

# Perception of Post graduate educational environment among Radiology Residents Using PHEEM criteria: A comparison between two public sector hospitals

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## ABSTRACT

Educational environment includes the support system of physical surrounding, equipment and human resource that helps to motivate engagement towards acquiring knowledge and learning. Assessment of student's perception on educational environment provides opportunities for improving learning experiences. The ever increasing innovations in medical field and the growing diversity of students as well as medical courses have led to proportionate increase in demand to evaluate educational environment. The current study aims to compare the perception of the learning environment at two public sector tertiary care hospitals in different cities of Pakistan using a standardized validated tool, PHEEM.

**Methodology:** In this cross sectional study, using 40 statement PHEEM Validated questionnaire, radiology residents of FCPS, MCPS, FRCR and MD working at two public sector teaching hospitals were included. The study was conducted in months of August and September 2021 with non-purposive convenience sampling technique. The individual perception scores by residents were calculated. The means, standard deviation and standard error of mean were calculated for individual domains as well as global scores and then compared in the two different hospitals, different levels in years of residency and both genders. A p-value of  $\leq 0.05$  was taken as significant.

**Results:** There were 45 radiology residents in total, who completed the questionnaire. The trainees perceived educational environment positive at their institutes, with a global mean of 73.3 (SD: 28.5). Autonomy, teaching and social support were rated 25.2 (SD 9.2), 30.1 (SD 13.4) and 18.1 (SD 7.6) respectively. Gender wise there was no difference between the PHEEM scores of the two groups. P value was 0.4. Similarly year of training did not have much difference either with a p value of 0.9 in the total PHEEM score of 1<sup>st</sup> year and 4<sup>th</sup> year residents.

**Conclusion:** Our results show that we have plenty of problems in both the hospitals which need to be addressed one by one.

**Key words:** educational environment, PHEEM, standardized, perception

## INTRODUCTION

Educational environment includes physical surroundings, equipment, teachers, colleagues and other student support systems which play an important role in motivating a learner. Assessment of student's perception on educational environment provides with opportunities for improvement of learning experiences.<sup>1</sup> The positive environment increases self-efficacy and ultimately leads to success and achievements in learning while a negative perception may hamper accomplishments. Students' perceptions of their teaching and learning environment are greatly affected by their cultural backgrounds, availability of various educational facilities, quality of their teaching faculty, curriculum load, and above all, their expectations from all these.<sup>2</sup> The recent developments and innovative curricular implementations in medicine and the increasing diversity of students as well as medical courses across the globe have led to an increasing need to evaluate the existing educational environment.<sup>3</sup>

An evaluation tool for assessing the PG trainees working in a hospital for residency was developed and labelled as "PHEEM (Postgraduate Hospital Educational Environment Measure) in 2005 in UK. It is a questionnaire which was validated in local settings of many countries and results were applied in many studies.

Till date, evaluation of the perceptions of trainees undergoing post graduate programs in basic sciences and certain clinical specialties like Anesthesia, Paediatrics and Internal Medicine has been done using PHEEM. However, there is very little research in the radiology trainee's education literature exploring these areas that allow a better evaluation of one of the many aspects present in academic formation, allocation of resources and training of residents in diagnostic area serving as backbone any medical center. To our knowledge, no such study has ever been done to understand how radiology is taught, learned and perceived by radiology residents and its relation to the overall environment<sup>4</sup>.

Radiology is a growing specialty with a large number of qualified radiology consultants as well as specialists in their fields nationally and internationally, but so far there is no significant feedback been taken from the trainees regarding their training atmosphere ever.<sup>5</sup> There is scarce data available comparing the public sector hospitals in Asian countries. To fill that gap, the perception of PGRS in radiology using the modified PHEEM was conducted, which will lead to evaluation of the post graduate educational environment.<sup>6</sup> It is to provide a baseline for determining its reliability in our setup. This research will not only depict the strengths and weaknesses of postgraduate training in respective radiological unit of public Hospitals but will also help the stake holders and policy makers for planning evaluation with aligned strategies for future betterment. Further this study will compare the radiology learning environment in public sector teaching hospitals in two different cities with variable resources.

**Rationale:** The teaching educational environment directly affects the performance of the trainee.<sup>7</sup> Each institute and its respective department has a teaching strategy and learning approach which includes faculty commitment, incorporating technology, daily work station hours, research opportunity and personal study opportunities. This study is intended to provide incremental data to the existing literature that offers insight into factors that contribute to radiology residency program problems. Small steps can make huge differences starting in our own setup and then applying it to other departments.<sup>8</sup>

This study aims to compare the perception of the learning environment at two public sector tertiary care hospitals in different cities of Pakistan using a standardized validated tool.

