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Single Photon Emission Computed Tomography (SPECT) Awareness Among Allied Health Sciences Student

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Abstract:

- ***Introduction***

Single Photon Emission Computed Tomography (SPECT) is a valuable imaging technique used to assess various diseases by providing insights into the functional and metabolic processes within the body. Unlike traditional imaging methods, SPECT generates computer-based images that reflect the distribution of radiotracers introduced into the patient's system. These images are produced using gamma cameras, which may have one or more heads to detect the gamma radiation emitted by the radiotracers. Gamma rays, a type of electromagnetic radiation, travel at different wavelengths than visible light and allow for the visualization of internal physiological activity. In contrast, Computed Tomography (CT) scans provide three-dimensional anatomical images based on the body's x-ray absorption properties.

- ***Aim***

To assess the knowledge levels and create awareness about single photon emission computed tomography (SPECT) among AHS students in Saveetha College of Allied Health Sciences.

- ***Materials and Method***

A cross- sectional research was conducted with a self-administered questionnaire containing ten questions distributed amongst 100 Allied Health Science students. The students were randomly selected across various disciplines of Allied Health Sciences. The questionnaire assessed the awareness about single photon emission computed tomography (SPECT), safety and application among Allied Health Sciences Students. The responses were recorded and analyzed. There were no incomplete responses and no dropouts from the study. The final data obtained was organized, tabulated and subjected to statistical analysis.

- ***Results***

Among 100 Allied Health Sciences Students, 77% of the respondents were aware of SPECT (SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY) 17% were not aware and 6% are not sure (Fig- 1). 33% were aware that SPECT AND CT (or conventional CT) are the same, 42% were not aware and 25% were not sure (Fig-2). 45% were aware of can routine iodinated contrast medium can be used in SPECT 27% were not aware and 28% are not sure (Fig-3). 30% were aware of can SPECT be done for a breast-feeding patient 32% were not aware and 38% were Not sure (Fig-4), and

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25% were aware of can a pregnant patient be treated with radionuclides 49% were not aware and 26% were not sure in (Fig-5).

➢ ***Conclusion***

Awareness of Single Photon Emission Computed Tomography (SPECT) remains limited among Allied Health Science students. To improve understanding and highlight its clinical value, it is important to introduce targeted educational programs and awareness campaigns. Additionally, updating and enhancing the academic curriculum to include more comprehensive information on SPECT can play a crucial role in increasing students' knowledge and familiarity with this imaging modality.

Keywords: *Awareness, SPECT, CT, Radioactive Tracer, Allied Health Sciences.*

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I. INTRODUCTION

SPECT scanning involves capturing multiple two-dimensional images from various angles using a gamma camera. These projections are then compiled to form a tomographic image of the targeted area. Although the technique has relatively low photon detection efficiency—detecting only a small fraction of emitted photons—it achieves a spatial resolution of approximately 12x12x12 mm.

The imaging process requires numerous projection images acquired at different angles, allowing for detailed visualization of the distribution of radiotracers. Gamma cameras used in SPECT may have one or more detection heads to capture emissions from the administered radioactive tracers. Gamma rays, which belong to the electromagnetic spectrum, differ from visible light in terms of wavelength and energy.

Future advancements in SPECT and PET imaging are anticipated through innovations such as more advanced imaging equipment, enhanced computer algorithms for image processing, and the development of novel radiopharmaceuticals. These improvements aim to facilitate the visualization of critical biological functions like cell proliferation, low oxygen levels in tissues (hypoxia), and the formation of new blood vessels (angiogenesis), thereby increasing the clinical utility of nuclear medicine imaging.

II. AIM

To assess the knowledge levels and create awareness about single photon emission computed tomography among allied health science students.

III. MATERIALS AND METHOD

A cross- sectional research was conducted with a self-administered questionnaire containing ten questions distributed amongst 100 allied health science students. The students were randomly selected across various disciplines of allied health sciences. The study setting was designated in the university campus. The survey instrument was a questionnaire pre tested and evaluated for validity and reliability concerns.

The questionnaire included ten questions eliciting the demographic data through open ended response and multiple-choice questions for the other response. The study was approved by the institutional ethical committee and informed consent was obtained from the participants. The questionnaire was posted in an online platform and the identities of the respondents were kept confidential.

