

Medical Education: Reorientation of Medical Education program training and finding knowledge among under graduate medical students in a tertiary care teaching hospital in South India

Senthilvel Vasudevan^{1*}, Jayanthi Sureshbabu², Sumathi Senthilvel³

Lecturer in Pharmacy (Biostatistics), Dept. of Pharmacy Practice, College of Pharmacy, King Saud Bin Abdulaziz University for Health Sciences, Riyadh, Kingdom of Saudi Arabia.

*Tutor in Medical Entomology, Pondicherry Institute of Medical Sciences, Kalapet, Pondicherry, South India.
Formerly Lecturer in Nursing, Kasturba Gandhi College of Nursing, MGMC & RI Campus, Pondicherry, South India.*

***Corresponding Author:**

Dr. Senthilvel Vasudevan

Lecturer in Pharmacy (Biostatistics),
Dept. of Pharmacy Practice, College of Pharmacy,
King Saud Bin Abdulaziz University for Health Sciences,
Riyadh – 11481,
Kingdom of Saudi Arabia.

Abstract:

Background: Reorientation of Medical Education program conducting in medical education is very much useful to Under Graduate Medical Students. Their knowledge will be increased in research methodology at undergraduate level.

Methods: The present Reorientation of Medical Education program (ROME) study was conducted with under graduate medical students and with a sample size of one hundred and two medical students in the year 2013. They were involved in the various training of research methodology and in the existing softwares. Statistical analysis descriptive and McNemar test were used and the level of significant was 0.05.

Results: Totally eighty seven students were included in this study. In that, 31 (35.63%) were boys and 56 (64.37%) female students. Mean age was found as 21.24 ± 0.51 years (Range: 21 – 23). The knowledge in meaning of ROME and Knowledge in research methodology were found as very highly significant.

Conclusion: The present study has concluded that the implementation of ROME is very important and essential in the medical education curriculum. It would help to increase the young medical researchers in the medical field in India and they will be become a good and efficient medical practitioner in their life.

Key Words: reoriented medical education, teaching, under graduate medical students, knowledge

I. Introduction:

Reorientation of Medical Education (ROME) program is the best method of teaching the research methodology to the Under Graduate Medical Students (MBBS) in a teaching medical institution. The main and ultimate goal of undergraduate medical education in India is to improve the students' knowledge; skills, attitudes and responsiveness, then only they will be become an appropriate and efficient physician in the first contact of the community and in the world [1]. In this ROME training, Biostatistics is also teach to the medical graduate students. Biostatistics is the application of statistics to a wide range of topics in biology. It concepts and applications of teaching in medical education is very much essential and useful to Under Graduate Medical Students for their research. Then only their knowledge in research methodology and in the application of Biostatistics will be increased at the under graduate medical student level and they will show in the community based research activities in their CRRRI posting, in Post Graduate level or in further higher studies. Medical educators should have enough knowledge and updated it in time to teach to the medical students [2]. Nowadays, Medical Council of India [13] is also encouraging this type of community based research training to the medical students in all medical colleges in India. But, it was implemented in some of the medical colleges only. This have been happening by the lack of faculties of availability, working days of the medical college, funding and by improper planning of the teaching faculties in the medical colleges in India. World Health Assembly mentioned in the report that the necessity of medical teaching institutions' involvements and contributions in health care and delivery system to the community, research and its practices, preventive measures activities in the community level [3].

Nowadays, this type of training encouragement is essential and very important in medical research at the level of medical teaching institute in India. Then only the medical graduates would involve in research and to participate in the community level research. They would have been got some knowledge about the rural and urban population, their life style, burdens, challenges, kinds of diseases, causes of the diseases (Communicable and Non-Communicable) and what are all the methods available in India and etc. In this present study, my objectives are to educate the various research methodology steps and methods in Biostatistics, various tests, its applications to the under graduate medical students in a medical college level, to estimate the existing knowledge about research methodology, various study designs, data entry and analysis with the existing statistical software, report writing and submission of the final report and various types of study design among the medical students and to make a keen research interest among under graduate medical students through ROME program [4]. The main objectives of this paper are teaching about ROME posting and its importance, training the medical students in all the stages of research methodology, how to prepare research questionnaire and consent form, carry out a community based research, training in biostatistical concepts, tools, various tests in biostatistics, its applications and giving keen training in the existing statistical softwares, report writing, intervention methods and based on that conducting health education in the studied communities or area. Find the knowledge about ROME posting **among the under graduate medical students.**

II. Methods:

Study Participants and Study Area: In this ROME study, one hundred and two under graduate medical students were included those who are posted in Dept. of Community Medicine, Pondicherry Institute of Medical Sciences, Kalapet, Puducherry (UT), South India. In this paper, I have discussed all 4 group of students' activity in common and here I was provided one batch students' research details. Because, I was involved as a co-investigator of a group and my group was done a research related to water quality and its related diseases. Before conducting the ROME program, we have got the prior permission from the respective panchayat leaders in the study areas.

