

AWARENESS ABOUT 3D-SPECT AMONG ALLIED HEALTH SCIENCE STUDENTS

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Abstract

Introduction: Single-photon emission computerized tomography (SPECT) scans use radioactive materials and a specially designed gamma camera to produce three-dimensional images of the inside of your organs. The required input data for creation of 3D surface images is a dataset containing slice images which have been previously reconstructed from the SPECT acquisition data. These slices may be in one of several planes: transaxial, sagittal, coronal or oblique, and the orientation of the input data determines the orientation of the final 3D surface dataset. **Aim:** This survey was conducted for assessing the awareness about 3D-SPECT among Allied Health Science students. **Materials and method:** A cross-section research was conducted with a self-administered questionnaire containing ten questions distributed amongst 100 Allied Health Science students. The questionnaire assessed 3D-SPECT among Allied Health Science Students. The responses were recorded and analyzed. **Result:** 99% of the respondents were aware that gamma rays are used in 3D-SPECT. 94% of respondents were aware of 3D-SPECT. 97% of respondents were aware that SPECT is a nuclear medicine tomography. 48% of the respondents were known that the SPECT scans show depression. 81% of respondents were aware whether the skin is more sensitive in 3D-SPECT. **Conclusion:** There is a very good awareness amongst Allied Health Science students about 3D-SPECT. Enhanced awareness initiatives and educational programmes together with increased importance for curriculum improvements that further promote knowledge and awareness about 3D-SPECT among Allied Health Science Students.

Keywords: Awareness, 3D-SPECT, External Surface of Organs.

INTRODUCTION

Single-photon emission computerized tomography (SPECT) scans use radioactive materials and a specially designed gamma camera to produce three-dimensional images of the inside of your organs. The required input data for creation of 3D surface images is a dataset containing slice images which have been previously reconstructed from the SPECT acquisition data. These slices may be in one of several planes: transaxial, sagittal, coronal or oblique, and the orientation of the input data determines the orientation of the final 3D surface dataset [1].

Organ volume evaluation using planar imaging technique is a procedure often performed in nuclear medicine but faces difficulties due to structures containing radioactivity, which overlie or underlie the organ of interest. SPECT overcomes these difficulties since structures in the interior of the examined organ are separated in the reconstructed images. [1,2]

Scintigraphy provides information with respect to the detection of myocardial perfusion defects, the assessment of the pattern of defect reversibility and the overall detection of Coronary Artery Disease (CAD). There is a relationship between the location and the degree of the stenosis in coronary arteries and the observed perfusion on the myocardial scintigraphy, using data of 3D surface images of myocardium. This allows us to predict the impact evolution of these stenoses to justify a coronarography or to avoid it. [2]

Patients on the suspicion of hepatocellular disease may complete a liver scan. They are injected intravenously with Tc-99m Phytate and images are acquired 10 minutes post injection. The acquisition involved four planar images and a tomographic study of 64 planar views over a 3600 arc. Each SPECT angle view is preset to end in 20 sec. The tomographic reconstruction is performed with the FBP, Hanning 0.8 and no magnification. An image threshold calculated according to equation 3 for each specific patient and a gradient-shading factor of 20% is applied on the 3D reconstructed angular images.

3D surface images of the liver could be presented together with the planar anterior image and series of coronal views to increase the diagnostic effectiveness of the method, as information of the surface texture and volume size of this large organ together with Spleen position and size express its patho-physiology. Present surface models of detailed structures inside and outside the liver to promote medical simulation system of the abdomen.[3]

MATERIALS AND METHOD

This 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 responses and multiple choice questions for the other responses. The study was approved by the Institutional Ethical Committee and informed consent was obtained from the participants. The questionnaire was posted on an online platform and the identity of the respondents were kept confidential.

The questionnaire assessed the Awareness about 3D-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:

1. Is gamma rays is used in 3D SPECT?
2. Are you aware of 3D SPECT?
3. Is SPECT a nuclear medicine tomography?
4. Can a SPECT scan show depression?
5. Is it more sensitive to skin?

RESULT

99% of the respondents were aware that gamma rays are used in 3D-SPECT [fig.1]. 94% were aware of 3D-SPECT[fig.2]. 97% were aware that SPECT is a nuclear medicine tomography[fig.3]. 48% of the respondents were aware that SPECT scans show depression[fig.4]. 81% were aware whether the skin is more sensitive in 3D-SPECT[fig.5].

