

Evaluation of Knowledge, Attitude and Practice regarding Positron Emission Tomography Scan among UG, Interns & PG students: A Survey Study

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Abstract:

Background: Positron Emission Tomography (PET) provides a highly sensitive and specific way of diagnosing and monitoring tumour cells. Knowledge and awareness regarding PET is crucial to oncologic imaging.

Objective: To evaluate the knowledge, attitude and practice regarding Positron Emission Tomography Scan among undergraduate, Intern & postgraduate medical students.

Material and Methods: A questionnaire comprising of questions on knowledge, attitude and practice regarding PET scan was sent to 300 UG, intern and PG medical students via email and social media platforms. The 179 responses received were documented and comparisons were made between the groups.

Results: 55.56% of UG medical students did not have knowledge of F-fluorodeoxyglucose as the most commonly used radioactive tracer in PET scans. 68.52% of the UG medical students were unaware what a 'hotspot' represented in a PET scan, 64.56% and 89.13% of interns and PG medical students chose the correct answer. 72.22%, 86.08% and 97.83% of UG, intern and PG students respectively, agreed that PET scan helps in determining biochemical and physiological activity of tumours.

Conclusion: PG students displayed the greatest knowledge concerning PET scan. Medical students accept the importance and utility of a PET scan in oncologic imaging.

Keywords: PET, knowledge, attitude, awareness, oncologic imaging, cancer detection.

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I. Introduction:

The first human Positron Emission Tomogram was developed in the year 1974 by Mike Phelps and Ed Hoffman and it has experienced tremendous improvements since then.^{1,2} It has developed to be the most specific and sensitive oncologic imaging technique. This can be attributed to a range of radionuclides that emit positrons and detect changes in metabolic and biological processes of cells.² Positron Emission Tomography is a non-invasive oncologic imaging technique which offers information regarding the biochemical and physiological activity of tumours by the use of injectable radiotracer compounds.³ It is predicated on the difference in the physiologic and metabolic features of tumour and normal cells. In a large number of tumours the rate of uptake of glucose is greatly enhanced, which is detected by a PET machine by use of 18 F Fluorodeoxyglucose (18 F FDG).⁴ A PET scan used together with Computerized Tomography (CT) by way of PET/CT devices has revolutionized oncologic clinical and translational practice and research.⁵ Our study aims to assess and compare the knowledge and perception of undergraduate, intern and post-graduate medical students towards Positron Emission Tomography and its uses.

II. Materials and Methods:

The current cross-sectional questionnaire study conducted was conducted from 01-12-2019 to 31-02-2020. A questionnaire comprising of 6 questions on knowledge, attitude and practices was fabricated from a previous study by Nagaraj T et al.⁶ All questions were mandatory to submit the questionnaire. Links to the questionnaire were sent to 300 UG, Intern and PG medical students (100 each) via email and social media platforms. 178 replies were received bringing the response rate of the study to 59.33%. Data was tabulated and descriptive analyses were used for comparison between the groups.

III. Results:

Table 1 displays the distribution of the study participants as per their educational level. 30.17% were UG medical students, 44.13% were interns and 25.70% of the respondents were PG medical students. Table 2 displays the responses received from the participants for each question. 55.56% of UG medical students did not have knowledge of F-fluorodeoxyglucose as the most commonly used radioactive tracer in PET scans, while 68.35% interns and 84.78% of PG students gave the correct answer. 68.52% of the UG medical students were unaware what a 'hotspot' represented in a PET scan, 64.56% and 89.13% of interns and PG medical students chose the correct answer. 72.22%, 86.08% and 97.83% of UG, intern and PG students respectively, agreed that PET scan helps in determining biochemical and physiological activity of tumours. 72.22%, 86.08% and 97.83% of UG, intern and PG students respectively, agreed that PET scan helps in determining biochemical and physiological activity of tumours. 88.89% of UG students, 91.14% of interns and 100% of the PG students agreed that a PET/CT is better than just a PET scan in tumour identification. 70.37%, 83.54% and 93.48% of UG, intern and PG students, respectively, agreed that claustrophobia is a disadvantage of a PET/CT.