Study Period: This study was conducted in the period of 1st February to 5th March 2013 in the field practice areas of Dept. of Community Medicine, PIMS, Puducherry in twenty four hours in a week basis. At the beginning of the ROME program, the pre-test was conducted and the end of this program the post-test was conducted successfully.

Group discussion about the research and formation of various groups for ROME:



Splitting of students into various effective groups: Before conducting the research, elect a group of students for the proforma maintenance group, survey group, data entry and compilations group, review of literature and references preparation group, finance group, food and water arrange group, intervention group, screen play group.

Research methodology: This topic contains various steps, they are mentioned as follows: Formulation of research questions (hypothesis), types of study designs, important measurements – primary outcome variables, types of variables and its unit of measurements, formation of study questionnaire and consent form for the study participants, how to enter the collected mass (raw) data, how to analyze the collected data from the field (community) by existing software's like MS Excel 2007 and SPSS 16.0 version.

Find out their knowledge gain from the training among the students by using pre-designed and pre-tested questionnaire. Data entry was done by MS Excel 2007 and data analysis by SPSS 16.0 version.

Selection of the students for ROME: This teaching program was conducted by the Department of Community Medicine in Pondicherry Institute of Medical Sciences, Puducherry during the year 2013. As a teaching faculty, I have taught the subject Biostatistics to the 1st part of the 3rd professional students. The students were attended

the class for biostatistics in the Community Medicine Department from their 2nd year middle onwards. The entire batch of students was divided into four groups and the four groups were under gone the ROME program training. Data collections in the community have done by the students under supervision of respective faculties and interns were posted from our nearest Rural Health Centre or Urban Health Centre.

In this study cost involved that was fully borne by all four batch students. Separate logistic for all four batches were given by the Management, Pondicherry Institute of Medical Sciences, Kalapet, Puducherry. The data collection in the field by the medical students in their respective study areas and it was shown in the following figure.



III. Students trained in Research Methodology:

The Dept. of Community Medicine faculties explain all the steps involved in the research methodology and as follows:

- Explain how to conduct a research and how to frame a questionnaire or a proforma
- How to write the materials and methods
- Quoted how to gather the references and how to write the review of literature
- How to get the relevant results for their respective studies
- Elaborate how to write the discussion from the existing results
- Explain how to write the conclusion
- How to finalize and write recommendations based on the results obtained from their respective researches.
- Brief clearly how to write the references in the bibliography and
- Explain how to do the further clinical investigations based on their study results and to create awareness in community level. Help to the poor people through medical camps was done with the available faculties, Post Graduate students, Health Workers, Social Workers, Staffs and Staff Nurses in the Department of Community Medicine.

Students trained in biostatistics and its importance:

(a). Students undergone in the training of Biostatistics concepts and various types of tests and the uses of software's:

In this ROME posting, I have been explained the following:

- Explain all the concepts of Biostatistics, types of variables like ratio, interval, ordinal, nominal and types of data: Primary data and Secondary data, biostatistical tools, methods and its applications.
- How to frame the null (H_0) and alternative hypothesis (H_1) related to their research topics and explain the all the steps of hypothesis testing in medical research.
- Explain how to find the sample size based on prevalence (in percentage) for various disease related studies and in various situations.
- How to draw the diagrams and graphs by manually as well as by excel and SPSS
- Deliberate how to use and to enter the collected raw data in Microsoft Excel 2007.
- How to draw the diagrams in excel, how to transfer the data from Excel to Statistical Software SPSS 16.0 version (Statistical Package for Social Sciences)

- How to analyze the collected mass data (Primary Data) and how to do the analysis with the help of statistical software, how make the final tables from the SPSS output
- How to write the results according to the analysis of data for all the four groups of students
- Explain how to calculate Odds ratio, Pearson Correlation and Spearman Correlation and multivariate analysis with 95% Confidence Interval, p – value at 0.01 and 0.05 the association between two variables, calculate the correlation between two variables, its types and further other important tests in Biostatistics.
- How to form and find the regression equations, screening test, relative risk, attributable risk, vital statistics and etc.
- How to interpret the results from the analyzed results.

