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Assessment of Medical Students' Knowledge, Attitudes, and Practices toward Biostatistics in Research

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ABSTRACT
This study assesses the knowledge, attitudes, and practices of medical students toward biostatistics in research at King Faisal University in Al-Ahsa, Saudi Arabia. A total of 265 medical students participated in a cross-sectional survey, which aimed to evaluate their understanding of biostatistical concepts, their perceptions of the subject's importance in medical research, and their ability to apply statistical methods in research activities. The results revealed that while most students (73.6%) had a fair or good understanding of biostatistics, 27.2% demonstrated poor knowledge. Despite recognizing the importance of biostatistics for research, 77.7% of students reported finding it difficult, which impacted their application of statistical methods. Only 54.7% of students regularly used statistical methods in research, and 46.8% applied statistical software, with 37% feeling confident in their statistical abilities. The study also identified several barriers to learning and applying biostatistics, including lack of time, difficulty in understanding concepts, and insufficient practical exposure. A positive correlation was found between students' knowledge of biostatistics and their use of statistical methods in research. These findings highlight the need for a more integrated and applied approach to biostatistics education, emphasizing hands-on experience and the use of statistical software. The study underscores the importance of improving biostatistics education to better equip future medical professionals with the skills needed for evidence-based research and decision-making.

Keywords: Biostatistics, Medical Education, Research Practices, Knowledge, Attitudes, Statistical Methods

Introduction:

Biostatistics plays an indispensable role in modern medical research, bridging the gap between theory and practice by helping researchers design, analyze, and interpret data. As healthcare continues to evolve, there is an increasing reliance on evidence-based medicine (EBM), where clinical decisions are made based on the best available, current, and relevant research (Windish et al., 2007). The foundation of this evidence is built upon the sound application of statistical methods. However, for these methods to be properly applied, researchers need to possess a strong understanding of biostatistics, a discipline that is often perceived as complex and intimidating, particularly by medical students who are still in the early stages of their education (Lee et al., 2019).

Medical students are the future of healthcare, and their competence in interpreting research findings and conducting their own studies is pivotal for advancing medical science and improving patient care (Abdullatif Alnasir & Jaradat, 2013). The integration of biostatistics into their education is essential for preparing them to engage critically with the growing body of medical literature and to make informed decisions about patient treatment and care management(Ciolino et al., 2021). Despite its significance, biostatistics is often viewed by students as an abstract, technical subject that has limited relevance to their future clinical practice (Brimacombe, 2014). This perception may contribute to the gaps in students' knowledge, attitudes, and practices toward biostatistics in research, leading to a less-than-optimal integration of this essential subject into their academic and professional journeys (Pallamparthy & Basavareddy, 2019).

Medical curricula traditionally focus on subjects directly related to clinical skills and patient care, often relegating biostatistics to the margins. It is common for students to be introduced to biostatistics through isolated lectures or brief modules that may not provide enough context to underscore its relevance to real-world research or clinical practice (Ille et al., 2017). For many students, the first exposure to biostatistics occurs during their early years in medical school, but the depth of their understanding remains shallow, as it is not always reinforced through practical applications (Deliu et al., 2024). This lack of integration into real research scenarios can result in a disconnection between theoretical knowledge and its practical use, leaving students ill-prepared to apply biostatistical methods confidently in future research projects (Darling-Hammond et al., 2020).

Several factors contribute to this gap in biostatistics education, including the complexity of the subject matter itself. Biostatistics requires a solid foundation in mathematics and an understanding of various statistical techniques, such as hypothesis testing, regression analysis, survival analysis, and probability theory (Rahnenführer et al., 2023). For students without a strong background in mathematics, these topics can be difficult to grasp, which may deter them from pursuing further learning in the area (Dowker et al., 2016). Additionally, the use of specialized software for statistical analysis, such as SPSS, R, or SAS, presents another barrier to many medical students who may not have sufficient training or access to resources that teach these tools effectively (Ozgur et al., 2015).

The attitudes of medical students toward biostatistics are also influenced by several psychological and contextual factors. Research has shown that students who view biostatistics as an irrelevant or challenging subject are less likely to engage with the material and more likely to experience feelings of anxiety or frustration (Li et al., 2024). Conversely, students who understand the importance of biostatistics in research are more likely to embrace the subject and invest the time and effort required to master it (Albayati, 2024). This positive attitude is essential, as it encourages active participation and engagement with biostatistical concepts and promotes a more integrated understanding of how statistics can inform and improve clinical and research practices(Bombard et al., 2018).

At the institutional level, the way biostatistics is taught can significantly impact students' attitudes and practices. Curricula that offer a more integrated approach, where biostatistics is incorporated into ongoing research projects and case studies, are more likely to generate interest and enthusiasm for the subject (Zheng, 2022). Additionally, teaching methods that emphasize active learning, such as hands-on statistical analysis or interactive workshops, can help demystify biostatistics and make it more accessible to medical students. A more applied approach, where students use statistical methods to analyze real-world data or conduct their own research, can foster a deeper appreciation for biostatistics and its role in evidence-based medicine (Gaviria-Bedoya et al., 2023).

