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Original Research

GESDAV

Impact of structured training on medical students' performance in objectively structured performance evaluation in community medicine clerkship

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ABSTRACT

Objectives: The aim of this study was to determine the effect of structured training on the student's performance in the objectively structured performance evaluation (OSPE) at the end of the community medicine clerkship. **Methodology:** A quasi-experimental study was conducted using post-test only, non-equivalent control group design to assess the impact of structured training on performance of medical students in OSPE in community medicine clerkship. A 45-station OSPE was conducted integrating all the domains of learning that is higher order cognitive domain, the psychomotor domain, and affective domain. Of 84 students rotating through the 2 weeks clerkship in the Community Medicine Department, 40 students ("trained" group) went through a structured training program. **Results:** Of the 40 students who underwent the structured training program 36 (90%) passed the OSPE when compared to 21 (48%) out of 44 who did not undergo the structured training ($P < 0.001$). This association of training with passing OSPE was significant in the sub-group of 44 female students (91% vs. 50%) as well as the 40 male students (89% vs. 45%) with regards to the trained versus the untrained groups ($P = 0.001$ and $P = 0.002$ respectively). An improved pass percentage was also seen in the trained group when compared within the sub-groups of students who had attended <75% of the classes as well as those who had failed in previous annual examination ($P = 0.005$ and $P = 0.01$, respectively). **Conclusion:** Structured training program in community medicine clerkship is effective in enhancing the student's learning of analytical and problem solving skills, along with the development of relevant competencies.

KEY WORDS: Community medicine training, objectively structured performance evaluation, performance of students

INTRODUCTION

The financial resources are generally limited for all types of ventures, as outlined in the article by Hardin on "Lifeboat Ethics" describing the nature of financial resources. The article emphasizes that strict measures are needed in order to ensure that maximum benefit is attained from limited resources [1]. In the health field the nature of a globalized world requires that all doctors, irrelevant of their country of origin, need to have the best possible training within a resource constrained

environment [2]. Given that ground realities require the two premises to be brought into agreement, there is a strong requirement for institutions to develop curricula and their mode of instruction in a manner that is evidence-based.

Cullen *et al.* [3] described structured training as "training of a new worker through a systematically developed education program." Although they used this definition to describe training in an industrial set-up, this definition can be very apt in medical education as well. They further point out that, compared with unstructured training, this process can be slightly more costly, and requires more effort and man-power from faculty. The onus on the medical education researcher, then, is to assess if there are benefits to structured training over unstructured training. Gagné's work published in 1985 on purposeful learning found that programs lacking the eliciting of knowledge are poor and incomplete if knowledge is not elicited from participants [4]. Structured training serves the purpose of being an excellent method of delivering and drawing information from students [5]. It encourages self-directed learning, encourages active participation, and is most likely to produce good doctors [6].

For the purposes of this article, the standard didactic teaching strategy is considered unstructured. The reason is that this strategy reduces the role of the learner as stakeholders in their learning process. The process is not as rigorously structured as a training program. The standard teaching strategy is generally considered inefficient with one article concluding that didactic teaching is "not effective in changing physician performance," and fails in attracting as well as maintaining student interest [7]. In the field of medical education, a number of studies have been conducted on the benefits of structured training in basic sciences and in clinical or surgical fields [8-10]. Structured training has been found to be beneficial in the development of cognition, psychomotor skills and effect of students, irrelevant of which field they are studying in, and their skill-set. It has been found to improve the clinical skills [8], knowledge [9], and attitude [10] in different groups of students.

Community health science training offers invaluable opportunities for preparing students to work in communities [10]. The field requires a complex interplay of student's knowledge, skills and attitudes, and provides students with a very positive learning experience [11]. Given the nature of community medicine and public health, it seems to be very well suited to a structured training program. In Pakistan, the regulatory and policy making authorities dealing with medical education are the Pakistan Medical and Dental Council (PMDC) and the Higher Education Commission of Pakistan. In the PMDC 2005 curriculum, which is in use in all medical colleges and universities across Pakistan, community medicine is considered as a pre-clinical subject and the allocated time division is 40% for theory and 60% for practical skills content. The curriculum followed is subject-based but new drafts are being prepared by the PMDC to shift to an integrated, outcome based curriculum. The instructional methodology for practical skills development is not described in much detail in the current curriculum. Hence it is addressed in the curriculum implementation strategies of the medical universities and colleges. This has resulted in non-standardized and unstructured practical training in community medicine [12]. Realization of the need for giving importance to structured training in community medicine makes the basis of the conceptual framework for this study, predicting that there will be a significant impact of structured training on the performance of medical students in community medicine. The aim of the study was to determine the effect of structured training on medical student's performance in the objectively structured performance evaluation (OSPE) at the end of the community medicine clerkship.

METHODOLOGY

The study was conducted on 4th year medical students attending 2 weeks clerkship in the Department of Community Medicine in a public sector self-financed medical college in Lahore, Pakistan from December 2012 to May 2013. This is a newly commissioned medical college in Lahore and the class of 4th year is the first batch of this college. The college is affiliated with the University of the Punjab and follows the curriculum of the PMDC. The college has a very flexible attitude for adoption of appropriate instructional methodologies in different subjects to help in improving the learning outcomes of the graduates.

This was a quasi-experimental study, using post-test only non-equivalent control group design. The study population consisted of 90 students in the class of 4th year and all the students were enrolled in the study after taking their verbal informed consent. There were 84 students (out of 90), who were eligible for the study as they appeared in the final OSPE. The subjects were allocated to study and comparison group/non-equivalent control group using procedures other than randomization. Students at the start of the session were grouped in batches of 5 or 6 for their clinical and field rotation [Figure 1]. The batches were allocated to different clinical departments along with the Department of Public Health and Community Medicine. All the 84 students were taught the theoretical basis of all of the components to be covered in structured training via formal lectures and tutorials. In addition to the didactic sessions to build their knowledge base, 40 students in the study group received structured training scheduled for 3 h 20 min daily for 10 working days. The students were briefed daily for 30 min and then taken to the community or hospital depending on the competencies and skills to be developed. They were required to record their observations, document/report review findings, and write their comments and suggestions. This was done after analyzing and interpreting their findings through discussion in group in the presence of a facilitator. The content covered, skills developed and mode of skill transfer are listed in [Table 1]. At the end of the clerkship of an OSPE of the whole class was conducted to assess the learning of students in all the areas of community medicine taught in lectures and tutorials. The validity of a structured training was ensured by senior faculty members of the department through frequent visits during the training activities, feedback from students and through end training evaluation of students.