(b). Training of students in data entry and data analysis through existing software and statistical software:

In the analysis part, the students were trained as follows:

- How to tabulate the analyzed data (ie., result) in various types of tables and to find the percentage.
- How to present the analyzed the data in terms of diagrams and graphs in both Microsoft Excel 2007 and as well as in SPSS 16.0 version softwares. How to make the diagrams like bar chart – vertical & horizontal, multiple bar chart, histogram, percentage bar diagram (sub-divided bar diagram), pie diagram and exploded pie diagram, line diagram, scatter diagram and graphs.
- Trained how to write the conclusion according to the results.
- Explain how to find the p – value from the results, write the significance at 1% and 5% level and how to present it in the final report

(c). How to Planning and preparing a Gantt chart for their respective studies:

They have divided the whole month as follows: They took twelve days for data collection, and six days for entering the data in MS Excel 2007 software. Out of that, those six days, all the four batches of students underwent training in softwares like MS Excel 2007 and in SPSS 16.0 version. For analyzing the data they spent three days and they have took five days to prepare the results and to make the final research report within two days. In the rest of the days, they have conducted some awareness programs in their field related to their studies.

(d). How to collect the data in the fields:

Door to door and face to face interview method was followed by the students under the supervision of the faculty or intern. Data were collected correctly, accurately and with participants' consent form.

(e). How to prepare the final report and submission:

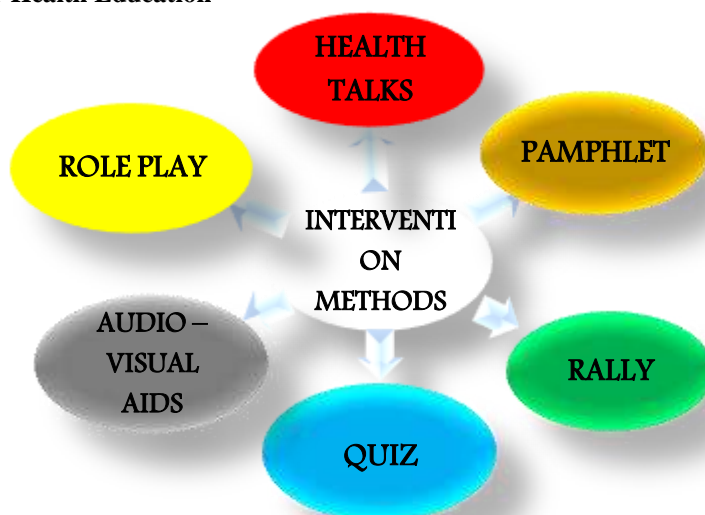
The final reports of all four groups are checked in all spire and give some valuable suggestions to rectify some errors in the results writing, tabulation, in suitable diagrams, how to mention the p-value and where, significances and suitable photos of the clinical interventions of the study community. Recommendations writing based on their respective studies.

IV. Intervention method carried out by ROME students in their study area:

Four groups are involved under this ROME posting program and I have to explain the intervention activities of one of my batch students briefly.

Health Education to the Community: Based on their respective results, all four groups of students were to plan and to prepare the health education programme through various methods. But, here I have been discussed about my group of students and what they were done in their study area and it was represented in the following flow chart:

Flow Chart for Health Education



Health Talk: A health talk was delivered by a group of medical students. One student gave a talk about “Personal hygiene” and also explained the procedure for six steps of hand washing. Another student from the group gave a talk about different types of vector borne diseases and methods to prevent them. Finally, a speech about types of water borne diseases, their symptoms and prevention was delivered by a student. The other students were clarified the doubts were raised by the participants (students and public).



Audio Visual Mode of Teaching: The students were preferred this mode of teaching because it will catch an eye of the audience in a most effective way. Two videos about the cause, symptoms, treatment and prevention of Cholera and Dengue were shown to the participants. Then we asked a few questions related to these videos, in order to get their feedback. The participants were enjoyed with the videos and promised to spread the message to their neighborhood in their village.

