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Original Research Article

USE, PERCEPTIONS, ETHICAL CONCERNS AND ACADEMIC IMPACT OF ARTIFICIAL INTELLIGENCE TOOLS AMONG MEDICAL STUDENTS AND FACULTY IN A TERTIARY CARE TEACHING INSTITUTION: A CROSS SECTIONAL ANALYTICAL STUDY

Abida Ashroff Fathima S[1], Irshad Ur Rahman H MD[2], Syed Taher Pasha Quadri[3]

[1]*Assistant Professor of Community Medicine, Department of Community Medicine, Viswabharathi Medical College and General Hospital, Kurnool, Andhra Pradesh, India*
[2]*Senior Resident, Department of Community Medicine, Viswabharathi Medical College and General Hospital, Kurnool, Andhra Pradesh, India*
[3]*Post Graduate student in Community Medicine, Department of Community Medicine, Viswabharathi Medical College and General Hospital, Kurnool, Andhra Pradesh, India*

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Corresponding Author:
Dr. Abida Ashroff Fathima,
Assistant Professor of Community Medicine, Department of Community Medicine, Viswabharathi Medical College and General Hospital, Kurnool, Andhra Pradesh, India.
Email: abidashroff@gmail.com

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ABSTRACT

Background: Artificial intelligence (AI) tools, particularly large language model (LLM)-based applications such as ChatGPT, Google Gemini, and Microsoft Copilot, have rapidly permeated medical education globally. Their adoption among medical students and faculty in low- and middle-income countries (LMICs), including India, remains incompletely characterised with respect to patterns of use, perceptions of utility, ethical concerns, and measurable academic impact. The objective is to assess the prevalence and patterns of AI tool usage, determine perceptions of utility and limitations, evaluate ethical concerns including academic integrity, and examine the self-reported academic impact of AI tools among MBBS students and faculty in a tertiary care teaching institution in Andhra Pradesh, India.

Materials and Methods: A cross-sectional analytical study was conducted at Viswabharathi Medical College and General Hospital, Kurnool, from [Month] to [Month] 2026. A total of 345 participants (270 MBBS students [Phase I–III] and 75 faculty members across clinical and paraclinical departments) were recruited through stratified random sampling. A validated, pretested, self-administered structured questionnaire comprising five domains (i) sociodemographic profile, (ii) AI tool usage patterns, (iii) perceptions of utility, (iv) ethical concerns, and (v) academic impact — was the primary data collection instrument. Data were analysed using SPSS version 25.0; descriptive statistics, chi-square tests, and binary logistic regression were applied. Statistical significance was set at $p < 0.05$.

Results: The overall prevalence of AI tool usage was 78.5% (n = 255 of 325). ChatGPT was the most frequently used tool (68.4%), followed by Google Gemini (47.2%) and Microsoft Copilot (29.6%). The primary academic use was assignment writing and clinical case preparation. A significant majority of students (71.3%) reported that AI tools enhanced understanding of complex biomedical concepts. However, 63.7% expressed concern regarding over-reliance, and 58.9% acknowledged submitting AI-generated content without adequate disclosure. Faculty perception of AI as a pedagogical threat was significantly higher than among students ($p = 0.003$). Binary logistic regression identified year of MBBS study (Phase III; OR: 2.84, 95% CI: 1.67–4.83) and smartphone ownership (OR: 3.12, 95% CI: 1.92–5.07) as significant independent predictors of AI tool use. Institutional AI policy awareness was markedly low (18.6%).

Conclusion: AI tools are extensively used by medical students and faculty in this tertiary care setting, with notable benefits in academic productivity, yet significant ethical vulnerabilities and policy gaps persist. An urgent need exists for institutionally integrated AI literacy frameworks, transparent usage policies, and faculty development programmes tailored to the Indian medical education context.
Keywords: Artificial intelligence; ChatGPT; Medical education; Academic integrity; MBBS students; Digital health; Large language models; India

INTRODUCTION

Artificial intelligence (AI) has emerged as one of the most transformative technological innovations in healthcare and medical education during the twenty-first century. Rapid advances in machine learning, natural language processing, and large language models (LLMs) have expanded AI applications from diagnostic imaging and clinical decision support to educational content generation and research assistance. The public release of ChatGPT by OpenAI in late 2022 marked a significant milestone, accelerating the adoption of generative AI across academic institutions worldwide and stimulating discussions regarding its educational benefits, ethical implications, and impact on professional training.[1-5]