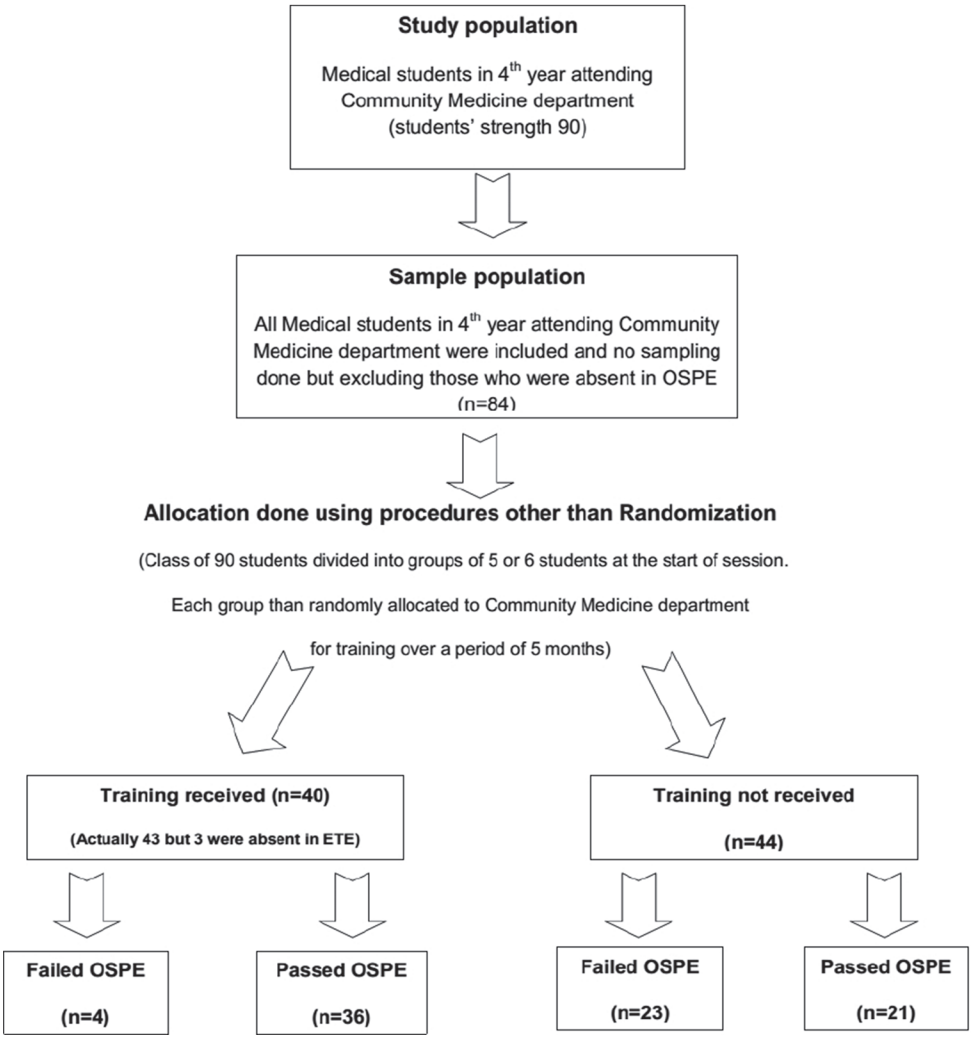

Figure 1: Flow diagram explaining methodology

Table 1: Structured training program

Topic areas covered	Skills developed	Mode of teaching
Reproductive health	Observational skills	Briefings
Family planning	Interviewing skills	Community/field visits
Epidemiology,	Clinical skills	Hospital visits
Research and survey methodology	Basic epidemiological skills	Structured questionnaires
Biostatistics	Counseling skills	Small group discussions
Hospital waste management	Information recording skills	Teaching on specimens, models and devices
School health services	Data management skills	Role playing
Health education	Research proposal development skills	
	Professional and research ethics skills	

Objectively structured examinations have been found to be a reliable and valid way of assessing students [13-15]. In the Pakistani context, OSPEs have been found to be a fairer and more reliable than the traditional method of viva voce as a method of examination [16]. All the 84 students underwent an OSPE consisting of a circuit of 45 stations with three rest stations placed at approximately uniform distance; 30 stations were non-interactive, 6 were interactive and 9 were viva spots. A total of 3 min was given at each station using a stopwatch. The OSPE was designed to evaluate the ethical behavior of participants, their clinical examination skills, interpersonal counseling skills, their recording skills, analytical and problem solving skills. On interactive stations, nursing students were placed, who were trained as mock patients/clients and also in the structured rating of students on these stations as standardized raters. OSPE performance in the non-interactive stations was rated using pre-formed assessment rubrics developed by senior faculty of the department. They were rated by the junior faculty members and counter checked by a senior faculty to ensure validity of this objectively structured exam.

Data analysis was performed using Statistical Package for the Social Sciences version 21 (SPSS Inc., Chicago, IL, USA). The data are presented as frequencies and percentages for the categorical variables and mean ± standard deviation for the numerical variables. The Chi-square test was used to compare the categorical data, and *t*-test was used to compare the numerical data. $P < 0.05$ was considered as statistically significant for all the statistical tests.