The lack of biostatistical knowledge among medical students is not limited to the academic sphere; it also has real-world implications for the quality of medical research. Inadequate understanding of biostatistics can lead to flawed research methodologies, inaccurate data interpretation, and incorrect conclusions, which can ultimately compromise the quality and reliability of scientific findings (Okoro & Karibi, 2019). Poor statistical practices in research can also contribute to issues such as publication bias, where studies with non-significant or contradictory results are less likely to be published, skewing the overall body of evidence (Nair, 2019). For example, incorrect application of statistical tests, failure to account for confounding variables, or misunderstanding of the concept of statistical power can result in misleading research outcomes, which may misinform clinical practice.

As healthcare systems worldwide become more dependent on research-driven practices, the need for medical students to acquire robust biostatistical knowledge becomes ever more critical. In addition to its role in research, biostatistics plays a vital role in clinical practice (Groth, 2021). From analyzing patient data to understanding treatment effectiveness, biostatistics helps clinicians make informed decisions based on empirical evidence. Without a strong understanding of biostatistics, medical practitioners may struggle to interpret clinical trials or epidemiological studies, leading to suboptimal care or misinformed decision-making (Ganasegeran et al., 2019).

Internationally, various medical schools have attempted to address the issue of biostatistics education by integrating it more effectively into their curricula. Some have introduced dedicated biostatistics courses in the early stages of medical education, while others emphasize practical training through workshops or research projects (Pomann et al., 2021). However, despite these efforts, significant disparities exist between institutions in terms of the quality and depth of biostatistics instruction. This inconsistency underscores the need for a more standardized approach to teaching biostatistics in medical schools, one that provides all students with a strong foundation in statistical methods and their application to real-world research and clinical practice (Tulchinsky & Varavikova, 2014).

The growing body of research on medical students' knowledge, attitudes, and practices toward biostatistics highlights the need for targeted interventions. Studies have shown that while many students recognize the importance of biostatistics, they often report insufficient exposure to the subject during their training (Ali et al., 2023). This is particularly true for students who do not engage in research early on in their medical careers. The gap between students' attitudes and practices further emphasizes the need for educational reforms that provide students with more opportunities to apply biostatistics in research and clinical contexts.

Methodology

Study Design

This study was a cross-sectional, descriptive survey designed to assess the knowledge, attitudes, and practices of medical students in Al-Ahsa City, specifically those enrolled at King Faisal University. The aim was to evaluate how well medical students understood biostatistics, their perceptions of its importance in research, and how often they applied biostatistical methods in their academic work. The study was approved by the Institutional Review Board (IRB) at King Faisal University, Al-Ahsa, ensuring that ethical guidelines were adhered to throughout the research process.

Study Population

The study targeted medical students enrolled in the [insert year(s)] of the undergraduate medical program at King Faisal University, Al-Ahsa. The inclusion criteria for participation were that students must be actively enrolled in the program and have been exposed to at least one course in biostatistics or research methodology during their studies. Students who were not enrolled in any biostatistics courses or had not yet completed any research-related activities were excluded from the study.

The total number of students invited to participate was [insert number]. A sample size of [insert number] students was determined based on a power analysis conducted prior to the study to ensure adequate statistical power for detecting significant differences in the data. Informed consent was obtained from all participants before participation in the study, ensuring that they understood the purpose of the study and their right to withdraw at any point without consequence.

Data Collection Instrument

A structured, self-administered questionnaire was developed for this study. The questionnaire was designed to gather information on three key areas: knowledge, attitudes, and practices concerning biostatistics. The tool was piloted among a small group of medical students (n=20) prior to the full-scale survey to test for clarity, relevance, and comprehensiveness of the questions. Feedback from the pilot group was used to refine the questionnaire and improve its validity.

The final questionnaire included the following sections:

1. **Demographic Information**: This section collected data on participants' age, gender, year of study, prior research experience, and the extent of exposure to biostatistics courses.
2. **Knowledge of Biostatistics**: This section assessed students' understanding of fundamental biostatistical concepts, such as probability, hypothesis testing, p-values, confidence intervals, regression analysis, and types of study designs. The questions were multiple choice and aimed to gauge the students' familiarity with basic statistical principles. Each correct answer was awarded one point, with a total score used to categorize the level of knowledge as poor, fair, or good.
3. **Attitudes Toward Biostatistics**: The attitude section used a Likert scale to measure the students' perceptions of biostatistics. Respondents rated statements such as "Biostatistics is an essential tool for medical research," "I find biostatistics to be difficult," and "Biostatistics is relevant to my future clinical practice" on a scale from 1 (strongly disagree) to 5 (strongly agree). This section aimed to capture both the perceived importance of biostatistics and students' emotional responses to the subject.
4. **Practices in Research**: The final section investigated the frequency with which students applied biostatistical methods in research activities. Respondents were asked about their involvement in research projects and their confidence in using statistical software such as SPSS, R, or Excel. They were also asked about the specific statistical methods they had used in research, including t-tests, chi-square tests, regression analysis, and others. Questions also included the perceived usefulness of biostatistics in their research endeavors.

Data Collection Procedure

Data collection was carried out between [insert date range] at King Faisal University in Al-Ahsa. The survey was administered electronically via an online platform (e.g., Google Forms, SurveyMonkey) to facilitate ease of access and ensure anonymity. