Section: Biochemistry

Original Research Article

KNOWLEDGE LEVELS OF CLINCAL BIOCHEMISTRY AND MEDICAL GENETICS AMONG MEDICAL STUDENTS

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Abstract

Background: Clinical Biochemistry and medical genetics are an integral part of MBBS curriculum. The relevance of genetic susceptibility to prevalent conditions like COVID-19, cancer and inborn errors of metabolism is recognized as a significant contribution of genetics to medicine. Since many years, clinical biochemistry has made a commendable contribution for obtaining information on metabolic and functional processes in both healthy and sick individuals and is an important component of medical diagnostics and monitoring therapy. Objectives: To assess knowledge levels of clinical biochemistry and medical genetics among medical students at Govt Medical College Thrissur. Study Design: Descriptive cross sectional Study. **Materials and Methods:** A google form with 10 MCQs each from clinical biochemistry and medical genetics were sent at the same time to students of second, third and final year MBBS students of GMC Thrissur(N=500). Questionnaire validation was done by conducting a pilot study among population including 10% of sample size.The responses sent within 20 minutes were recorded in excel sheet and statistical analysis done with Kruskal- Wallis test. **Results:** The mean scores of second, third and final years obtained were 16.93±8.03, 17.16±7.33, and 17±7.7respectively. There was no statistically significant difference between the mean value of scores obtained from all the three years of MBBS students and their knowledge levels indicates need for improvement. **Conclusion:** Knowledge levels of clinical biochemistry and medical genetics among second, third and final year MBBS students was found to be insufficient. Hence integrating topics of medical genetics and clinical biochemistry into curriculum of these three years of MBBS will have immense impact on future clinical practice.

INTRODUCTION

Clinical biochemistry and medical genetics are basic medical sciences which attempt to explain the activity of living systems at the molecular level including an understanding of various metabolic and signaling pathways.[1] Genetics is gaining an increasingly important role in medicine. The role of genetic susceptibility to prevalent conditions like COVID-19, cancer, cardiovascular disease, and even psychiatric illness was eventually recognized as a significant contribution of genetics to medicine. The discovery of rare genetic illnesses like
inborn errors of metabolism only added to its importance.[2] Hence, the teaching of genetics should also be increased proportionally to ensure that future physicians will be able to take the advantage of new genetic technology, and to understand the associated ethical, legal and social issues

Clinical biochemistry belongs to the field of medical technology, which involves techniques and methods to analyze various chemical components in body fluid samples.[3] As a theoretical subject within clinical medicine, clinical biochemistry has developed over the past 150 years out of the encounter between analytical chemistry and medicine. It has also been bound up with research, teaching and patient care for roughly 50 years.[4] To a greater or lesser degree, depending on the specialty, the doctor in a position of responsibility will have to handle the data produced by the methods of clinical chemistry. For this reason, clinical chemistry plays a vital role in medical training.

Knowledge of Medical genetics and clinical biochemistry are extremely relevant in the current era

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of clinical practice. The field of genetics has seen remarkable advancement in the past 50 years, from the discovery of DNA in 1953 to the completion of the Human Genome Project in 2003.[5] For physicians to become adequately versed and remain current in human genetics, it is necessary to begin teaching the discipline in undergraduate medical education. The learning of genetics must continue on throughout the additional training years in addition to the years spent as a practicing physician.[6] Genetic services are always in high demand in clinical and direct-to-consumer settings due to advancements in technology, lower testing prices, and more public awareness.[7] In an effort to ensure that medical education reflects current understanding of genetics and its impact on medical practice, the Association of Professors of Human and Medical Genetics (APHMG) has developed a Core Curriculum for Medical School Genetics Education that has been updated periodically.[8] Despite the development of genetic and genomic educational resources for physicians, genomic medicine is still competing with other expanding areas of knowledge for the limited time available for continuing medical education.[9]

The primary responsibilities of a Clinical Biochemist include Interpretation of patient laboratory tests for screening, diagnosis, management and monitoring of disease process. Knowledge of Clinical biochemistry also helps to develop interpretive guides for other professionals using the laboratory service, through the selection and validation of reference intervals, interpretive comments and critical values. The use of laboratory services can be improved by educating clinicians. Bareford and Hayling showed that there was a definite and sustained reduction in inappropriate requests when certain measures such as issuing guidelines, fact sheets and holding seminars on clinical biochemistry were implemented.[10] In a study done in 2000 by Mishra eta al,98% of doctors and medical students agreed that clinicians should be invited to seminars to improve their skills in interpreting laboratory investigations.[11] When asked about the best method of delivering teaching on the subject, 93% preferred seminars with active participation to lectures or symposia. According to studies conducted by Jonathan etal in 2007 showed that reviewing case studies or correlation of selected results of clinical biochemistry with actual patient history works well in educating students and residents.[12] Although

clinical biochemistry related topics are covered in the first year MBBS curriculum, knowledge and application of the same by medical students needs to be assessed and should enhanced in the clinical years for effective diagnosis and treatment of the patients.

Objectives

To assess the knowledge levels of clinical biochemistry and medical genetics among medical students in Govt Medical College Thrissur

Study Design

Descriptive cross-sectional study.