Table 1: Distribution of the study participants as per their educational level:

Educational level	Undergraduate (UG)	Intern	Postgraduate (PG)	Total
No. of participants	54	79	46	179
Percentage distribution	30.17%	44.13%	25.70%	100%

Table 2: Responses received from the participants for each question:

S.No.	Question	Response	No. as per educational level			% as per educational level		
			UG	Intern	PG	UG	Intern	PG
1	Which radioactive substance is most commonly used in a PET scan?	18 F Fluorodeoxyglucose	24	54	39	44.44%	68.35%	84.78%
		Technetium- 99m	30	23	7	55.56%	29.11%	15.22%
2	Hotspot in a PET scan is?	Area of highest concentration of radioactive tracer	17	51	41	31.48%	64.56%	89.13%
		Area of highest temperature in PET machine	37	28	5	68.52%	35.44%	10.87%
3	PET scan helps in determining biochemical and physiological activity of tumours?	Agree	42	69	44	77.78%	87.34%	95.65%
		Disagree	12	10	2	22.22%	12.66%	4.355
4	PET scan helps in	Agree	39	68	45	72.22%	86.08%	97.83%

	diagnosis, therapy monitoring and recurrence of tumour metastasis?	Disagree	15	9	1	27.78%	11.39%	2.17%
5	Is PET scan with CT better in identifying the tumour?	Agree	48	72	46	88.89%	91.14%	100%
		Disagree	6	7	46	11.11%	8.86%	100%
6	Is claustrophobia a disadvantage in using PET/CT?	Agree	38	66	43	70.37%	83.54%	93.48%
		Disagree	16	13	3	29.63%	16.46%	6.52%
	Total		54	79	46	100%	100%	100%

IV. Discussion:

This study assesses and compares the knowledge and perception of UG, Intern and PG medical students towards PET scans. Cancer cells can reprogram themselves to facilitate sustained growth and long-term survival. They metabolize glucose to lactic acid even in the presence of oxygen and functional mitochondria. This phenomenon is a characteristic feature of cancer cells and is known as the ‘Warburg effect’.^{7,8} F-fluorodeoxyglucose (F-FDG) helps to visualize this abnormal glycolytic activity by use of a positron emission tomogram (PET).⁹ More than half, i.e. 55.56% of UG medical students did not have knowledge of F-FDG as the most commonly used radioactive tracer in PET scans. On the other hand 68.35% interns and 84.78% of PG students gave the correct answer. Nagaraj T et al.⁶ in a similar study on dental surgeons reported that their study participants lacked the necessary knowledge regarding the use of F-FDG in PET scans. They reported only 25% correct answers in their study.

A ‘hotspot’ is an area of elevated metabolic activity of cells and thus increased uptake of radioactive tracer.¹⁰ In our study whilst a staggering 68.52% of the UG medical students were unaware what a ‘hotspot’ represented in a PET scan, 64.56% and 89.13% of interns and PG medical students chose the correct answer. These findings reflect poor knowledge of radiological methods in undergraduate medical students. Sharma et al. (2010)¹¹ also revealed that UG medical students exhibited insufficient understanding of Radiology.

Areas of increased radiotracer uptake can help differentiate benign from malignant lesions.^{12,13} Detection of the stage of the cancer is probably the most crucial factor in determining the patient’s survival and the choice of treatment is also preferably made depending upon the cancer stage.¹⁴ 72.22%, 86.08% and 97.83% of UG, intern and PG students respectively, agreed that PET scan helps in determining biochemical and physiological activity of

tumours. 72.22% of UG students, 86.08% of interns and 97.83% of PG students agreed that PET scan helps in diagnosis, therapy monitoring and recurrence of tumour metastasis. Our results are in agreement with that of Nagaraj T et al.⁶

Whilst Computerized Tomography (CT) is undoubtedly the foundation of oncologic imaging, it does not possess the ability to identify the biochemical and physiologic activity of tumours which a PET holds. With the high resolution of a CT scan the abilities of a PET scan have been greatly enhanced.¹⁵ 88.89% of UG students, 91.14% of interns and all of the PG students agreed that a PET/CT is better than just a PET scan in tumour identification. PET/CT is an elaborate procedure and required around 20 minutes to complete, so claustrophobia is unfortunately a disadvantage.¹⁶ 70.37%, 83.54% and 93.48% of UG, intern and PG students, respectively, agreed that claustrophobia is a disadvantage of a PET/CT. These results are in agreement with that of a previous study.⁶

V. Conclusion:

Post-graduate students possess good knowledge and awareness regarding Positron Emission Tomography. Undergraduate and interns are also aware of the practical applications of a PET and PET/CT. Medical students appreciate the importance and effectiveness of PET in oncologic imaging for cancer diagnosis and monitoring.

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