The questionnaire assessed the awareness about single photon emission computed tomography (SPECT) among allied health science students. The responses were recorded and analyzed. There were no incomplete responses and no dropouts from the study. The final data obtained was organized, tabulated and subjected to statistical analysis. The salient questions in the study are.

- Name
- Age
- Gender
- Year of Study
- Contact Number
- Are you aware of SPECT? (SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY)
- Is SPECT and CT (or conventional CT) are same?
- Can a routine iodinated contrast medium be used in SPECT?
- Can SPECT be done for breast- feeding patients?
- Can a pregnant patient be treated with radionuclides?

IV. RESULTS

Among 100 Allied Health Sciences Students**, 77%**of the respondents were aware of SPECT (SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY) **17%** were not aware and **6%** are not sure in (**FIG 1)**. **33%** were aware that SPECT AND CT (or conventional CT) are the same **42%** were not aware and **25%** were not sure in **(FIG 2**). **45%** were aware of can routine iodinated contrast medium can be used in SPECT **27%** were not aware and **28%** are not sure in (**FIG 3). 30%** were aware of can spect be done for a breast-feeding patient **32%** were not aware and **38%** were Not sure in (**FIG 4**), and **25%** were aware of can a pregnant patient be treated with radionuclides **49%** were not aware and **26%** were not sure in (**FIG 5**).

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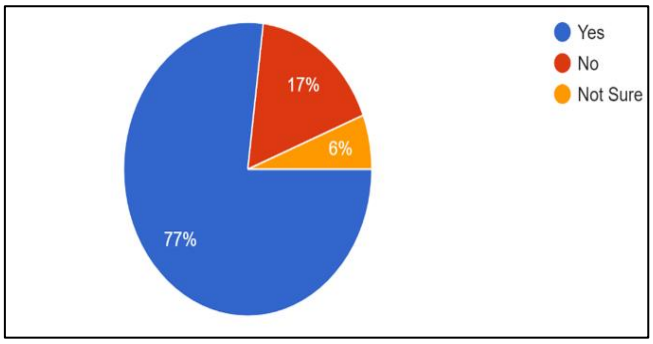

Fig 1 Awareness About Spect (Single Photon Emission Computed Tomography).

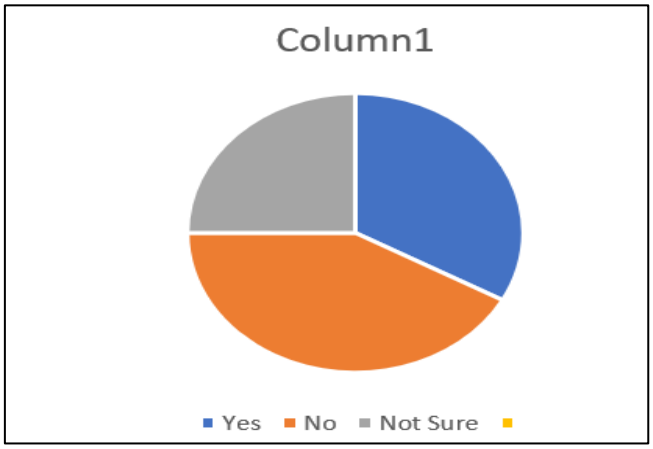

Fig 2 Awareness About the Differences in Spect and Ct (Or Ct).