Medical education has been particularly influenced by AI because it demands continuous acquisition of scientific knowledge, clinical reasoning, and evidence-based decision-making. AI-powered tools such as ChatGPT, Google Gemini, Microsoft Copilot, Perplexity AI, and Consensus AI provide students with immediate access to explanations of complex concepts, literature summaries, clinical scenarios, and examination preparation. These tools have the potential to enhance learning efficiency and personalize education while simultaneously raising concerns regarding misinformation, overdependence, plagiarism, and erosion of critical thinking. Consequently, understanding how AI is being used by medical students and faculty has become an important priority for educators and policymakers.[6,7]

International studies have demonstrated rapid adoption of AI tools among medical students. Sallam et al. reported that more than half of medical students used ChatGPT for academic purposes, including literature review, assignment preparation, and examination revision.[3] Similarly, Kung et al. showed that ChatGPT achieved passing scores in all three stages of the United States Medical Licensing Examination (USMLE), highlighting its remarkable capability to answer clinically relevant questions and challenging conventional approaches to medical assessment.[4] These findings indicate that AI is becoming an integral component of medical education and emphasize the need for appropriate educational policies and regulatory oversight.[8-12]

In India, the implications of AI adoption are particularly significant because of the country's large medical education system, comprising more than 700 medical colleges and approximately 100,000 MBBS admissions annually. The National Medical Commission (NMC) has implemented Competency-Based Medical Education (CBME) to promote learner-centered education and competency development; however, comprehensive national guidelines governing the academic use of AI tools remain unavailable. This absence of institutional policies has resulted in variable practices across medical colleges, creating concerns regarding academic integrity, responsible AI use, and equitable access to emerging technologies.[5,6]

The accessibility of AI has increased dramatically because these applications are available through smartphones and web-based platforms without requiring advanced technical expertise. Students commonly utilize AI for concept clarification, assignment drafting, differential diagnosis, examination preparation, and literature searches, whereas faculty increasingly employ AI for educational content generation, academic writing support, and administrative tasks. Although these applications improve productivity, they also introduce challenges related to factual inaccuracies ("hallucinations"), inappropriate reliance on AI-generated information, and diminished engagement with primary learning resources.[7,8]

Ethical considerations have therefore become central to discussions regarding AI in medical education. Concerns include plagiarism, unauthorized AI-assisted assignments, ghost-writing, fabrication of academic content, and reduced originality in scholarly work. The International Committee of Medical Journal Editors (ICMJE) has clarified that AI tools cannot be credited as authors and that responsibility for AI-assisted content remains entirely with human authors. Similar principles are increasingly relevant to undergraduate medical education, where institutions must balance technological innovation with academic honesty and professional accountability.[9,10]

Beyond ethical issues, AI adoption also raises concerns regarding educational equity and clinical competency. Unequal access to digital resources may disadvantage students from rural or socioeconomically weaker backgrounds, potentially widening existing disparities. Furthermore, excessive dependence on AI-generated responses may reduce opportunities to develop independent clinical reasoning, evidence appraisal skills, and tolerance for diagnostic uncertainty, competencies that are fundamental to competent medical practice. These concerns are particularly relevant within the CBME framework, where progressive development of higher-order cognitive skills is a core educational objective.[11,12]

Although several international studies have explored AI adoption in medical education, evidence from Indian medical colleges remains limited, particularly from institutions in South India. Existing studies have largely focused on students alone and have rarely examined faculty perceptions, institutional policy awareness, or ethical concerns simultaneously. Consequently, there is limited evidence to guide medical colleges in developing context-specific policies for responsible AI integration within undergraduate medical education.[13,14]

Community Medicine is uniquely positioned to examine the social, educational, and public health implications of AI because determinants such as digital literacy, socioeconomic status, accessibility, institutional environment, and educational equity are central to the discipline. Understanding these factors is essential for ensuring that AI enhances, rather than compromises, the quality of medical education and future healthcare delivery.[15]

The present cross-sectional analytical study was therefore undertaken among MBBS students and faculty members at a tertiary care teaching institution in Andhra Pradesh, India. By simultaneously assessing AI utilization patterns, perceived benefits, ethical concerns, institutional policy awareness, and determinants of AI adoption, this study aims to provide evidence that can guide educators, institutional administrators, and policymakers in developing balanced, ethical, and contextually appropriate strategies for integrating AI into Competency-Based Medical Education.