## METHODOLOGY

This is a descriptive cross sectional study design with a Validated PHEEM Questionnaire. Using the non-probability sampling techniques, the Quantitative numerical data was tabulated and analyzed statistically using SPSS version 23. Means were compared using student T test and p value of  $\leq 0.05$  was taken as

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significant. Study was conducted in month of August and September 2021.

All the radiology Residents of FCPS, MCPS, FRCR and MD working in two public sector teaching hospitals of Pakistan, one in capital city of Pakistan ,Islamabad (hospital 1) and the other in Tertiary care Teaching hospital of Southern Punjab ,Bahawalpur (hospital 2) were included in the study.

**Data collection instrument:** PHEEM is a sensitive, yet reliable and valid, multidimensional tool that quantitatively measures the learning environment and the worth of medical residency programs. It is a 40 statements questionnaire, ranked by using 5 point Likert scale. Total PHEEM score (0-160) gives an overall assessment of educational environment:

“SCORES: 0-40 indicates for “very poor”, 41-80 for “plenty of problems”, while 81-120 represents ‘room for improvement’.121-160 suggests “an excellent” educational environment. “

The PHEEM questionnaire instrument is further divided into 3 categories:

Perception for role autonomy

Perception for teaching

Perception for social support.

**I: Perception of autonomy:** “There are 14 items with maximum 56 score; 0-14=very poor; 15-28= a negative view of one's role; 29-42= a more positive perception of one's job; 43-56=excellent perception of one's job”.

**II: Perceptions of teaching:** “15 items with a maximum of 60; 0-15=very poor quality; 16-30=in need of some retraining; 31-45= moving in right direction; 46-60=model teaching”

**III: Perceptions of social support:** “11 items with a maximum of 44; 0-11= non-existent; 12-22= not a pleasant place; 23-33= more positive than negative; 34-44=a good supportive environment”

Based on this, some questions had to be slightly rephrased. The context as well as the process of completing the survey (PHEEM), was explained to PGTs .Due to COVID restrictions and SOPs, survey forms were sent to all the PGRs .Confidentiality and anonymity was ensured by directly emailing and requesting not to mention name.

This was done after approval from institutional review board, heads of units' permission and author of the PHEEM questionnaire, the data is collected through forms circulated and submitted via email. The participants were asked about their current training situations and their agreement with the statements using the 5 options in Likert scale.

There were 4 negative statements with scoring in reverse order so that for all items higher scores meant better environment. The data regarding gender, age of the trainees, hospital, residency year were also included. Participation in the study was voluntary and anonymity was maintained. The data was collected by the researcher directly.

**Data analysis procedure:** The quantitative data was analyzed using SPSS 23. Descriptive statistics (Overall Mean score, Mean score for subscales with S.D & S.E.M and frequencies) were calculated.

Overall PHEEM score with sub categories score of its domains “autonomy, teaching and social support” were categorized into three levels with different cut-off scores and their frequencies and percentages are calculated. After checking for normality of distribution, overall PHEEM scores and scores of its three domains are summarized as mean ±standard deviation.

Independent T-test was used to compare the overall mean scores of PHEEM and each of its items between two hospitals. P value of ≤0.05 was taken as significant.

**RESULTS**

There were 45 radiology residents in total who completed the questionnaire. 20 were from Islamabad (hospital 1) and 25 from Bahawalpur (hospital 2). Out of these 45 residents, 11 residents were males. Over all the residents perceived their educational environment with a global mean of 73.3 (SD 28.5). Autonomy,

teaching and social support were rated 25.2 (SD 9.2), 30.1 (SD 13.4) and 18.1 (SD 7.6) respectively. These results are shown in table 1.

Comparison of the PHEEM scores of the hospitals in two cities is shown in Table 2. The total score by hospital 1 (Islamabad) is 64.1(SD 29.7) and Hospital 2 (Bahawalpur) is 80.7 (SD 25.8). This difference is statistically significant (p 0.05). Perception of autonomy is different in the two hospitals with means 21.8 in Hospital 1 and 27.8 in Hospital 2. This difference is also statistically significant (p value 0.02). Again perception of social support is also different for the radiology residents of the two hospitals with the means of 15.4 for Hospital 1 and 20.2 for Hospital 2. P value is 0.03. Perception of role of teaching is similar in both hospitals with a p value of 0.1.

Gender wise there is no difference between the PHEEM scores of the two groups. P value here is 0.4. Gender wise PHEEM scores are shown in Table 3.