MATERIALS AND METHODS

Study Setting- Government Medical College, Thrissur

Study Subjects- Second, third and final year MBBS students in Government Medical College, Thrissur

Inclusion Criteria

- MBBS students studying in 2nd ,3rd and 4th year at Govt medical college Thrissur who are willing to take part in the study

Exclusion Criteria

- **Students in first year MBBS**
- **Students who didn't submit the google form responses in 20 mins**

Sample Size-500 (175 students from 2nd and 3rd year and 150 students from final year MBBS) sample size calculated by the formula $n=z\alpha 2pq/d2$

$z\alpha=1.96$ for 5% level of significance;

p=29.2% as calculated from least response rate obtained from the study conducted by Alotaibi AA, Cordero MA etal in 2021 (Study on Assessing Medical Students' Knowledge of Genetics:

Basis for Improving Genetics Curriculum for Future Clinical Practice) q=1-p

d=14%precision

Sampling technique- Census sampling

Study Period- 1 month after approval from IRC and IEC

Study Procedure- A questionnaire is prepared consisting of 10 MCQs each from clinical biochemistry and medical genetics. Questionnaire validation was done by conducting a pilot study among population including 10% of sample size. A google form with the questionnaire along with consent form and participation information sheet is prepared. The MCQ section of google form can be accessed only if the first two pages of consent form and participation information sheet are filled. The google form is sent via mobile phone at the same time to all the students and responses are recorded at the same time in excel sheet within a time of 20mins. The responses received after 20 minutes were excluded from the study

Difficulty index calculation was done

A score of two marks given to each question

First 10 questions were allotted to clinical biochemistry and last 10 questions to medical genetics Difficulty index was scored as: -

1.< 10-knowledge levels not satisfactory 2.10-20 - needs improvement

3.20-30-satisfactory

4.>30-high levels of knowledge

Analysis Plan- The data will be entered in Microsoft excel and further analysis will be done using SPSS 16.0 version software by Kruskal -Wallis test.

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RESULTS

A descriptive study was conducted among 500 MBBS students (175 each from 2nd and 3rd year and 150 from final year) of GMC Thrissur by sending a questionnaire with 20mcqs from clinical biochemistry and medical genetics. The data will be entered in Microsoft excel and further analysis done using SPSS 16.0 version software by Kruskal -Wallis test. At p value <0.05 results were considered significant. The mean scores of second, third and final year MBBS students obtained were 16.93±8.03,17.16±7.33, and 17±7.7 respectively. There was no statistically significant difference between the mean value of scores obtained from all the three years of MBBS students .According to difficulty index calculation ,mean scores indicate that knowledge levels of all the three years of MBBS students are not satisfactory or needs improvement.

Table 1: Number and percentage of participants in the study

Year of MBBS	N	Percentage
Second	170	34
Third	173	34.6
Final	157	31.4
Total	500	100

Table 1: Mean and standard deviation of scores of second, third and final year MBBS students

Year of MBBS	N	Mean	Std- Deviation	P value Kruskal Wall - test
Second	170	16.9353	8.03627	.0868
Third	173	17.1618	7.33876	
Final	157	17.5541	8.01872	
Total	500	17.20280	7.78472	

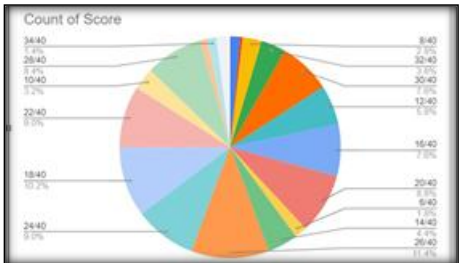

Figure 1:

Frequently missed MCQs

Which of the following is not a cause of hyperuricemia?

a. Lesch- Nyhan syndrome
b. renal retention
c. defects in pyrimidine metabolism
d. primary gout

Causes for high anion gap metabolic acidosis are all of the following except

a. diabetic ketoacidosis
b. organic aciduria
c. lactic acidosis
d. renal tubular acidosis

A 20 yr old male presents with more than 100 colorectal polyps and a carrier of APC gene mutation on chromosome 5q21 resulting in an autosomal dominant condition. Which DNA repair mechanism is defective in the above-mentioned condition?

a. Nucleotide excision repair
b. Base excision repair
c. Double stranded break repair
d. Methyl directed mismatch repair

What is Ct value in RT-PCR used to diagnose Covid -19 infections

a. cycle threshold
b. critical time
c. cell threshold
d. cycle time

DISCUSSION

From this study knowledge levels of students in both clinical biochemistry and medical genetics was found to be inadequate. More than 50 percentage of students failed to answer questions regarding causes of clinical scenarios like hyperuricemia and also they had less idea regarding basics of genetics as well as genetic technologies.

According to the results from cohort research conducted in Cameroon among medical students and physicians reveal a lack of knowledge about genetics, particularly concerning genetic testing.[13] Another study conducted by Cargonja etal in 2021 revealed that carefully designed, need-based theoretical and practical education in genetics can significantly increase the self-confidence of future physicians and enhance the right decisions for the patient.[14] The integration of medical genetics across the medical curriculum, from pre-clinical, basic sciences to clinical years should be addressed according to studies conducted by Alotaibi etal.[15] A study conducted by Mahmoud A etal in 2019 among practicing physicians found that modifying the medical school curriculum by integrating biochemical and genetic concepts with clinical teaching will motivate the medical students.[16]

Improved understanding of medical genetics and clinical biochemistry has also allowed clinicians to employ the same for personalized approaches to disease prevention and treatment.

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CONCLUSION

Knowledge levels of both clinical biochemistry and medical genetics was found to be inadequate after the analysis of this study among second, third and final year MBBS students. Through this study we intend to modify the teaching learning methods included in the current MBBS curriculum so as to enhance the knowledge and awareness of clinical biochemistry and genetics which plays a vital role in early diagnosis and treatment of diseases.

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