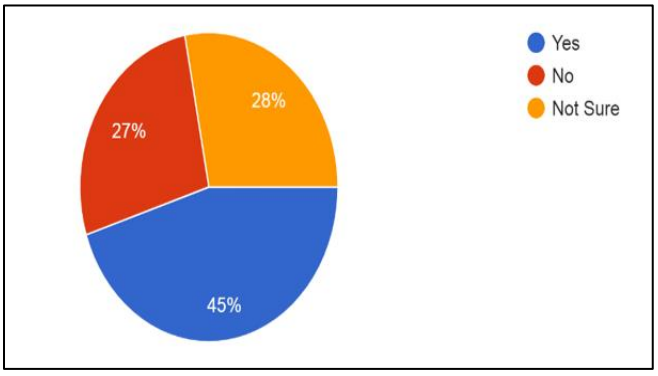

Fig 3 Awareness About Routine Iodinated Contrast Medium Can be Used in Spect

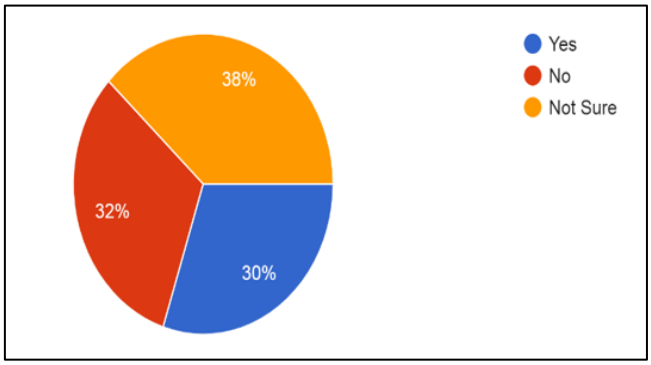

Fig 4 Awareness About Spect be Done for Breast-Feeding Patients.

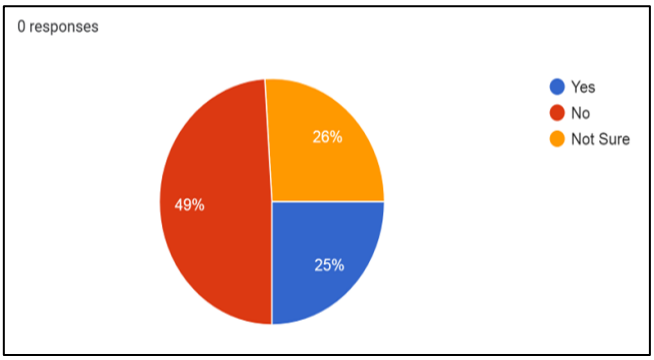

Fig 5 Awareness About Whether a Pregnant Patient Be Treated with Radionuclides

V. DISCUSSION

SPECT is a nuclear imaging modality that integrates computed tomography and a use of radioactive material called a **Tracer**. Tracer is injected intravenously and mixes with your blood. As your blood moves through your body, it is taken by or absorbed by your heart muscles. There are three main tracers used in SPECT imaging Technetium-99m, iodine-123 and iodine-131.The radioactive tracer that emits the gamma rays (a form of electromagnetic radiation), from the patient. Spect (Single Photon Emission Computed Tomography) is also used to help in diagnosis of stroke, seizure, infection and tumors. The purpose of this survey is to analyze the awareness about SPECT among Allied health science students (6) (13).

Some of the questions were raised in the survey is to analyze whether the students are aware about the differences between SPECT and Conventional CT, As SPECT images are taken after an injection of radiopharmaceutical drugs whereas in Conventional CT use of X-ray photons (Radiation) we are going to analyze the image. (7)(19)

Through the survey's questions we are also trying to assess the knowledge among Allied health sciences student regarding routine iodinated contrast medium can be used in SPECT Routine iodinated contrast media cannot be used in SPECT imaging modality as iodinated contrast medium that contains iodine which is used for x-ray-based imaging modalities such as CT, fluoroscopy, cath lab (for angiography and angioplasty). Iodinated contrast medium doesn't emit gamma radiation for this reason we are using radiopharmaceuticals (8) (12) (18)

Women those who are breast-feeding and those who are primary or sole care of young children's (under 5 - years of age) may need to take preparation before and after the scan is done (14)(15). They have to stop breast-feeding to avoid close contact with young children for a short-time (24 hours). This is due to the small amount of radioactivity drug which is present inside your body after the scan has been done (9) (16) (17)

The last section of this survey was about whether a pregnant patient be treated with radionuclides Radioiodine therapy is essentially contra-indicated for pregnant womens.

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Pregnant women should not be treated with a radioactive substance unless the radionuclide therapy is required. The potential absorbed dose and risk to the fetus should be estimated and conveyed to the patient. Radioiodine therapy is essentially contra-indicated for pregnant women's (10) (11).

VI. CONCLUSION

There is moderate awareness amongst AHS students about SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY (SPECT). Enhanced awareness campaigns and educational programs, along with greater emphasis on curriculum development, should be implemented to improve understanding and highlight the benefits of Single Photon Emission Computed Tomography (SPECT).

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