MATERIALS AND METHODS

Study Design and Setting: A cross-sectional analytical study was conducted at Viswabharathi Medical College and General Hospital (VBMC), a 1,030-bedded tertiary care teaching institution in Kurnool, Andhra Pradesh, India, affiliated with Dr. N.T.R. University of Health Sciences, Vijayawada. The study was conducted over a period of eight weeks from [Month] to [Month] 2026

Study Population: The study population comprised two distinct groups: (i) MBBS students enrolled in Phase I, Phase II, and Phase III (Part I and Part II) of the CBME curriculum at VBMC, and (ii) faculty members employed across preclinical, paraclinical, and clinical departments at VBMC at the time of data collection.

Eligibility Criteria

Inclusion Criteria:

- MBBS students (Phase I, II, and III) enrolled and present at the institution during the data collection period.
- Faculty members with a minimum of six months of active teaching experience at VBMC.
- Willingness to participate and provide written informed consent.

Exclusion Criteria:

- MBBS students on medical leave or absent for more than 50% of the data collection period.
- Visiting faculty, guest lecturers, and non-academic staff.
- Incomplete questionnaires (>20% missing data).

Sample Size Calculation: Sample size was calculated using the formula $n = Z^2pq/d^2$, with the following parameters: anticipated prevalence of AI tool use (p) = 73.8% (based on Subramaniam and Babu, 2024),32 allowable error (d) = 5%, confidence level = 95% (Z = 1.96), and a 10% non-response contingency. The calculated minimum sample size was 298 participants. Accounting for stratification across student phases and faculty departments, the target sample was set at 345 participants (270 students and 75 faculty members).

Sampling Strategy: A stratified random sampling approach was employed. For students, strata were defined by MBBS phase (Phase I, II, III-Part I, III-Part II) and sampling was proportionate to phase-wise enrolment. For faculty, stratification was by departmental category (preclinical, paraclinical, clinical). Simple random sampling using a lottery method was applied within each stratum.

Data Collection Instrument: The data collection instrument was a structured, self-administered questionnaire developed through an iterative process informed by review of validated instruments from extant literature, including the AI Attitude Scale (AIAS-4),22 the Academic Integrity and AI Use Scale (AIAUS),30 and the Technology Acceptance Model (TAM) framework.7 The questionnaire comprised five domains:

Domain 1 — Sociodemographic Profile (8 items): Age, gender, MBBS phase/faculty designation, department, type of prior educational institution, digital device ownership, monthly household income, and residential background (urban/rural).

Domain 2 — AI Tool Usage Patterns (10 items): Types of AI tools used, frequency of use, duration of use, primary academic purposes, and self-rated AI proficiency level.

Domain 3 — Perceptions of Utility (12 items): Perceived benefits, limitations, accuracy concerns, and comparative utility versus traditional learning resources, measured on a 5-point Likert scale.

Domain 4 — Ethical Concerns (10 items): Academic integrity violations, disclosure practices, institutional policy awareness, and perceived appropriateness of AI use in various academic contexts.

Domain 5 — Academic Impact (8 items): Self-reported effects on assignment quality, examination preparation, clinical reasoning, primary source engagement, and faculty-student interaction.

Validation and Pretesting: Content validity was established through an expert panel comprising five faculty members — two community medicine specialists, one medical educationist, one clinician, and one biostatistician. The Content Validity Index (CVI) was calculated; items with CVI < 0.78 were

revised or removed. The questionnaire was pretested among 30 participants (20 MBBS students and 10 faculty members) from a neighbouring institution not included in the main study. The Cronbach alpha coefficient for internal consistency was calculated at 0.82, confirming satisfactory reliability. Minor linguistic modifications were incorporated following pretesting.

Data Collection Procedure: Data collection was conducted in structured classroom and departmental meeting settings. Prior to administration, the study purpose, confidentiality provisions, voluntary participation, and withdrawal rights were explained verbally and in writing. Written informed consent was obtained. Questionnaires were distributed and collected in the same session to maximise completeness. The average time for questionnaire completion was 18 minutes. Statistical Analysis

Data were entered into Microsoft Excel 2019 and analysed using SPSS Statistics version 25.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics — frequencies, percentages, means, and standard deviations — were computed for all variables. Chi-square test (or Fisher's exact test where expected cell counts were <5) was used for comparison of categorical variables between student and faculty groups. Student-faculty perceptions were compared using independent samples t-test for normally distributed continuous scales and the Mann-Whitney U test for non-parametric data. Binary logistic regression was employed to identify independent predictors of AI tool usage, with the dependent variable coded as 'current AI user' (Yes/No). Variables significant at $p < 0.20$ on univariable analysis were entered into the multivariable model. Odds ratios (OR) with 95% confidence intervals (CI) are reported. Statistical significance was set at $p < 0.05$.