Similarly year of training has not much difference either with a p value of 0.9 in the total PHEEM score of 1<sup>st</sup> year and 4<sup>th</sup> year residents. These results are shown in Table 4.

Finally table 5 shows PHEEM questionnaire and response of study participants to each question.

Table 1: PHEEM perception in Radiology residents of two public sector hospitals

		perception of Autonomy	perception of teaching	perception of social support	Total score
N	Valid	45	45	45	45
	Missing	1	1	1	1
Mean		25.1778	30.0667	18.0889	73.3333
Std. Error of Mean		1.37924	2.00212	1.14716	4.25441
Std. Deviation		9.25225	13.43063	7.69540	28.53945
Minimum		3.00	2.00	4.00	17.00
Maximum		44.00	56.00	40.00	132.00

Table 2: Comparison of PHEEM perception in Radiology residents of two public sector hospitals

	city	N	Mean	Std. Deviation	Std. Error Mean
perception of Autonomy	islamabad	20	21.8000	10.20114	2.28104
	bahawalpur	25	27.8800	7.57914	1.51583
perception of teaching	islamabad	20	26.9000	13.79512	3.08468
	bahawalpur	25	32.6000	12.84523	2.56905
perception of social support	islamabad	20	15.4000	7.59085	1.69737
	bahawalpur	25	20.2400	7.21849	1.44370
Total score	islamabad	20	64.1000	29.70894	6.64312
	bahawalpur	25	80.7200	25.81911	5.16382

Table 3: Comparison of PHEEM perception in the two genders

	gender	N	Mean	Std. Deviation	Std. Error Mean
perception of Autonomy	male	11	27.2727	9.42434	2.84155
	female	34	24.5000	9.23514	1.58381
perception of teaching	male	11	32.8182	14.19027	4.27853
	female	34	29.1765	13.27214	2.27615
perception of social support	male	11	18.9091	8.80289	2.65417
	female	34	17.8235	7.42833	1.27395
Total score	male	11	79.0000	31.38790	9.46381
	female	34	71.5000	27.80805	4.76904

Table 4: Comparison of PHEEM perception in Radiology residents in first and final year of training

	year of training	N	Mean	Std. Deviation	Std. Error Mean
perception of Autonomy	1	14	23.8571	11.94125	3.19143
	4	16	25.1250	8.77781	2.19445
perception of teaching	1	14	30.1429	17.39521	4.64907
	4	16	29.0000	12.95634	3.23908
perception of social support	1	14	18.2143	9.37409	2.50533
	4	16	18.0625	7.09431	1.77358
Total score	1	14	72.2143	36.89315	9.86011
	4	16	72.1875	27.25000	6.81250

Table 5: PHEEM questionnaire

	Question	Both Hospital 1 and 2 Mean	Hosp. 1 Mean	Hosp. 2 Mean	P value
1	"My working hour confirm to the guidelines provided"	2.2	2.40	2.04	0.33
2	"My consultant sets clear standards to be achieved"	1.89	1.25	2.40	0.00
3	"I am able to allocate time for continuous medical education"	2.04	1.75	2.28	0.17
4	"I had an informative orientation plan"	2.40	2.40	2.40	1.00
5	"I have the appropriate level of responsibility in this position"	2.31	2.30	2.32	0.95
6	"I have good clinical super vision"	1.80	1.30	2.20	0.04
7	"There is favoritism in this post"	0.53	0.50	0.56	0.85
8	"I have to perform inappropriate tasks"	0.49	0.35	0.60	0.48
9	"There is informative guideline book for internship"	1.47	1.35	1.56	0.63
10	"My consultant supervisor has good communication skills"	2.58	2.80	2.40	0.36
11	"I am placed on duty roster inappropriately"	0.76	0.30	1.12	0.03
12	"I am able to participate actively in educational events"	2.02	1.60	2.36	0.08
13	"There is sex discrimination"	0.89	0.80	0.96	0.74
14	"There are clear clinical protocols in this post"	2.09	1.80	2.32	0.20
15	"My consultants are enthusiastic"	2.20	2.00	2.36	0.40
16	"I have good collaboration with my fellows"	2.27	2.25	2.28	0.94
17	"My working hours are less than 48 hrs per week"	1.02	0.45	1.48	0.01
18	"I have the opportunity to provide continuity of care"	2.02	1.60	2.36	0.03
19	"I have suitable access to career guidance"	1.84	1.30	2.28	0.01
20	"This hospital has good quality accommodation especially on call"	1.82	1.45	2.12	0.10
21	"There is access to an educational plan relevant to my needs"	2.09	1.75	2.36	0.11
22	"I get regular feedback from my seniors"	2.31	2.25	2.36	0.80
23	"My consultant is well organized"	1.76	1.20	2.20	0.02
24	"I feel physically safe in hospital/ward environment"	1.71	1.15	2.16	0.01
25	"I am blamed inappropriately by my seniors/consultants"	1.02	1.15	0.92	0.62
26	"There is adequate catering/canteen services in hospital"	1.16	1.10	1.20	0.80
27	"I have enough clinical learning opportunities"	2.09	1.9	2.24	0.41
28	"My consultant has good teaching skills"	2.38	2.30	2.44	0.73
29	"I feel part of team working here"	1.96	1.85	2.04	0.64
30	"I have opportunities to perform appropriate	2.07	1.95	2.16	0.57