Quiz: A quiz competition related to water borne diseases, was conducted among the students of the Villipakkam primary school, related to water borne diseases. The students actively participated in the competition. Prizes were also distributed to the participants at the end of the competition.



Awareness Rally: The students were carried out an awareness rally in the interiors of the Villipakkam village. Our Head of the Department (HOD), guide and the school students also joined in the rally with enthusiasm. All were shouted slogans related to personal hygiene, prevention of water borne and vector borne diseases. The school students were also carried the placards along with us while marching.



Role Play: The medical students were performed a role play on the topic “Prevention is better than cure”. This role play helped to reinforce their message and was well applauded by the audience.



Pamphlets: Two pamphlets related to prevention of water borne and vector borne diseases were prepared by the students and distributed to the audience, community people in data collected are of Chunampet and to the public while they were marched in the rally. So, the phablets in the local language of tamil.

<p align="center">Pamphlets are in local language (Tamil) about water quality and water borne diseases and how to stop it.</p>	

Medical Camp: Finally, a medical camp was conducted by the Interns of Dept. of Community Medicine along with the ROME program students in the Villipakkam primary school, Chunampet, Tamilnadu. A total of one hundred and fifteen patients from the locality were examined and medicines were given. From this, the ROME students were got an idea about the medical camp.



End of the ROME recommendations to the whole Community participants:

- Thorough cleaning of all overhead tanks and water tanks once in every month.
- Avoid pond water for drinking purpose.
- Prevent stagnation of drainage near the drinking water source.
- Wash the containers properly before collecting water in it.
- Keep the water containers and water pots closed.
- Drink boiled water.
- Wash hands thoroughly with soap before eating and after defecation.

Statistical Analysis: Quantitative variables were expressed as Mean, SD, proportions and McNemar test was performed for testing before and after ROME program and test the knowledge among the group of students. The statistically significant was taken as p – value less than 0.05.

V. Results:

Totally, one hundred and two students were participated in this ROME study. In that, eighty seven students were completed both pre and post-test questionnaires. Among eighty seven students, 31 (35.63%) were boys and 56 (64.37%) were female students [**Diagram – 1**]. Mean age of the under graduate medical students were found as 21.24 ± 0.51 years (Range: 21 – 23). In this study, the response rate was 85.29%. Some of the students were absent in either pre or post-test time due to unhealthy and some emergency reasons. So, the drop out percentage was found as 32.35%.

The knowledge gain by the under graduate medical students was as follows: Knowledge gain in meaning of Reorientation of Medical Education was found as 69 (83.10%) in pre-test and 83 (100%) were in post-test and the difference was statistically highly significant with $p < 0.01$ and in research methodology was found as 29 (34.90%) in pre-test and 71 (85.50%) were in post-test and the difference was statistically very highly significant with $p < 0.001$.

How to enter the data in MS Excel 2007 was found as 46 (55.40%) in pre-test and 81 (97.90%) were in post-test and the difference was statistically highly significant with $p < 0.01$, and data cleaning, trimming, processing and analysis done by exciting SPSS software 16.0 version was found as 13 (15.70%) in pre-test and 74 (89.20%) in post-test was statistically very highly significant with $p < 0.001$. Report writing and submission was found as 36 (43.40%) in pre-test and 70 (89.20%) in post-test was statistically very highly significant with $p < 0.001$ and knowledge on various study designs was found as 14 (16.90%) in pre-test and 63 (75.90%) in post-test was statistically very highly significant with $p < 0.001$.

In this study, the knowledge gain by the under graduate medical students were as follows: How to enter the data in MS Excel 2007 was statistically highly significant. Knowledge gain in research methodology and data cleaning, trimming, processing and analysis done by exciting SPSS software 16.0 version were found as statistically very highly significant. Report writing and submission and Knowledge on various study designs

were found as statistically very highly significant. In randomized control trial study, the knowledge of the students was not found as a significant with $p > 0.05$ were shown in [Table – 1]. .

The attitude and interest of the undergraduate medical students in research and community based research were found as follows: the ROME posting place preferred as rural community, the response in pre-test was 57 (68.70%) and in post-test was 59 (71.10%) and response as urban community, 26 (31.30%) in pre-test and 24 (28.90%) were in post-test. Most of students, 48 (57.80%) were respond the most difficult thing is data analysis in ROME posting research in post-test, whereas in pre-test only 28 (33.70%) were respond. The easiest job in ROME program was data entry in pre-test 53 (63.90%) and in post-test 43 (51.80%). Most of the students in post-test, 78 (94%) were responded that the research in community. Interest in health care in community was found as 79 (95.20%) were in pre-test and 83 (100%) were in post-test.