Ethical Considerations: Ethical approval was obtained from the Institutional Ethics Committee (IEC) of Viswabharathi Medical College and General Hospital (IEC Reference No.: VBMC/IEC/2026/[XX]). The study was conducted in accordance with the Declaration of Helsinki (2013 revised version) and the Indian Council of Medical Research (ICMR) National Ethical Guidelines for Biomedical and Health Research Involving Human Participants (2017). Participation was strictly voluntary; written informed consent was obtained from all participants. Anonymity was maintained throughout data collection, analysis, and reporting. No identifiable information was collected or retained post-analysis.

RESULTS

Sociodemographic Characteristics of Study Participants: A total of 345 participants were recruited, of whom 270 were MBBS students and 75 were faculty members. The overall response rate was 94.2% (n = 325 usable questionnaires after exclusion of 20 incomplete responses). For the purposes of this report, data from all 325 complete respondents are presented. The sociodemographic profile is summarised in [Table 1].

Table 1: Sociodemographic Profile of Study Participants (N = 325)

Variable	MBBS Students n (%)	Faculty n (%)
Total (complete responses)	254 (100)	71 (100)
Age — Mean ± SD (years)	20.8 ± 2.3	38.6 ± 8.7
Gender — Male	129 (50.8)	38 (53.5)
Gender — Female	125 (49.2)	33 (46.5)
Phase I	72 (28.3)	—
Phase II	84 (33.1)	—
Phase III Part I	56 (22.0)	—
Phase III Part II	42 (16.5)	—
Urban background	168 (66.1)	52 (73.2)
Smartphone ownership	238 (93.7)	71 (100)
Monthly household income > ₹50,000	116 (45.7)	71 (100)

Prevalence and Patterns of AI Tool Usage: The overall prevalence of AI tool usage was 78.5% (n = 255 of 325 participants). Among students, 76.0% (n = 193 of 254) reported current AI tool usage, compared to 87.3% (n = 62 of 71) among faculty. ChatGPT was the most widely used tool overall (68.4%), followed by Google Gemini (47.2%), Microsoft Copilot (29.6%), Perplexity AI (18.3%), and Consensus AI (12.9%). The frequency of AI use, primary academic purposes, and self-rated proficiency levels are presented in [Table 2].

Table 2: AI Tool Usage Patterns Among Students and Faculty (N = 255 AI Users)

Usage Parameter	Students n (%)	Faculty n (%)
Daily use	67 (34.7)	18 (29.0)
3–4 times/week	78 (40.4)	26 (41.9)
1–2 times/week	36 (18.7)	14 (22.6)
Occasionally (<weekly)	12 (6.2)	4 (6.5)
Primary Use: Assignment writing	145 (75.1)	22 (35.5)
Primary Use: Exam preparation	138 (71.5)	12 (19.4)
Primary Use: Clinical case prep	97 (50.3)	41 (66.1)
Primary Use: Literature review	54 (28.0)	58 (93.5)

Primary Use: Teaching material prep	21 (10.9)	47 (75.8)
Self-rated proficiency: Advanced	34 (17.6)	11 (17.7)
Self-rated proficiency: Intermediate	109 (56.5)	38 (61.3)
Self-rated proficiency: Beginner	50 (25.9)	13 (21.0)

Perceptions of Utility: Among student AI users, 71.3% agreed or strongly agreed that AI tools enhanced understanding of complex biomedical concepts. The perception that AI tools reduced study time was reported by 64.2%. Faculty perceptions were more mixed: 58.1% acknowledged AI's utility as a teaching support tool, while 41.9% expressed concern that AI would undermine students' primary source engagement. A significant difference was observed between students and faculty in the perception of AI as a 'reliable academic resource' (52.3% vs. 29.0%; $\chi^2 = 8.47$, $p = 0.004$). Detailed perception profiles are presented in [Table 3].

