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ORIGINAL RESEARCH

Enhancing Critical Appraisal Skills: Evaluating Medical Students' Performance and Perceptions in Analysing Drug Promotional Literature

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Abstract

Background: Skill-and outcome-based learning is always an advancement in medical education, One crucial aspect of this approach is the development of critical appraisal skills. This study compared student performance and perceptions when using a conventional comprehensive checklist versus a newly validated, concise checklist for critically appraising Drug Promotional Literature (DPL), in accordance with current national (Uniform Code for Pharmaceutical Marketing Practices, India 2024) and international (WHO ethical criteria) guidelines.

Methods: a prospective, randomised crossover study conducted among 82 second-year MBBS students in two sessions. In the first session, students were introduced to both methods: the Old Method involved a printed 23-item checklist with binary responses and inferences, while the New Method required manual recording of an 18-item checklist prior to analysis. Scores were assigned based on their performance. In the second session, participant perceptions were gathered through a semi-open-ended questionnaire.

Results: The Old Method yielded scores ranging from 6.9 to 10 with a mean of 8.8, whereas the New Method resulted in scores ranging from 7.1 to 10 with a mean of 9.1, demonstrating significantly improved performance. Additionally, 98.8% of participants preferred the New Method, with 74.4% commending its comprehensive approach, 60.9% appreciating its alignment with both WHO guidelines and the Indian context, 59.7% valuing its updated references, and 53.6% noting its ease of use despite the manual note-taking requirement.

Conclusion: The updated, concise checklist resulted in a significant enhancement in student performance and the feedback received from the participants was exceptionally favourable. This structured, skill-based approach shows promising potential to improve critical appraisal skills and overall learning outcomes in medical education.

Keywords: Critical appraisal skills, Medical education, Drug Promotional Literature, WHO ethical criteria, Uniform Code for Pharmaceutical Marketing Practices.

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Introduction:

Skill-and outcome-based learning is always an advancement in medical education, One crucial aspect of this approach is the development of critical appraisal skills. As part of the National Medical Commission (NMC) curriculum in India, second-year MBBS students engage in practical sessions that involve the systematic evaluation of drug promotional literature (DPL) to assess its completeness and reliability (1). DPL serves as a valuable resource for physicians to stay informed about newly released medications while also functioning as a key marketing tool for pharmaceutical companies (2). However, concerns persist regarding the selective omission of crucial information about adverse effects by pharmaceutical manufacturers, potentially influencing prescribing decisions in a biased manner (3-5). This highlights the importance of incorporating training on the critical appraisal of DPL within medical education to ensure ethical and evidence-based decision-making. Several methods are currently employed for the critical appraisal of drug promotional literature, such as utilizing a checklist tool adapted from practical manuals and applying WHO ethical criteria for medical drug promotion (6). In 2024, the Government of India's Ministry of Chemicals and Fertilizers,

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Department of Pharmaceuticals, released the Uniform Code for Pharmaceutical Marketing Practices in India (7). In response, the Department of Pharmacology in the study institute has developed and validated a new method featuring a revised checklist that integrates both WHO and national standards in a more concise and structured manner.

In this study, we compare student performance and perceptions using two distinct methodologies for DPL analysis—referred to as the **Old Method** and the **New Method**. The Old Method employs a comprehensive checklist derived from a practical manual, which is printed and provided to students (8). They utilize this checklist as a structured guide to evaluate DPL and formulate their analytical conclusions. Conversely, in the New Method students are required to recall and write down key checklist points before conducting the DPL analysis, thereby reinforcing memory retention, thereby enhancing analytical skills.

This study aims to evaluate the performance and perception of medical students when using an updated skill-based approach compared to a conventional method for the critical analysis of Drug Promotional Literature (DPL). By assessing these aspects, the study seeks to determine whether the revised method enhances students' ability to critically evaluate medical literature.

