



“PERCEPTIONS OF FIRST MBBS STUDENTS REGARDING FIRST AND SECOND INTERNAL ASSESSMENT (IA-I AND IA -II) PATTERN BASED ON REVISED 2024 - CBME CURRICULUM WITH FOCUS ON PRACTICAL BIOCHEMISTRY: A CROSS - SECTIONAL STUDY.”

Dr Kumud N. Harley*

Professor, Head Biochemistry, Dept of Biochemistry, Government Medical College, Amravati, Maharashtra, India. *Corresponding Author

ABSTRACT In competency- based curriculum, Internal assessment focuses on the content and process of learning i.e. what and how students have learnt throughout the course. This assessment gives priority to psychomotor, communication and affective domains. It helps the teachers and learners to modify their teaching learning strategies. In reference to NMCs revised CBME -2024 guidelines. State University has planned different assessment structure in internal assessment I (IA-I) & internal assessment II (IA -II) exam pattern with focus on practical biochemistry. The present study thus aimed to evaluate first MBBS (n=100) students' perception about these two different IA patterns and their effectiveness in real world scenario in terms of scope for testing various domains of learning via breaking up individual competencies into different learning objectives, and practical internal assessment pattern play pivotal role. **Methods:** Structured questionnaire that includes both open and close ended question was introduced with students via google form and perception was registered to assess perception of first MBBS students regarding cognitive, psychomotor and affective domain of the learning. **5-point Likert's scale** was used to measure student's opinion and responses were expressed as %. **Results:** More than 70 % student agreed with Internal assessment II (IA-II) as better pattern over IA-I. **Conclusions:** As per the learner's opinions to the administered questionnaire, study indicates that participants were able to effectively integrate clinical aspects of biochemistry by using IA -II than IA -I practical biochemistry pattern. Further, integration of biochemical reactions with clinical cases, concept of problem based learning its applicability in actual clinical practice, acquisition of practical skill, critical thinking, reasoning, comprehension, analysis levels of cognitive domain and its incorporation with affective and psychomotor domain can be coordinated well in IA-II.

KEYWORDS : Internal assessment - I and II, Biochemistry, Revised CBME -2024 guidelines, Medical Students perception, domains of learning.

INTRODUCTION:

The Competency-Based Medical Education (CBME) curriculum, implemented by the National Medical Commission (NMC) in India in 2019, had marked a significant departure from the traditional medical education model. This move was motivated by the need to produce medical graduates who are not only knowledgeable but also competent enough in a range of essential skills, including clinical, communication, and ethical decision making. (1) Competency-Based Medical Education curriculum changes in MBBS 2024 represents a major shift in medical education. By focusing on specific competencies, the curriculum aims to produce well-rounded medical professionals. Approach includes structured clinical exposure, early engagement with patients, and emphasis on self-directed learning (1,3). Students are encouraged to develop reflective practices, which help them evaluate their performance and identify areas for improvement. (1-3)

Internal assessment (IA) is a crucial component of medical education that evaluates students progress and competencies throughout their academic journey. IA provide continuous feedback helping students identify areas of improvement and ensuring they meet the required standards for clinical practice. The revised 2024 CBME curriculum emphasizes to make IA accessible to students so that they get enough opportunities and time to improve.(3) With reference to revised 2024 CBME- curriculum guidelines, MUHS -Nasik has proposed changes in practical Internal assessment with focus on biochemistry practical's Internal assessment -I (IA-I) and Internal assessment II (IA-II), prelims as well as university examination pattern is concerned. Being new structure, lots of discussion and never-ending debate is still going on regarding which pattern of practical assessment is better that would be helpful to understand learners' point of view so as to incorporate and achieve a balance between various domains of learning as required by curriculum to meet global standards. George E. Miller, an American physician, put forward a comprehensive assessment system that became an influential model in the field of medical education. This assessment framework is now known as “Miller's Pyramid” (1) aids in assessing medical learners' clinical skills, competence, and performance. The framework describes four levels of assessment: “knows” (assessment of knowledge), “knows how” (assessment of competence), “shows how” (assessment of performance), and “does” (assessment of action).

In medical education, the three primary domains of learning are cognitive, psychomotor, and affective. These domains represent different aspects of learning: cognitive focuses on knowledge and understanding, psychomotor on skills and performance, and affective on attitudes, values, and ethics. IA is an ongoing and longitudinal

assessment. (1-2,4) focuses on the content and process of learning that is what and how students have learnt throughout the course. This assessment gives priority to psychomotor, communication and affective domains. (5-7)

In subject biochemistry, there is wide scope for testing various domains of learning via breaking up individual competencies into different learning objectives, and practical internal assessment pattern play pivotal role as almost all competencies can be covered which is perhaps not possible during university examination to integrate the subject content which is conducted throughout the first professional year. (6-8)

In the view of above, the present cross-sectional study was conducted on first MBBS undergraduate medical students to evaluate their perspectives with focus on revised CBME -2024 biochemistry Internal assessment I (IA-I) and internal assessment II (IA-II) practical examination pattern. In addition, study aimed to explore students opinion whether present clinical application based assessment approach adapted in revised CBME -2024 will be useful for them to integrate laboratory findings and biochemical processes effectively to fosters a deeper understanding of the subjects applicability in real world medical practices and in true sense to provide the assessment for learning approach than just assessment of learning.

MATERIAL AND METHODS:

This cross-sectional observational study was conducted on 100 first MBBS students in the department of Biochemistry, GMC Amravati-Maharashtra. Students were first sensitized regarding the study objectives and the old and revised CBME -2024 curriculum change in internal assessment. As students were completed both first and second internal assessment examination and quite aware of the changes done with respect to IA I and IA II. Internal assessment II practical examination was conducted with set of questions as per the stations (4 stations) proposed by MUHS -Nasik. Students' opinion regarding both the pattern were then collected. Structured questionnaire was prepared that includes both open and close ended question and shared with students via google form. Questionnaire was framed to assess perception of first MBBS students regarding cognitive, psychomotor and affective domain of the learning. (Structured questionnaire).

5-point Likert's scale was used to measure student's opinion. Scale typically offers five response options: 1. Strongly agree 2. Agree. 3. Neutral 4. Disagree & 5. Strongly disagree. A pilot study was conducted to validate the questionnaire. The questionnaire was validated for its feasibility of content, construction, and language and eliminates all ambiguous words. Qualitative data from feedback forms

were exported and analyzed in Microsoft Excel. Descriptive and inferential statistical analyses were performed and expressed as %.

Questionnaire : To assess cognitive domain of the students :-

1. Internal assessment II (IA-II) practical biochemistry pattern proposed by MUHS Nasik for year-2024 is more effective to enhance critical thinking as compared to Internal IA-I pattern.
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
2. In depth knowledge gain can be achieved effectively in IA-II as compared to IA-I.
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
3. IA-II pattern ensures student to memorize topic content easily and minimizes concept of rote learning.
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
4. Do you think IA-II pattern promote self-driven learning (Self directed learning)?
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
5. Providing multiple opportunities for evaluation in IA-II encompass well in MUHS 2024 syllabus as compared to IA-I.
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
6. Refining assessment methods and scope of Reasoning /decision making, is addressed satisfactorily in practical IA-II pattern as compared to IA-I.
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

Questionnaire : To assess affective domain of the students :-

1. Interest for learning clinical biochemistry content is promoted and purpose of active learning is achieved well in IA-II pattern as compared to IA-I.
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
2. Do You Think IA-II pattern is less cumbersome and less time consuming as compared to IA-I.
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
3. Do you think stress/anxiety factor is minimized in IA-II as compared to IA-I.
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
4. Do you think uniform pattern of practical IA-II, Prelims and university examination should implement longitudinally to avoid confusion?
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

To assess Psychomotor domain of the students :-

1. Knowledge acquisition, skills developed using case based scenario helps to decode learning gap between theoretical knowledge & practical skills efficiently in IA-II pattern.
1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
2. Skill acquisition is efficiently refined in IA-II to bridge the gap between theoretical based knowledge of laboratory findings (blood/ urine) to correlate with biochemical process.
1.Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
3. Problem solving, precision, and techniques, interpretations-based stations seem to be more relevant to enhance ability of students to construct concrete decision after using IA-II pattern as compared to IA-I.
1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
4. Stations designed in IA-II instead of performing whole estimation in IA-I serves purpose of assessment for learning (AFL) .
1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree
5. Purpose of outcome-based approach can be accomplished by IA-II pattern well as compared to IA-I.
1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

Overall opinion about II Internal assessment practical structure.

1. Are you satisfied with OSPE stations/questions kept in our practical's examination of IA-II.

1. Yes 2. No

2. Grand viva- voce skipped in IA-II is good option as compared to IA-I.

1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

Open Ended Questions

1. Opinion about overall proposed assessment pattern of biochemistry by MUHS Nasik with reference to revised CBME- 2024 : Merits and demerits
2. Suggestion's /Recommendations if any.

RESULTS AND OBSERVATIONS:

After receiving ethical committee clearance, A cross sectional study was conducted on 100 first MBBS medical students (n=100). Students' perception was registered regarding their viewpoints about NMCs revised CBME -2024 guidelines with focus on practical biochemistry Internal assessment -I and Internal assessment -II pattern. Questionnaire was distributed through google forms that includes both closed and open - ended questions. Data was recorded and expressed as percentage % for the questions framed to explore viewpoints with respect to cognitive, psychomotor and affective domains.

QUESTIONNAIRE RESPONSES RECEIVED

Table -A : To Assess Cognitive Domain:

Q1. Enhanced critical thinking effectively in IA-II as compared to IA-I.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	16	63	13	6	2

Q2. In depth knowledge gain can be achieved effectively in IA-II as compared to IA-I.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	14	53	22	11	1

Q3. IA-II practical pattern ensures student to memorize topic content easily and minimizes concept of rote learning.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	15	58	17	09	01

Q4. IA-II pattern promote self-driven learning (Self - directed learning)?

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	09	79	07	04	01

Q5. Providing multiple opportunities for evaluation in IA-II encompass well in MUHS 2024 syllabus as compared to IA-I.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	07	67	15	8	02

Q6. Refining assessment methods and scope of reasoning /decision making is addressed satisfactorily in practical IA-II pattern as compared to IA-I.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	19	59	14	06	02

Table-B- To Assess Affective Domain:

Q 1. Interest for learning clinical biochemistry content is promoted and purpose of active learning is achieved well in IA-II pattern as compared to IA-I

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	20	62	7	9	02

Q 2. Do You Think **IA-II** pattern is less cumbersome and less time consuming as compared to **IA-I**.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	12	46	17	19	06

Q 3. During examination, Stress factor is minimized in **IA-II** as compared to **IA-I**.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	19	40	23	18	00

Q 4. Do You Think Interest for learning Clinical aspects of Biochemistry is achieved better In **IA-II** as compared to **IA-I**.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	22	61	14	02	01

Table -C - To Assess Psychomotor Domain:

Q1. Knowledge acquisition, skills developed using case-based scenario helps to decode learning gap between knowledge over practical skills efficiently in **IA-II** pattern.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	14	55	24	07	00

Q2. Knowledge and skill acquisition is efficiently refined in **IA-II** to bridge the gap between Laboratory findings (blood/ urine) to correlate with biochemical process.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	18	56	16	09	01

Q3. Is Problem solving, precision, and techniques, interpretations-based stations (OSPE) seem to be more relevant to enhance your ability to construct concrete decision after attempting **IA-II** exam as compared to **IA-I**.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	18	56	16	09	01

Q4. Stations designed in **IA-II** with regard to modified quantitative and qualitative estimation in **IA-II** serves purpose of assessment for learning (AFL).

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100 (%)	15	51	19	12	03

Q5. Purpose of outcome- based approach can be accomplished well by **IA-II** pattern as compared to **IA-I**.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100(%)	13	59	21	05	02

D: Overall opinion about II Internal assessment practical examination at our Institute

Are you satisfied with **OSPE** stations/questions kept in practical/ examination of **IA-II**.

Responses	Yes	No
N= 100 ; Number of students	92 %	8%

Grand viva- voce skipped in **IA-II** is good option compared to **IA-I**.

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100	21	36	22	16	05

Do you think uniform pattern of practical **IA-II**, Prelims and university examination should implement longitudinally to avoid confusion?

5-point Likert's scale	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Number of students n=100	16	46	17	16	05

E : RESPONSE OF THE STUDENTS FOR OPEN ENDED

QUESTIONS REGARDING OVERALL PATTERN /STURCTUREAND SUGGESTIONS:(N= 84)

Key responses :

A. 60 students preferred **IA II** Practical biochemistry structure with comments below:

- The station-based assessment ensures equal weightage for different domains, covering instrument handling, biochemical techniques, quality control, and metabolism errors. This approach promotes clinical correlation, making learning more relevant for future healthcare applications.
- The focus on case-based scenarios (metabolism errors, quality control issues) forces students to apply their knowledge rather than recall facts. This **reduces the gap between theoretical biochemistry and clinical applications, making learning more patient-oriented.**
- Comprehensive coverage:** The assessment pattern covers a wide range of topics, ensuring that students have a thorough understanding of the subject matter. Focus more on competence, personalized learning with clear learning objectives.
- Pattern **encourages critical thinking and problem-solving skills, which are essential for medical professionals.** Covers all essential aspects of the subject, ensuring students to receive a well-rounded education.
- The updated **guidelines emphasize the clinical implications of biochemical processes, enabling students to connect laboratory findings with patient care scenarios.** This integration fosters a deeper understanding of the subject's applicability in real-world medical practice.
- Structured approach and aligned with the topics covered in class. **More clinical relevance, better skill assessment,** more diversified. Enabled one to think in a multidimensional way about things, encouraged deep knowledge of concepts.
- Use of **OSPE** (Objective structured practical examination) and case - based evaluation ensures that students develop their practical ability, critical thinking, problem solving abilities rather than just memorizing the theoretical concepts.
- IA-II** pattern emphasizes on clinical correlation and laboratory interpretation and hence more to test psychomotor domain.
- 18 students suggested uniform pattern throughout professional year as it is difficult for them to cope up with content variability. 06 students were in favor of old **IA -I** pattern of practical biochemistry.
- Though,** study highlights students' perception about revised practical biochemistry 2024 pattern. **But,** they also gave their suggestions regarding theory paper structure where, almost 90 % students had requested to give option for long answer question and time constraint as the major challenges they are facing while attempting theory biochemistry paper.

DISCUSSION:

Main purpose of Internal assessment and periodical feedbacks are necessary for continuous improvement, and to lay a road map for future reforms. The new **CBME** curriculum emphasizes to make **IA** accessible to students so that they get enough opportunities and time to improve (1-3). The **IA** plays a pivotal role in the medical education curriculum as it provides opportunities to assess skills and competencies that cannot be evaluated through traditional examinations. (6-9)

Present study focuses on learner's perceptions about practical biochemistry Internal assessment I & **IA II** pattern changes done in modified **CBME -2024** guidelines. Based on the responses and suggestions received from the students (**TABLE - A, B and C**), it has been indeed confirmed that positive constructive feedback was received from majority of the students and preferred internal assessment **II** as choice of pattern. In addition, suggested to implement the same for first **IA** as well i.e same pattern to follow throughout professional year so that purpose of integration of applied aspects of biochemistry in real clinical settings scenario can be effectively done. Knowledge and skills can be better achieved and found to be an effective way to retain and correlate information.