VI. Discussion:

ROME program is conducting to Under Graduate Medical Students in India in some of the medical Colleges only. Because of, lack of faculties, don't have enough development of the medical teachers, lack of time, lack of money and lack of planning by the teaching faculties in the medical colleges in India [2]. By this type of training program, benefits have been received by both medical students and by the community. Community Medicine has been taught to the Under Graduate Medical students under the Department of Community Medicine [5] from II MBBS end and III MBBS (part I) as per guidelines of Medical Council of India (MCI) [1]. Out of those four groups, one group only had applied the Biostatistical tools properly and appropriately. Then, the particular batch only has won the best group of students' research project award given by the Dept. of Community Medicine, PIMS, Puducherry. This award has been awarded every year to the best research students' group among the four group. By this activity and engorgement, the under graduate medical students' knowledge and skills were increased in the research methodology and in the subject Biostatistics. Then, automatically their stage fears were also eliminated by presenting their respective projects in the stage in front of Director – Principal and other faculty members from other Specialities also. This program would help to them to become a good, knowledgeable and efficient medical practitioner and will become a good teacher in medical field in their future. The knowledge of Biostatistical tools and the usage of Statistical Package of Social Sciences Software (SPSS) not only helps in their under graduate level study but also helpful in their research carried out at the time of clinical postings, and in future they will be posted as CRRI in the Dept. of Community Medicine for one months as per MCI norms [1] and as well as in their post graduate level study also. This ROME will definitely be helpful to prepare their dissertations (or) projects at the time of their higher medical related studies.

Nathan DG et al [6] reported in his paper that, nowadays the physicians are not getting an opportunity to do research. By this type of training in the subject of biostatistics through ROME program, the UG medical student's knowledge would increase in Research and get some keen interest to do research in their future studies. Beverley Adams-Huet et al. have reported that the collaboration between statisticians and clinical researchers in medical field from the formation of protocol preparation for any medical related study and its further development [8]. If under graduate students were trained in research training, then they will get a bright future in their life. Conducting workshops on research methodology, documentation of results and the concepts of biostatistics and its applications are also needed to Under Graduate Medical Students level. Nowadays, the distance between the general community and their needs from the medical field was much. This situation is to be changed and medical schools have to increase their social responsibilities in the coming days [9]. If we want to do this, the ROME program is to be implementing in all the medical colleges and included in the medical education curriculum. In this ROME program, four groups of students have done four different researches. Out of that four community based studies, in two studies they have been used the Geographic Information System (GIS) successfully. Abbas Bazargan et al. have mentioned in his paper that the learning of knowledge and skills through the use of problem based learning approach was needed [10]. The result was showed that the knowledge gain in various study designs were good except in the randomized control trial study design. Normally, the under graduate medical students were not having enough experience in research and publications in their study period [11 – 12]. Recently medical council of India noted in the press report that the conducting research is being neglected in the level of higher education especially in the medical education. So, recently MCI has made a mandatory for all medical colleges in India to have a research cell in all medical colleges [13]. So, through this research cell, all medical colleges in India would implement the ROME programme successfully in the future years. End of ROME program, the poor patients were found out by the students in their respective field and gave some necessary free treatment to them. The community people were appreciated very much our medical students as well as our students were also got an excellent and golden opportunity to learn about the community, their needs and expectations. At the end of this ROME program, they have told that the overall experience by this was full satisfaction. Moreover, they were mentioned that they did some useful help to the

poor community people in their study area. Some of the students were mentioned this type of community service had been given self-satisfaction.

VII. Conclusions:

The present study has concluded that the implementation of ROME is very important and essential in the medical education curriculum. By this ROME training, UG medical students have come to know how to conduct a community based study, to understand the steps involving in the research methodology, how to use biostatistics concepts, tools to be used appropriately in their medical field, they have come to know about the community, their burden, difficulties, challenges, diseases, how to solve these issues, they have got the administration knowledge, how to conduct a research/study and etc., It would help to increase the young researchers in the medical field in India and they will be become a good and an efficient physician in their life.