Verbal consent was taken from the students prior to being allocated to the intervention group, and the consent was taken in front of a witness. Based on the hypothesis that the structured training would have a significant impact on the examination, the OSPE was not factored into the internal assessment, and did not contribute to the end-of-term examination. Students who had not gone through the training program for the study subsequently underwent the training. Owing to a strong rapport already existing between the department and an open-door policy, we encouraged the participants to bring forward any concerns they had about the study, and they were provided with any information and clarifications that the researchers and participants felt were required.

RESULTS

The study was conducted on 84 students coming for clerkship in community medicine in the Department of Public Health and Community Medicine. Of the 40 students who underwent structured training 18 (45%) were males and 22 (55%) were females when compared to 22 (50%) out of 44 for both genders in the other group, which was not given structured training. There were 12 (30%) students who attended <75% of the classes in a structured training group when compared to 16 (36%) students in the other group. This proportion was the same (i.e., 30% and 36%) for the presence of students with a supplementary status (failing in the annual examination) for both the groups, respectively [Table 2].

A total of 36 (90%) out of 40 students passed the OSPE from the structured training group as compared to 21 (48%) out of 44 from the other group ($P < 0.001$). Table 3 shows the marks

Table 2: Student's attributes and training

Categories	Training (*N* (%))	
	Attended (*N*=40)	Not attended (*N*=44)
Gender		
Males	18 (45)	22 (50)
Females	22 (55)	22 (50)
Class attendance		
<75%	12 (30)	16 (36)
≥75%	28 (70)	28 (64)
Presence of supplementary status in previous exams		
Present	12 (30)	16 (36)
Not present	28 (70)	28 (64)

Table 3: Student's attributes and categories of OSPE results

Categories	Total	OSPE passed (*N* (%))			OSPE failed (*N* (%))	
		>70% marks	61-70% marks	50-60% marks	44-49% marks	<44% marks
Overall						
Training done	40	7 (18)	10 (25)	19 (48)	2 (5)	2 (5)
Training not done	44	4 (9)	9 (21)	8 (18)	18 (41)	5 (11)
Gender						
Female	44	9 (20)	14 (32)	8 (18)	11 (25)	2 (5)
Male	40	2 (5)	5 (12)	19 (48)	9 (23)	5 (12)
Class attendance						
≥75%	56	10 (18)	15 (27)	15 (27)	14 (25)	2 (4)
<75%	28	1 (4)	4 (14)	12 (43)	6 (21)	5 (18)
Presence of supplementary status						
Supple status not present	56	10 (18)	15 (27)	14 (25)	12 (21)	5 (9)
Supple status present	28	1 (4)	4 (14)	13 (46)	8 (29)	2 (7)