	practical procedures"				
31	"My seniors and consultants are accessible"	2.09	1.90	2.24	0.42
32	"My work load in this post is fine"	2.49	2.15	2.76	0.14
33	"Senior staff utilize learning opportunities effectively"	1.49	0.85	2.00	0.00
34	"Training in this post makes me feel ready to be a consultant"	2.04	1.85	2.20	0.37
35	"My consultant is a good role model"	2.42	2.25	2.56	0.45
36	"I get a lot of enjoyment out of my present job"	1.42	1.00	1.76	0.06
37	"My consultant encourages to be an independent learner"	2.38	2.35	2.40	0.90
38	"There are good counselling opportunities for junior doctors who fail to complete their training satisfactorily"	2.04	1.85	2.20	0.39
39	"My consultant/seniors provide me with good feedback on my strengths and weakness"	1.60	1.65	1.56	0.83
40	"My consultant/senior promote mutual respect among members of my unit"	2.18	1.70	2.56	0.06

## DISCUSSION

Using the published guide to interpret mean scores, this study shows that the global mean of 73.3 shows post graduate environment with plenty of problems. The mean score of hospital 2 is higher than hospital 1. Even though this difference is statistically significant, the means fall within the same category of educational environment with plenty of problems. If we compare our mean PHEEM score with other economically sound countries, the picture looks quite gloomy as a study in Saudi Arabia shows a mean of 100, a Japanese study shows a mean of 102.4 and an Italian study shows a mean score of 106.8.<sup>9,10,11</sup> However Pakistani studies show variable results. A score of 79.82 was seen in a study conducted in twin cities in 2014<sup>12</sup> and a score of 85.19 in a study conducted in pediatric medicine departments of various hospitals in Lahore.<sup>13</sup>

A score of 93.96 was seen in a study involving three hospitals in Karachi.<sup>14</sup> A very high score of 107 was seen in a study done in Army Medical College.<sup>6</sup> There is no statistically different difference in responses from the two genders but reason could be larger female representation. The ratio is 3:1. Similarly the difference in responses from 1<sup>st</sup> year and final year of training is not seen.

A mean score of perception of autonomy in both hospitals show a negative view of one's job. Although the difference of means in the two hospitals is statistically significant it still falls in the same category.

In the area of role of teaching the means fall in two different categories. In case of hospital 1 there is need of some retraining whereas for hospital 2 things seem to be moving in the right direction with improvement in teaching environment.

Scores in the area of perception of social support in both institutions show that this is not a pleasant place.<sup>15</sup> The unfriendly environment may be due to long shifts, lack of support and bullying by seniors as seen in other studies.<sup>16,18</sup> Availability of resources and infrastructure remains an important factor throughout the educational environments.<sup>19,20</sup> The studies conducted in poor resource countries like Ethiopia showed results of 70.87 with more negative attributes owing to the resource limitation.<sup>21</sup> PHEEM seems to be an important and valuable tool allowing policy makers to reflect upon strengths along with existing weaknesses of their

residency program across the world. If we compare our overall results to other specialities where study was already been conducted, that is gynaecology, anesthesia and ICU, more positive scores have been reported.<sup>21</sup> The possible difference in such variations could be the experience and number of staff, different workload residents handle in each subject and teaching methods applied and implemented .It is understandable that ours' is a low economic income country and health budget here barely covers necessities. Better scores in other hospitals may be due to their good educational environment or lack of anonymity while answering the questionnaires.

Limitation: It is much possible that carrying out such an evaluation in some other residency affiliated hospitals of the country for clinical or basic specialties with larger student sample size may yield different results.

## CONCLUSION

Our results show that we have plenty of problems which need prompt corrective measures in terms of resident's essentials for learning and also the curricular targets that needs to be addressed one by one .There are more such studies needed in order to identify and create awareness about such road blocks.

**Conflict of interest:** Nil

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