Methodology:

Institutional Ethics Committee approval was obtained prior to the initiation of the study, with the project approval number **ESICMC/SNR/IEC-F658/01-2025**. A prospective, randomised, open labelled study was conducted in the Department of Pharmacology at **ESIC Medical College, Hyderabad**, involving **second-year MBBS students**. A total of 82 students were enrolled in the study and randomized into two groups. A crossover design was employed, and the study was conducted over two sessions.

During the first session, the content and analytical methods of both the **Old Method** and **New Method** of DPL analysis were explained, along with relevant references in the practical session. Participants were then instructed to perform a critical appraisal of a given DPL using both approaches.

Old Method: A printed checklist with 23 checkpoints is provided to the students. They are asked to answer "Yes" or "No" for each item on the checklist while evaluating the given drug promotional literature, and then provide an inference. Each correct answer on the checklist is awarded 1 mark, which is standardized to a total of 8 marks, and an additional 2 marks are given for the inference, culminating in a total score of 10 marks.

New Method: In this approach, students are required to manually write down the checklist, which consists of **18 checkpoints**, before proceeding with the analysis. They are required to answer "Yes" or "No" for the provided drug promotional literature and provide a final inference. Each correct answer is valued at 1 mark, which is standardized to a total of 8 marks, and an extra 2 marks are allotted for their written inference of the DPL. keeping the overall score at 10 marks.

The second session focused on gathering the participants' perceptions on the two methods through a semi-open-ended questionnaire.

Statistical analysis: Data was analysed by Microsoft Excel and GraphPad prism software version 5. Data was summarised by Mean ± SD for continuous data and Median± IQR for score data. Data was summarised by percentages for categorical data. The comparison between two methods was done by Unpaired "t" test for continuous data and Mann Whiteney "U "test for score data. All P values less than 0.05 were considered as statistically significant.

Results:

The comparative analysis of the Old and New Methods, evaluated on a 10-point scale, demonstrates a clear improvement in performance. The Old Method yielded scores ranging from 6.9 to 10, with a mean score of 8.8, whereas the New Method exhibited a slightly higher range, from 7.1 to 10, with an increased mean score of 9.1. Statistical analysis indicates a significant difference between the two methods ($p < 0.05$), suggesting that participants achieved better results using the New Method compared to the Old Method. These findings highlight the effectiveness of the new approach in enhancing performance outcomes.

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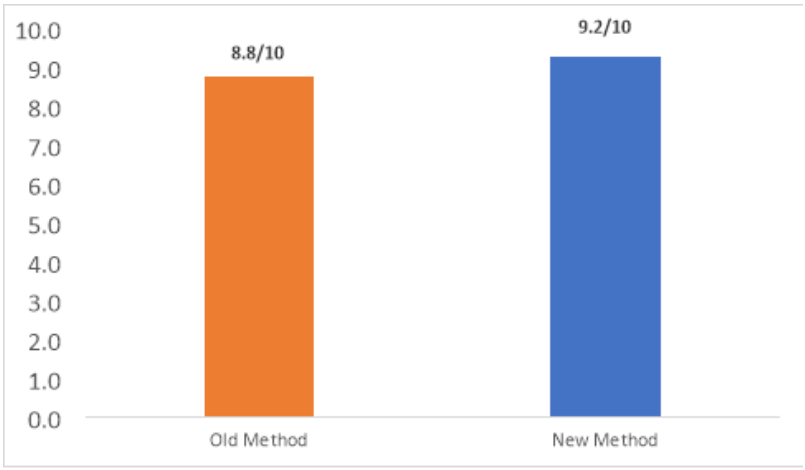

Figure 1: Comparative Evaluation of Participants' Performance Based on Mean Scores Using Traditional and Revised Critical Appraisal Methods

Methods	n	Minimum Score	Maximum Score	Mean	SD	P-value
Old Method	88	6.9	10	8.8	0.86	0.0002 *
New Method	88	7.1	10	9.2	0.80	

* Statistically significant ($p < 0.05$)

Table 1: Comparative Analysis of Participants' Performance Using Traditional and Revised DPL Critical Appraisal Methods

In the follow-up session, participants' perceptions of the DPL analysis methods were assessed through a qualitative questionnaire. When asked about their preferred method, an overwhelming majority of 98.8% (n = 81) indicated a preference for the new method, whereas only 1.2% (n = 1) favoured the old method.