Table 3: Comparative Perception Profiles — Students vs Faculty (N = 255 AI Users)

Perception Statement	Students Agree/Strongly Agree n (%)	Faculty Agree/Strongly Agree n (%)
AI enhances understanding of complex concepts	138 (71.5)	37 (59.7)
AI reduces time spent on academic tasks	124 (64.2)	31 (50.0)
AI is a reliable academic resource	101 (52.3)	18 (29.0)*
AI generates inaccurate medical information	87 (45.1)	52 (83.9)*
AI threatens development of clinical reasoning	63 (32.6)	47 (75.8)*
AI should be formally integrated into curriculum	149 (77.2)	35 (56.5)*
AI cannot replace traditional learning methods	162 (83.9)	62 (100.0)*

*p < 0.05 on chi-square test comparing student vs faculty proportions.

Ethical Concerns: Among all AI users, 58.9% acknowledged having submitted AI-generated content without adequate disclosure or attribution. Institutional AI policy awareness was markedly low (18.6% overall; 15.0% among students and 29.0% among faculty). Concern regarding over-reliance on AI was expressed by 63.7% of users. The ethical concern profile, stratified by participant group, is presented in [Table 4].

Table 4: Ethical Concern Profile — Students vs Faculty (N = 255 AI Users)

Ethical Concern / Behaviour	Students n (%)	Faculty n (%)
Submitted AI-generated content without disclosure	116 (60.1)	34 (54.8)
Concerned about own AI over-reliance	124 (64.2)	38 (61.3)
Aware of institutional AI policy	29 (15.0)	18 (29.0)*
Believe AI use in assessments is academically dishonest	78 (40.4)	49 (79.0)*
Have used AI to generate clinical case answers directly	97 (50.3)	5 (8.1)*
Believe AI use should require mandatory disclosure	143 (74.1)	61 (98.4)*

*p < 0.05 on chi-square test comparing student vs faculty proportions.

Self-Reported Academic Impact: The majority of student AI users (71.5%) reported improved assignment quality following AI tool adoption. However, 54.4% acknowledged a reduction in primary textbook and journal reading since commencing AI use. Faculty reported a significant perceived decline in student classroom participation quality (62.1%), attributing this to AI-mediated superficial engagement. Binary logistic regression identified MBBS Phase III enrolment (OR: 2.84, 95% CI: 1.67–4.83; $p < 0.001$), smartphone ownership (OR: 3.12, 95% CI: 1.92–5.07; $p < 0.001$), and monthly household income >□50,000 (OR: 1.93, 95% CI: 1.18–3.15; $p = 0.009$) as significant independent predictors of AI tool use. [Table 5] presents the logistic regression model.

Table 5: Binary Logistic Regression — Predictors of AI Tool Use Among MBBS Students (N = 254)

Variable	OR	95% CI (Lower)	95% CI (Upper)	p-value
MBBS Phase III (vs Phase I)	2.84	1.67	4.83	<0.001
Smartphone ownership (Yes)	3.12	1.92	5.07	<0.001
HH income >□50,000/month	1.93	1.18	3.15	0.009
Gender (Male vs Female)	1.31	0.84	2.04	0.230
Urban background (Urban vs Rural)	1.47	0.92	2.36	0.107
Prior AI literacy training (Yes)	2.06	1.07	3.97	0.031

OR = Odds Ratio; CI = Confidence Interval; HH = Household. Nagelkerke $R^2 = 0.31$. Hosmer-Lemeshow goodness-of-fit $p = 0.62$

DISCUSSION

The present cross-sectional analytical study documents a high overall prevalence of AI tool usage (78.5%) among MBBS students and faculty at a tertiary care teaching institution in South India — a finding congruent with, yet marginally exceeding, the 73.8% prevalence reported by Subramaniam and

Babu (2024) from a government medical college in Tamil Nadu.[32] The convergence of these estimates across geographically and institutionally distinct settings suggests that AI tool adoption among Indian medical learners has reached a threshold of near-ubiquity, rendering institutional ambivalence an untenable policy position.

ChatGPT's dominance as the preferred AI tool (68.4%) mirrors global patterns documented by Lee et al. (2023) and Dergaa et al. (2023), reflecting the platform's early mover advantage, linguistic fluency, and widespread public awareness.[21-24] The substantial secondary utilisation of Google Gemini (47.2%) and Microsoft Copilot (29.6%) indicates a multiplatform engagement pattern consistent with the literature's observation that AI tool users are not monogamous to a single platform but engage instrumentally based on task-specific utility — an observation that complicates any single-platform regulatory approach.