OSPE: Objectively structured performance evaluation

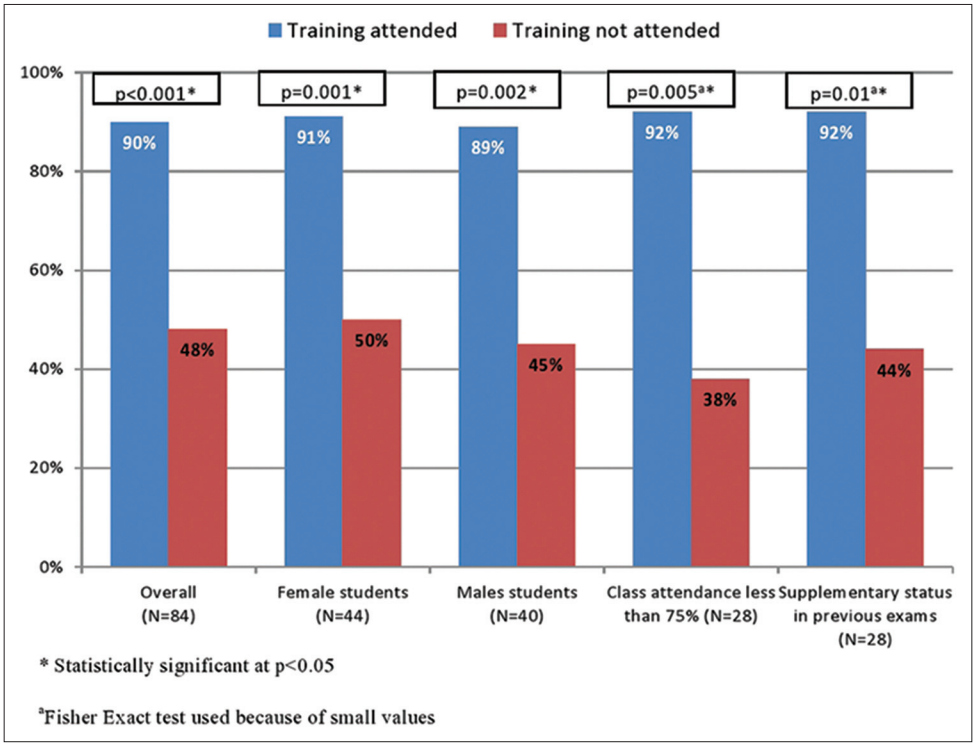

Figure 2: Objectively structured performance evaluation pass percentage in different categories comparing trained versus not trained groups

distribution for the two groups of student showing that the trained group generally performed better than the comparison group with 17 (43%) getting more than 60% marks in the trained group as compared to 13 (30%) in the other group. It was also seen that female students had better performance than males with 23 (52%) getting more than 60% marks as compared to only 7 (17%) of the males. The comparison regarding class attendance >75% (as compared to <75%) and not having a supplementary in the previous annual examinations (vs. having a supplementary examination) showed that in both the categories 25 (45%) of the students who had attendance >75% or did not have a supplementary exam got more than 60% marks in the OSPE as compared to 5 (15%) of their respective counterparts [Table 3]. A comparison of the mean marks in the OSPE examination showed similar results with a trained group, females and class attendance >75% having significantly higher marks when compared to their counterparts as shown in Table 4.

Figure 2 shows the comparison of the trained and untrained groups with regards to the pass percentage in OSPE (getting 50% marks or more) by the different sub-groups of gender, class attendance, and previous supplementary status. It is seen that females in the trained group performed better than those in the comparison group with a pass percentage of 91% and 50% respectively ($P = 0.001$) ; this was the same for the males with a pass percentage of 89% versus 45% ($P = 0.002$) respectively. When a similar analysis was done on the sub-category of students who had attended less than 75% of the classes ($N = 28$) it was found that out of these 11 out of 12 (92%) from the trained group passed the OSPE as compared to 6 out of 16 (38%) students from the comparison group ($P = 0.005$). The same results were found when comparing the group of students who previously had failed in at least one of their annual examinations and then passed in the supplementary (make-up) examination ($N = 28$). It was seen that in the trained group 11 out of 12 (92%) students passed as compared to 7 out of 16 (44%) in the comparison group ($P = 0.01$).

Table 4: Mean and mean difference of OSPE scores

Categories	OSPE results					
	N	Mean±SD	Difference	*P* value	95% confidence limits	
					Lower	Upper
Training						
Yes	40	53.4±8.9	5.4	0.02*	0.83	9.97
No	44	48.0±11.8				
Gender						
Females	44	53.2±11.8	5.4	0.02*	0.83	9.97
Males	40	47.8±8.9				
Class attendance						
75% or above	56	52.4±10.7	5.4	0.03*	0.55	10.25
<75%	28	47.0±10.2				
Presence of supplementary status						
Supple not present	56	51.9±11.4	3.9	0.12	−1.03	8.82
Supple present	28	48.0±9.1				

*Statistically significant at $P<0.05$, [a]Fisher exact test used because of small values, OSPE: Objectively structured performance evaluation

DISCUSSION

Seeing that the odds of students who attended the training sessions passing the OSPE was 9.85 times that of students who did not attend the session, and that the results were highly significant, it is necessary to discuss the possible reasons for this huge difference, and to see whether or not other studies corroborate with these findings.