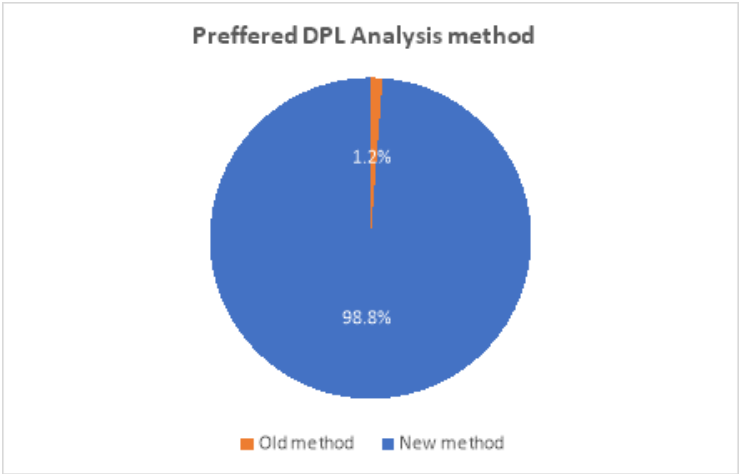

Figure 2: Participants' Preferences Between Traditional and Revised Critical Appraisal Methods

The respondents who preferred the old method 1.2% (n = 1), provided specific reasons for preference. This participant indicated that the checklist content is comprehensive, that the method is appropriate for both WHO guidelines and the Indian context, and that the old method is easier because it does not require writing a checklist.

Q. Reasons for Preferring the Old Method		
Answer	**n (number)**	**percentage**
The checklist content is comprehensive	1	1.2 %
The references used to select the checklist's checkpoints are current and well-maintained.	0	0 %
It is well-suited for both WHO guidelines and the Indian context.	1	1.2 %
The New Method is perceived as overly complex.	0	0 %

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The checklist is easier to use because it eliminates the need to manually draft the checklist points.	1	1.2 %
Others (please specify)	0	0 %

Table 2: Reasons for Participants' Preference for the Traditional Critical Appraisal Method Over the Revised Approach

Among participants who preferred the new method (99%), the reasons for this preference were as follows. The most common rationale, mentioned by 74.4% (n = 61) of respondents, was that the checklist content is comprehensive. The second most cited reason, noted by 60.9% (n = 50), was that the method is appropriate for both WHO guidelines and the Indian context. Additionally, 59.7% (n = 49) of participants appreciated that references used to select the checklist's checkpoints are current and well-maintained. Moreover, 53.6% (n = 44) found that, although the checklist requires manual writing of checklist points, it is easier to use, while 31.7% (n = 26) indicated that the old method is difficult. Finally, 1.2% (n = 1) mentioned in the open-text option that the new method offers much more concise points.

Q. Reasons for Preferring the New Method		
Answer	**n (number)**	**Percentage**
The checklist content is comprehensive	61	74.4%
The references used to select the checklist's checkpoints are current and well-maintained.	49	59.7%
It is well-suited for both WHO guidelines and the Indian context.	50	60.9.%
The Old Method is perceived as overly complex.	26	31.7 %
Even though it requires manually writing the checklist points, the overall process remains easier	44	53.6%
Others (please specify) 1 Answer: The points are much more concise in new method	1	1.2%

Table 3: Factors Influencing Participants' Preference for the Revised Critical Appraisal Method Over the Traditional Approach