Fig 1: Awareness about whether the gamma rays is used in 3D-SPECT

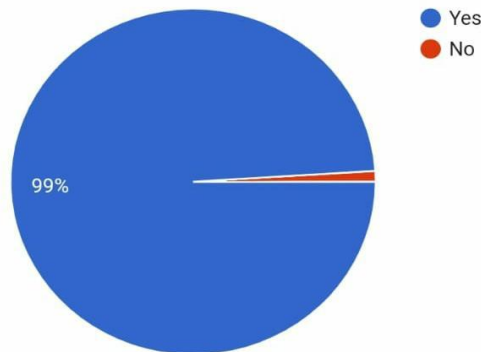


Fig 2: Awareness about 3D-SPECT

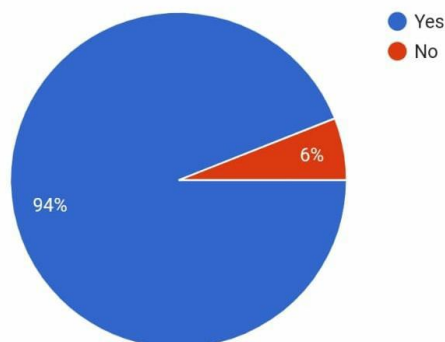


Fig 3: Awareness about the SPECT is a nuclear medicine tomography

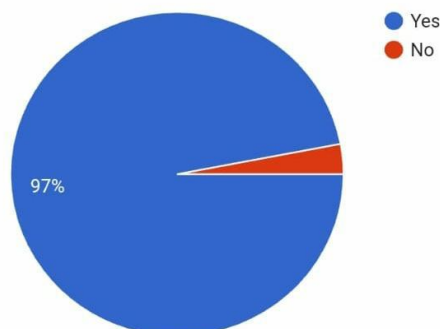


Fig 4: Awareness about whether the SPECT scan show depression

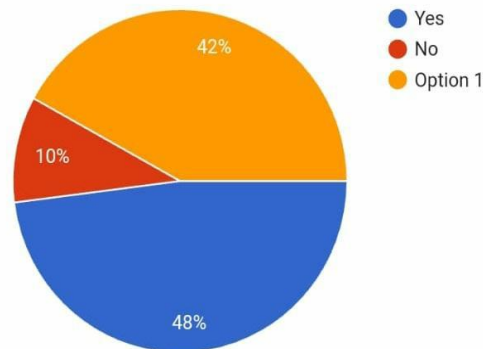
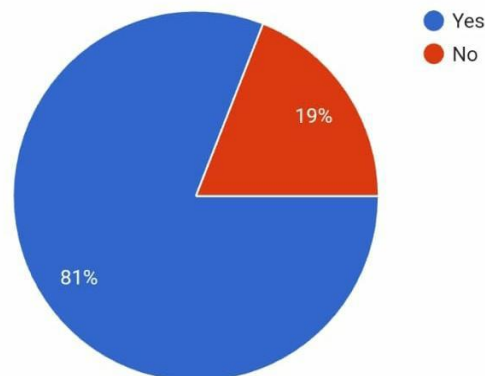


Fig 5: Awareness about the 3D-SPECT is more sensitive in skin



DISCUSSION

Single-photon emission computed tomography is a nuclear medicine tomographic imaging technique using gamma rays. It is very similar to conventional nuclear medicine planar imaging using a gamma camera (that is, scintigraphy), but is able to provide true 3D information. This information is typically presented as cross-sectional slices through the patient, but can be freely reformatted or manipulated as required. The technique needs delivery of a gamma-emitting radioisotope (a radionuclide) into the patient, normally through injection into the bloodstream. [6] 99% of the students were aware that gamma rays are used in 3D-SPECT

3D SPECT/CT fusion provides as high reproducibility and accuracy for diagnosing bone metastasis as 2D SPECT/CT. Although there are still some problems generating 3D SPECT/CT fusion images, 3D SPECT/CT fusion images reduced the interpretation time compared to 2D SPECT/CT fusion images.[7] 94% were aware of 3D-SPECT.

SPECT images are taken after an injection of a nuclear medicine radiopharmaceutical. The injected medication 'sticks' to specific areas in the body, depending on what radiopharmaceutical is used and the type of scan being carried out. For example, it can show bone in a bone scan, and gallbladder and bile ducts in a hepatobiliary scan. The radiopharmaceutical is detected by nuclear medicine gamma cameras. The camera or cameras rotate over a 360-degree arc around the patient, allowing for

images to be reconstructed in three dimensions[8].97% were aware that SPECT is a nuclear medicine tomography

The anatomic circuits of depression and mood regulation have been revealed by converging evidence from SPECT, PET and fMRI (functional magnetic resonance imaging) studies of depression and analysis of both lesions resulting in depressive symptoms and surgical lesions used to treat severe cases of depression.^{5,6} These convergent findings have revealed a network of brain regions, including the dorsal prefrontal cortex, ventral prefrontal cortex, anterior cingulate gyrus, amygdala, hippocampus, striatum, and thalamus in the pathophysiology of depression.[9]

3D imaging offers direct visualization and measurements of complex structures of the internal organs of the human body, which cannot be satisfactorily evaluated using 2D imaging. As reconstruction methods improve in accuracy and in ability to manipulate large matrices, new threshold techniques and corrections will be used, so that perfect absolute quantitative accuracy will be brought closer.[10] 81% were aware whether the skin is more sensitive in 3D-SPECT

CONCLUSION

There is a very good awareness amongst Allied Health Science students about 3D-SPECT Enhanced awareness initiatives and educational programmes together with increased importance for curriculum improvements that further promote knowledge and awareness about 3D-SPECT among Allied Health Science Students.

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