ASSESS THE EFFECTIVENESS OF AN INQUIRY BASED LEARNING METHOD IN MICROBIOLOGY FOR UNDERGRADUATE MEDICAL STUDENTS

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Abstract: Two hours practical session in Microbiology for II MBBS students is most of the time monotonous, vague, teacher centric and not utilized time qualitatively by teaching faculty in conventional method. Inquiry-based learning is a form of active learning that starts by posing questions, problems or scenarios—rather than simply presenting established facts or portraying a smooth path to knowledge. To determine the student's performance & effectiveness of inquiry-based learning method over traditional practical method by comparing once. To study students' and faculty perceptions about inquiry based learning (IBL) method Prospective interventional analytical study was conducted for II MBBS students in department of Microbiology for four months. After Ethical committee approval and informed consent randomized selected 100 students of II MBBS divided into two batches; one for didactic practical and one for interactive new inquiry based teaching learning method. Four topics (Staphylococcus, Streptococcus, Corynebacterium and *M. tuberculosis)* selected with 15 days interval from regular departmental teaching schedule. Structured the inquiry based questions to cover entire topic, post test papers and feedback forms and validated prior to start the study. Two hrs practical sessions divided into four parts. First half an hour introduction of the topic as routine didactic method, next half an hour we distributed the questions among students and told them to read, discuss and collect the information from the books or any other sources. Next half an hour discussed the questions and last half an hour conducted short test of 20 marks. Average score in tests was considered for analysis. Mean score was calculated and unpaired t test was applied. P value less than 0.05 was

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considered statistical significance. Students' and faculty perceptions about inquiry based learning (IBL) method determined by taking questionnaire based feedback using Likert scale at the end of all four sessions. Mean score for topic Staphylococcus taken in traditional way was 9.02 with SD of 2.3 and that taken by the interactive inquiry based learning method was 14.6 with SD of 2.8 and t value 11.1. Mean score for topic Streptococcus taken in traditional way was 8.94 with SD of 2.6 and that taken by the interactive inquiry based learning method was 14.6 with SD of 2.9 and t value 10.2. Mean score for topic Corynebacterium taken in traditional way was 9.48 with SD of 2.4 and that taken by the interactive inquiry based learning method was 14.0 with SD of 2.7 and t value 8.8. Mean score for topic *M. tuberculosis* taken in traditional way was 9.38 with SD of 2.7 and that taken by the interactive inquiry based learning method was 14.2 with SD of 3.0 and t value 8.4. Improvement in the performance of the students was observed. Mean score was statistically significant (p value is 0.001) in all four topics conducted by interactive inquiry based learning method. Approximately 90% students agreed that the topic better taught in interactive inquiry based learning method and wanted to have more of such sessions.A positive feedback was received from the students and faculty members stated that the inquiry based learning method was very interesting and effective. The students were more alert, interested and receptive in the session. It helps how to utilized two hours practical time that enhance the interest of students and session become more interactive and informative. Student liked the method as it increases the interaction between teacher and students. It helps in integration of concepts and development of thinking skill. IBL method simplified and clarified concepts the topic, increased receptivity and questions increased attention span. It improves the confidence of teacher as well as students[2].The study proved that inquiry based learning method is more effective than didactic method to understand the topic. Strengthen quality of teaching learning. Learners are encouraged to participate and interact.

Keywords: II MBBS Student, Inquiry-based learning, Didactic method, Self-efficacy

1.Introduction

Aim of medical education, to develop competent Indian medical graduate (IMG) with having sound knowledge, management skill and applied aspect of the subject in his practice for the community.

IMG are adult learners, to improve their understanding and higher thinking of the subject, it is necessary to introduce different newer interactive methods in teaching which are student centric than teacher centric ones[1].

Inquiry-based learning is a form of active learning that starts by posing questions, problems or scenarios—rather than simply presenting established facts or portraying a smooth path to knowledge. [2]

Interactive Inquiry based learning method, would improve student active involvement during the learning process and will help in reinforcement of their learning knowledge and that would also reflect positively in their confidence of the examination. [3]

Hence in this study decided based on the new method.