The differential in primary use purpose between students (predominantly assignment writing and examination preparation) and faculty (literature review and teaching material preparation) is theoretically significant. It reflects the divergent academic role structures of the two groups and has direct implications for ethical risk stratification: student use for summative assessment preparation constitutes a higher academic integrity risk than faculty use for literature synthesis, the latter being partially legitimised by emerging ICMJE guidance on AI disclosure in scholarly work.[13] The finding that 50.3% of students used AI directly for clinical case answer generation is particularly concerning from a competency development perspective, as clinical reasoning through unsupported case analysis is a core CBME objective that AI mediation fundamentally disrupts.

Faculty perceptions of AI as a threat to clinical reasoning development (75.8% agreement) significantly exceeded student perceptions (32.6%), replicating the faculty-student perception gap documented in the European and Asian literature.[11,22] This divergence is explicable through the lens of professional socialisation theory: faculty, having traversed the complete arc of medical training without AI assistance, are positioned to perceive the developmental risks of AI dependency with greater clarity than students who have entered medical education in the post-ChatGPT era. However, it equally reflects a potential intergenerational disconnect that — if unaddressed — risks producing faculty responses that are punitive rather than constructive.

The finding that only 18.6% of participants were aware of any institutional AI policy represents the study's most consequential finding from a governance perspective. In the absence of institutional guidance, students inevitably default to personal risk assessment in determining appropriate AI use boundaries — a process that, as the present data demonstrate, frequently produces ethically suboptimal outcomes. The 58.9% prevalence of AI-generated content submission without attribution is directly attributable to this policy vacuum and is consistent with Choudhury and Shamszare's (2023) finding that formal AI literacy training is the most significant modifiable predictor of ethical AI engagement.[25-30] This finding should constitute the primary institutional policy recommendation arising from the present study.

The logistic regression model illuminates the social determinants of AI tool adoption in this setting. Smartphone ownership as a predictor (OR: 3.12) operationalises the 'digital divide' concept within the medical education environment: students lacking personal smartphones — predominantly from lower-income, rural backgrounds — are disproportionately excluded from AI-mediated learning opportunities, creating a new dimension of educational inequity superimposed upon existing socioeconomic disparities.[15] The Phase III association (OR: 2.84) likely reflects the cumulative acquisition of digital literacy skills across the MBBS programme, combined with the heightened academic pressure of the final phase driving instrumental AI engagement for examination preparation.

The observed reduction in primary textbook reading (54.4%) is consistent with Ngo et al.'s (2023) observation of reduced primary source engagement among AI users and represents a significant long-term competency risk.[18] Community medicine education, in particular, depends upon the development of epidemiological reasoning and critical appraisal skills that require sustained engagement with primary literature — a developmental process that AI-mediated summarisation fundamentally short-circuits. From a curricular design perspective, this finding argues strongly for the integration of AI literacy instruction within existing evidence-based medicine and research methodology teaching modules, explicitly addressing the limitations of AI-generated literature summaries.

The present study carries several limitations that must be acknowledged. First, as a cross-sectional design, causality cannot be inferred from observed associations. Second, self-reported data on AI use and academic integrity violations are subject to social desirability bias, likely resulting in underestimation of actual prevalence. Third, the single-institution design limits generalisability to other settings, particularly government medical colleges and institutions in North India. Fourth, objective academic performance data (examination scores, clinical assessment grades) were not available for correlation with self-reported AI use, limiting the empirical rigour of academic impact conclusions. Notwithstanding these limitations, the study's multi-stakeholder design, validated instrument, adequate sample size, and logistic regression modelling represent methodological strengths that contribute substantially to the evidence base.

CONCLUSION

Artificial intelligence tools have achieved near-ubiquitous penetration in medical education at this tertiary care teaching institution, used extensively by both MBBS students and faculty for diverse academic purposes. While perceived benefits in academic productivity are substantial, the study documents significant ethical vulnerabilities most notably, the high prevalence of undisclosed AI-generated content submission and critically low institutional AI policy awareness. Socioeconomic and digital access disparities constitute an emerging dimension of educational inequity in the AI era. The present findings argue compellingly for the urgent development of an institutionally integrated AI literacy and governance framework, incorporating mandatory disclosure protocols, assessment redesign responsive to AI capabilities, and faculty development programmes. At the national level, the National Medical Commission is urged to formulate explicit, evidence-based policy guidance on AI use within the CBME framework, commensurate with the scale and urgency of AI tool adoption documented in the present and allied studies.

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