can be performed safely but it is better to have verbal consent from the patient.
D. It can be performed depending on clinical indication and if the scan is justified based on patient's clinical condition

Among 136 response ,56(41.2%) Respond false that that CT scan CT scan is absolutely contraindicated in Pregnancy. 41(30.1%) give correct answer. So it indicates that hospital staff has not adequate knowledge regarding CT scan procedure .

29)Which of the following statement regarding indication of screening mammography is not true?

A. It should be performed annually in patient above 45 years of age.
B. Screening mammography for breast cancer is indicated in 31-year-old patient with positive family history of breast cancer.
C. It is proven imaging modality which is associated with reduction in overall patient mortality
D. Screening USG breast should be performed before performing mammography in 60-year-old patient

30)Which of the following can be taken along with the patient in room containing MRI machine?

A. Ornaments
B. Routine stretcher
C. Oxygen mask.
D. Routine pulse oximeter.

106(77.9%)has given correct response that Routine pulse oximeter can be taken along with the patient in room containing MRI machine.

31)What is true regarding screening by metal detectors before taking patient for MRI?

A. It should be mandatory
B. It should not be done
C. It depends on availability of metal detector in MRI department
D. It depends on patient's preference.

103(75.7%) given correct answer that metal detectors should be mandatory before taking patient for MRI. similar study was done in malasiya by Aisyah Mohd Rahimi et al[9] for nursing staff knowledge of radiology procedure ,it shows that only 25% nurses knows same thing.

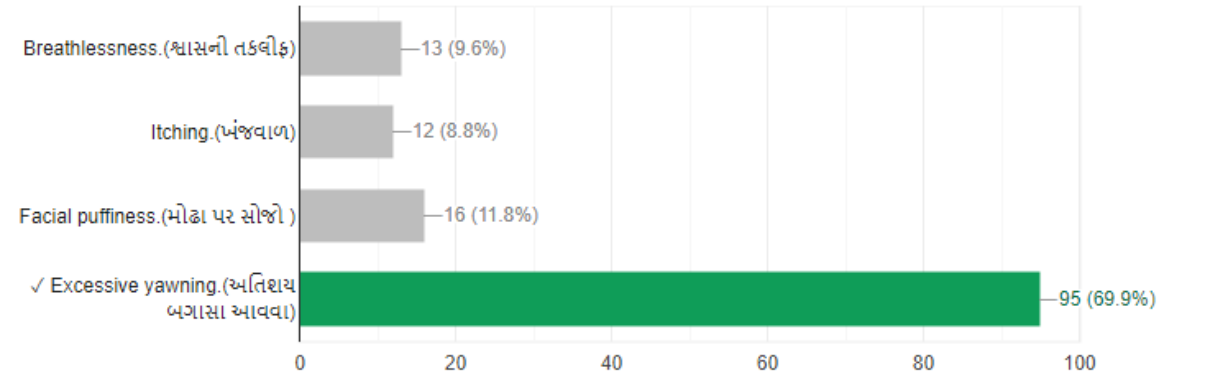
32)Patient with suspected ocular foreign bodies, which of the following investigation should not be done?

A. X-ray.
B. USG.
C. CT scan.
D. MRI

Among 136 Responses **,**85(62.5%) knows that for suspected ocular foreign bodies ,MRI is contraindicated.

33)Which of the following is not a symptom of contrast reaction after iodinated contrast medium administration for contrast CT scan?

A. Breathlessness.
B. Itching.
C. Facial puffiness.
D. **Excessive yawning**.



Fig/Graph 6: Showing response Regarding allergic reaction symptom

Among 136 Responses, Majority(69.9%) of hospital staff was aware of symptom of allergic reaction like Breathlessness, Itching, Facial puffiness etc due to contest media and Majority 100(73.5%) have idea for a drug that useful in managing contrast reaction. Study done by J. Cruz et all[10] they found that 85% hospital staff was aware of symptom of allergic reaction of contrast media and how to manage patient of it.

34) Which of the following medication is not useful in managing contrast reaction?

A. Atropine
B. Hydrocortisone
C. Metformin
D. Adrenaline

Applications of the ionizing radiation (hereinafter called radiation) have increased in many fields of life. Medicine is one of the leading examples where radiations are used to diagnose and treat patients. Among all the applications of radiation, medical applications (i.e. radiology, nuclear medicine, and radiotherapy) are a source of a low to high level of radiation received by the humans. [11] Therefore, radiation protection measures must be taken for the patients, workers, and public because the radiation doses can vary from low to very high in radiation medicine. Both ionizing and nonionizing radiations are commonly used in daily medical practice. It plays important roles in both diagnostic and therapeutic modalities.

Numerous researchers have carried out studies at medical institutions to gauge the understanding of radiation workers regarding various facets of radiation safety, taking into account the significance of radiation safety trainings and knowledge level. One hundred and one members of the medical community participated in a study in Turkey, and it was found that the radiation workers were not fully informed of the standards for radiation safety [12]. Another study conducted in Malaysia determined that the nuclear medicine nursing personnel had a moderate level of awareness of radiation safety . A national research should be carried out, according to the study's authors' recommendation, to gauge and improve the level of knowledge and awareness among all nuclear medicine nurses working in Malaysia. Seven hundred and eighty (780) radiation workers in a comparatively large research in Malaysia. A relatively large study of seven hundred and eighty (780) radiation workers in Italy showed a crucial need of awareness of radiation safety among radiation workers.[13]. According to the results of another survey carried out in Italy to evaluate the exposure levels in radiology facilities, radiology specialists (including residents), radiography students, and medical students have only rudimentary knowledge of radiation protection. Additionally, they discovered a knowledge gap regarding the actual radiation doses of routine radiological exams [14]. The study suggested that successful planning and execution of undergraduate and graduate teaching and training at the institutions.

The obtained results provided interesting information on the knowledge, expertise and convictions of medical professionals as regards basic aspect of general radiology safety and radiation protection. Another interesting conclusion is the low level of overall knowledge of radio graphical procedures among the nursing staff. It is particularly curious in the context of care they provide to hospitalized patients and to their active participation in preparation for scheduled imaging examinations.

CONCLUSION

Depending on the professional duties, amount of training, and even country of healthcare practitioners, awareness and knowledge of radiation threats may vary. The current findings showed that the present group had a high level of awareness regarding radiation risks generally. The results of the survey show that there needs to be more focus on providing all medical workers with extensive and systematic training in radiation protection.

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DECLARATIONS

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Conflict of interest: None

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