As revised pattern was published in the last quarter of 2024 year, limited articles related with the studies available. To the best of my knowledge this is perhaps among few studies as there's no other published study in subject biochemistry pertaining to changes done in revised **CBME** guidelines -2024. (3). However, few previous Indian studies have highlighted the utility of internal assessment and its

implementation. Badyal DK et al (6,7,9) suggested in their study on IA for medical graduates in India that the proper use of IA can effectively address the learning needs of students at an early phase. SDL being one of the important components in CBME pattern is one of the crucial components of student driven approach (10). Perceptions received from respondents in present study reflects positive response of the students affirming IA II encouraged them towards self-motivated approach of learning (88%). The results coincide with a previous study conducted in India on 31 final MBBS students before rolling of the CBME curriculum. Students felt that it reinforced, motivated self-directed learning, enabled correlations, improved understanding, put things in perspective, gave confidence, aided application, and enable to enhance their critical thinking, reasoning. (10, 11)

Study indeed confirmed that for majority of questions students responded positively and appreciated II internal assessment /Prelims, prelims biochemistry pattern as choice over IA-I. (Table A,B,C)

OSPE stands out as a promising technique tailored to assess performance in a realistic educational setting. Students were also exposed with open ended questions where different suggestion and OSPE introduction and assessment questions were asked (**D & E**). Student suggested that received organized OSPE stations designed in IA II exam itself covered more organized way of viva and fulfil the purpose of grand viva so, as per their opinion there is no need for separate viva section (74%). Effectiveness of OSPE as opined by students in present study was well in line with study conducted by Nayan RL et al (12) where they demonstrated that OSPE significantly enhances student performance and is well-received by both students and teachers as a more effective and comprehensive assessment method.

Study further registered student's viewpoint about Grand viva, though most of the students were happy with non-inclusions of grand viva but very few students wanted grand viva as separate component to be included as it provides immense confidence in communicating and felt like soft skill component is missing in IA II as confidence can be built through communications if viva voce introduced. Even though study focus only on all about practical Internal assessment pattern but few suggestions were received regarding theory pattern also.

Key opinions of students regarding theory question paper are mentioned here:

- Requested to keep option for long question. (n=85)
- Lengthy paper, time management is difficult. (n=93)

CONCLUSION:

The present study thus provides insight regarding practical biochemistry pattern of **IA-I** and **IA-II**. Appropriate implementation of IA as per given CBME guidelines, can help identify students' learning needs at an early stage and provide valuable information through feedback not only for students but for faculty as well. This, in turn, enables medical faculty to take remedial actions and enhance the learning experience.

Study observed that IA-II pattern is better in terms of integration of biochemical reactions with clinical cases, concept of problem based learning its applicability in actual clinical practice, acquisition of practical skill, critical thinking, reasoning, comprehension, analysis levels of cognitive domain and its incorporation with affective and psychomotor domain can be coordinated well to serve the purpose of CBME. However, study has certain limitations as it's a qualitative study did not look into the effectiveness based on the performance of the students as one-time responses received. Also, the perspective of faculty and role of faculty development is not recorded here. But the same needs to be highlighted more than anything else as an effective implementation of a curriculum is possible only by collective involvement of all stakeholders.

ACKNOWLEDGEMENTS

I would like to thank Dean, EC members. Special thanks to my wonderful first MBBS 2024 batch of GMC Amravati for their active participation in the feedback process and non-teaching staff of the department of biochemistry for the support throughout conduction of this study.

Funding: No funding sources.

Conflict Of Interest: None

Ethical Approval: The study was approved by the Institutional Ethics Committee.

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