To start off the discussion, we should assess the theoretical basis of the difference in the examination results. Aalbers *et al*. describe the processes that motivate students to prepare for sessions, stating that "practical exercises promoted preparation, especially when the exercises were discussed" [17]. This means that didactic sessions alone are insufficient motivators for learning. They also describe a phenomenon called "social loafing," wherein students exchange information between one another. This phenomenon has been described by Dent and Harden [18] that although large group whole-class teaching is an indispensable part of teaching, small group work expedites collaboration between students and enhances cooperative learning. Although Aalbers states that this phenomenon discourages pre-reading for sessions, Dent and Harden believe that it is an important mechanism by which students learn, and it contributes greatly toward their examination performance. This premise greatly contributes toward the validity of the argument that tutorials and structured training are better strategies when compared to a purely didactic training format. Results of current study support this argument very well by showing significant impact of structured training on medical student's performance ($P < 0.001$).

Dent and Harden [18] also state that "there are strong educational and logistical arguments for placing more emphasis on the community as a context for student learning," further stating that a purely theoretical didactic training session has a major disadvantage: Students may not see the relevance of what is taught to their future career as doctors. This suggests that, for community medicine, tutorials and structured training may be of benefit in promoting its importance for the medical students. Abu-Zidan and Elzubeir [19] write that active, experiential learning adds greatly to student satisfaction with teaching. These methods stimulate greater cognitive engagement, as well as more student-student and student-instructor interaction.

A qualitative study among speech therapy and audiology students in South Africa [10] found that student's outlook towards rural practice improved significantly after a 4 days practicum, which involved basic tasks and structured observations. Through pre and post-studies, the authors noted that there was a change in the attitude from an intra-personal to an interpersonal focus. The students perceived an increase in their knowledge base, their flexibility and sensitivity toward cultural issues, and that they were suddenly made cognizant of their roles in a larger context. In our study, this was reflected by their OSPE scores, as the OSPE tested knowledge, communication skills and attitude of students.

Owing to a dearth of articles on the benefits of structured training in community medicine context, parallels can to be drawn to other fields. Several studies have been conducted on the impact structured training has on clinical skills and communication skills. Structured training was used to train students in neurological skills [8], and found improvements in the results were statistically significant; while another found that students trained in digital rectal examinations scored higher on the OSCE [20], while another study on the same topic found the mean score improved to 4.9 following the workshop as compared to 2.2 before the workshop [21] showing similar findings as in the current quasi-experimental study.

A study by Wagner *et al*. [22] found that, as a result of structured training in communication, students described feeling an increased confidence in their ability to interview patients, and under-stood the importance of building and maintaining a positive rapport with the patient through their communication skills. They also felt increasingly cognizant of their roles as healthcare professionals. The study also described a positive feedback from their clinical preceptors, who noticed an increased level of preparedness among students who had participated in the training program. Another study by Lim *et al*. [23] found that OSCE scores based on the Jefferson scale of physician empathy rose significantly following a structured course on empathy. Another study found that residents who under-went structured training for laparoscopic skills on box-sets [24] had significantly higher global rating scale scores at the end of course, indicating that they were had greatly improved their skills, and had better retention after 5 months. A similar study [25] found that that structured training improved dexterity and laparoscopic skills. All these evidence provides a strong support for the findings of the present study, emphasizing the importance of structured training and its impact on student's performance and learning.

This study attempted to rule out potential confounders by assessing gender, attendance records as well as supplementary examination status. It was interesting to note that the improved overall performance in the trained group was maintained across the different sub-groups that were compared including among those students who attended <75% of the classes or had failed at least once in an annual examination in the past.

The study was a quasi-experimental because of the difficulty in randomization. The control group was non-equivalent and no pre-test was conducted, which may affect the comparability of the two groups under study. This study demonstrates the fact that a structured training program is beneficial to the students, and is a worthwhile endeavor despite the resource requirements associated with such a program.

CONCLUSION

Structured training in the subject of community medicine in medical school has a significant impact on enhancing the learning of students as measured by OSPE.

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