AIMS and OBJECTIVE

To determine the student's perform effectiveness of IBL- inquiry based learning method over traditional Practical method by comparing once [4,5]

To study student perceptions about Inquiry Based Learning (IBL) method

2.METHODOLOGY

Study Design: Prospective interventional analytical study
Place of the study: Department of Microbiology, DVVPF's Medical College and Hospital, Ahmednagar[6-9]
Duration of study: 4 months from October 2018 to January 2019.
Study population: Second year(III semester) medical undergraduate students
Sample Size: 100 students participated in the study
Ethics committee approval was taken
Sensitization of the faculty members
Structure the inquiry based questions to cover entire topic and Validation
Voluntary participation of the students (100 from 154 students) with written informed consent.[10,11]
Four topics in the subject of Microbiology were chosen namely Staphylococci, Streptococci, *Corynebacterium diphtheriae* and *Mycobacterium tuberculosis explain the table 1,2,3,4*

Table 1: Intervention Day 1				**Table 2: Intervention Day 2**
Batch	Topic	Teacher	T-L Method	Batch Topic Teacher T-L Method
A	Staphylococci	1	Didactic	A Streptococci 1 IBL
B	Staphylococci	2	IBL	B Streptococci 2 Didactic
Table 3: Intervention Day 3				Table 4: Intervention Day 4
A	C. diphtheriae	2	Didactic	A M. tuberculosis 2 IBL
B	C. diphtheriae	1	IBL	B M. tuberculosis 1 Didactic

Two hrs practical session divided into four parts. First half an hour introduction of the topic as routine didactic method. Next half an hour we distributed the questions among students and told them to read, discuss and collect the information from the books or any other sources. Next half an hour discussed the questions and last half an hour conducted short test of 20 marks.
At the end of each four session a short test of 20 marks was taken on the respective topic.
Average score in tests was considered for analysis.
Students' perceptions about Inquiry Based Learning (IBL) method by taking questionnaire based feedback using Likert scale at the end of all four sessions.
Faculty feedback taken
The result were analyzed

3.OBSERVATION & RESULT

Show in table 5&6.

Table 5: Perception of the students about IBL interactive and didactic sessions		
No.	DESCRIPTION	RESPONSES
1	The method provided guidance about how to learn this topic effectively	92% students agreed the topic better taught in interactive IBL method session than didactic method
2	Ensured adequate coverage of	90% students agreed

	whole topic in all aspects	
3	The method encourage to understand the applied aspect of the topics	88% students favoured the IBL method stimulate to understand the clinical aspect of the topic.
4	The approach is interesting	96% participants accepted
5	Would like to have more such IBL method sessions	90% students wanted to have more of such sessions
6	The method encourage be more confident in oral practical examination	90% students agreed
7	IBL method cleared their doubts and thinking	82% students felt this
8	Was comfortable during the session by IBL method	70% students agreed
9	IBL method helps in developing self directed study	78% students response agreed
10	Increases the interaction between teachers and students	82% students agreed

Table 6 : Comparison of Learning outcome scores of test taken immediately after session by unpaired t test

Topic	Group (T-L Method)	n	Mean Score	SD	t value	p value
A	Control (Didactic)	100	9.02	2.281	11.096	< 0.001
	Intervention (IBL)	100	14.64	2.761		
B	Control (Didactic)	100	8.94	2.958	10.188	< 0.001
	Intervention (IBL)	100	14.68	2.668		
C	Control (Didactic)	100	9.48	2.435	8.810	< 0.001
	Intervention (IBL)	100	14.04	2.733		
D	Control (Didactic)	100	9.38	2.702	8.404	< 0.001
	Intervention (IBL)	100	14.18	3.001		

Faculty feedback: A positive feedback was received from the faculty members stating that the IBL method is very interesting and effective. The students were more alert, interested and receptive in the session . it improves the confidence of teacher as well as students.

Graphical presentation of result P: 3-C and / or P : 1-D

Topic	**Group**	**Mean score**	**SD**	**'t' value**	**P value**
Staph	Control	9.02	2.281	11.096	< 0.001
	Intervention	14.64	2.761		

Strept	Control	8.94	2.958	10.188	< 0.001
	Intervention	14.68	2.668		
CIDPH	Control	9.48	2.435	8.810	< 0.001
	Intervention	14.04	2.733		
MTB	Control	9.38	2.702	8.404	< 0.001
	Intervention	14.18	3.001		

4.DISCUSSION

The present study was conducted to determine the effectiveness of Inquiry based learning method.
Post test conducted after every intervention showed significant difference in the immediate understanding of the students (Table 6)
It helps how to utilized two hours practical time that enhance the interest of students and session become more interactive and informative.
Student like the method as it increases the interaction between teacher and students.
It helps in integration of concepts and development of thinking skill.
IBL method simplified and clarified concepts the topic, increased receptivity and questions increased attention span.

5.LIMITATIONS

No challenging limitation except the time required for preparation of the session and more effective in small group.

FUTURE PLAN

To conduct this study in other department.
To introduced this IBL method in regular teaching.

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