Acknowledgement:

Authors are thankful to Dr. (Brig.) Zile Singh, Prof. and HOD, Dept. of Community Medicine, Pondicherry Institute of Medical Sciences, Kalapet, Puducherry – 605 014. South India for his excellent help and encouragement for this study. Authors are very much thankful to the PIMS management and to the Director – Principal. Authors are thankful to the faculties, students and to the interns those who were participated in this study. Authors are very thankful to the community people those who were participated in this study and for their great cooperation.

Declarations:

Funding: None

Conflict of Interest: There is no conflict of interest in the study.

Ethical Approval: Not required

References:

- [1]. Medical Council of India: Regulations on Graduate Medical Education 2012. Available on: <http://psgimsr.ac.in/faculty%20-2/REGULATIONSON%20GRADUATE%20MEDICAL%20EDUCATION-%202012.pdf> [Accessed on 7th February 2015]
- [2]. Adkoli BV, Gupta V, Sood R, Pandav CS. From reorientation of medical education to development of medical educators. *Ind J Public Health* 2009; 54 (4):218 – 222.
- [3]. World Health Assembly Official Records: Reorientation of medical education and medical practice for health for all. Available from: http://www.who.int/hrh/resources/WHA48-8_EN.pdf [Accessed on 22nd November 2014].
- [4]. Deo MG. 2009. Need for research oriented medical education in India. *Indian J Med Res* 130: 105 – 107.
- [5]. WHO: World Health Organization: Reorientation of Medical Education – Goal, Strategies and Targets. SEARO Regional Publications No.18, 1991. Available from: http://apps.searo.who.int/pds_docs/B0083.pdf [Accessed on 10th February 2015]
- [6]. Nathan DG. National Institutes of Health Director's Panel on Clinical Research. Clinical research: Perceptions, reality and proposed solutions. *JAMA* 1998; 289: 1427 – 1431.
- [7]. Aggarwal S. Research oriented medical education in India. *Indian J Med Res* 2010; 131: 590.
- [8]. Adams – Huet B, Ahn C. Bridging Clinical Investigators and Statisticians: Writing the Statistical Methodology for a Research Proposal. *J of Invest Med* 2009; 57(8): 818 – 824. doi:10.231/JIM.0b013e3181c2996c
- [9]. Garg. B. S. 'Reorient medical education for community welfare'. Available from: The Times of India dated on 27th September 2014. <http://timesofindia.indiatimes.com/city/nagpur/Reorient-medical-education-for-community-welfare/articleshow/43563116.cms> [Accessed on 17th Feb. 2015]
- [10]. Abbas Bazargan. Strengthening research and statistical skills of medical doctors through a hands – on approach: A Case Study from Iran. Available from: http://iase-web.org/documents/papers/icots7/4C1_BAZA.pdf [Accessed on 17th February 2015]
- [11]. Detsky ME, Chiu L, Shandling MR et al. Heading down the wrong path. *N Engl J Med* 2006 ; 355:67 – 67.
- [12]. Detsky ME, McDonald DR, Baerlocher MO et al. Does this patient with headache have a migraine or need neuroimaging? *JAMA* 2006; 296:1274 – 1283.
- [13]. Medical Council of India: MCI makes research cell a must for all medical colleges. Available from: The Hitavada: The people's paper dated on 19th Feb. 2015. <http://thehitavada.com/news-details/mci-makes-research-cell-a-must-for-all-medical-colleges> [Accessed on 19th February 2015]

Table: 1 Distribution and Knowledge about pre and post test scores in reorientation of medical education among under graduate medical students and its significance

Study Variables	Reorientation of Medical Education Program		Significance
	Pre – Test	Post - Test	
Meaning of Reorientation of Medical Education	69 (83.10)	83 (100)	p < 0.01*
Research Methodology	29 (34.90)	71 (85.50)	p < 0.001**
How to do Data Entry with Micro Soft Excel 2007	46 (55.40)	81 (97.90)	p < 0.01*
Data cleaning, data trimming and data analysis done by SPSS software 16.0 version	13 (15.70)	74 (89.20)	p < 0.001**
Report writing and submission of the final report	36 (43.40)	70 (89.20)	p < 0.001**
Various study designs	14 (16.90)	63 (75.90)	p < 0.001**

*p < 0.01 Statistically Highly Significant **p < 0.001 Statistically Very Highly Significant

Figure: 1 Distribution of students participate in the reorientation medical education programme study