Among participants who preferred the new method (99%), the reasons for this preference were as follows. The most common rationale, mentioned by 74.4% (n = 61) of respondents, was that the checklist content is comprehensive. The second most cited reason, noted by 60.9% (n = 50), was that the method is appropriate for both WHO guidelines and the Indian context. Additionally, 59.7% (n = 49) of participants appreciated that references used to select the checklist's checkpoints are current and well-maintained. Moreover, 53.6% (n = 44) found that, although the checklist requires manual writing of checklist points, it is easier to use, while 31.7% (n = 26) indicated that the old method is difficult. Finally, 1.2% (n = 1) mentioned in the open-text option that the new method offers much more concise points.

Discussion

After analyzing the results, it was observed that although the absolute difference in performance between the two methods was modest, the new method demonstrated a statistically significant improvement. Moreover, qualitative feedback revealed a strong participant preference for the new approach, suggesting that it not only enhances performance but is also well-received—thus supporting its potential for broader adoption.

The new method incorporated manual writing to promote active participation and deeper cognitive processing. Despite initial concerns that manual writing might impose additional cognitive demands, participants surprisingly performed better with the new approach. This improvement is likely attributable to its well-organized and concise format, which facilitates easier information processing and retention. Furthermore, the positive perception of this structured presentation significantly influenced students' preference for the updated method, indicating promising implications for future educational practices.

With the shift towards skill-based and outcome-oriented medical education in India following the introduction of the Competency-Based Medical Education (CBME) curriculum by the National Medical Commission in 2019, students' strong preference for the new method, which emphasizes skill acquisition, represents a positive development (9). This inclination not only aligns with the objectives of the CBME framework but also reinforces the importance of hands-on proficiency in medical training. The adoption of this skill-oriented approach marks a significant step forward in achieving the desired educational outcomes and equipping future medical professionals with the necessary competencies.

Physicians must be well-aware about all aspects of newly introduced medicines, including their benefits and risks like adverse effects, contra-indications, precautions and drug interactions to ensure patient safety and maintain a strong doctor-patient relationship. The importance of this necessity is corroborated by a study by Vivek K et al.,

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demonstrating the insufficient inclusion of safety information in DPLs (10).

Multiple studies have demonstrated that many DPLs do not comply with the prescribed standard criteria or guidelines [11–17]. Furthermore, Sharma S et al. emphasize the importance of physician awareness regarding drug advertisements and their potential influence on prescription patterns, particularly when these advertisements deviate from established scientific facts [18].

From the perspective of critically appraising drug promotional literature, a study by Deolekar et al. highlights that undergraduate medical students have limited knowledge of the WHO criteria for assessing promotional drug information [19]. Similarly, research by Jaiswal et al. among postgraduate medical students indicates that their understanding of these criteria is also deficient [20]. Additionally, Amulya Gupta's article emphasizes the importance of training medical students in critical appraisal skills to enhance their evaluation of drug information [21].

Thus, innovative educational strategies aimed at improving students' analytical and appraisal skills can significantly enhance medical education outcomes. A positive perception of such training among students could contribute to the development of competent future physicians.

Conclusion

The updated methodology resulted in a statistically significant improvement in student performance, even though it required manually writing the checklist. Moreover, it was exceptionally well received, with 98.8% of students providing positive feedback. These findings indicate that an innovative, structured, and skill-based approach not only improves critical appraisal abilities but also significantly enhances engagement in medical education. The manual component may have further reinforced learning by encouraging active participation and deeper cognitive processing, thus contributing to improved outcomes.

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Author Contributions

Dr. Abhishakth Gerhardt B. S. planned, designed, and conducted the research and drafted the manuscript. Dr. Swarupa Rani Kasukurthi supported the research activities and assisted in drafting the manuscript. Dr. S. Seethalakshmi contributed to the research efforts and critically reviewed the manuscript.

Conflict of interest: Declared none

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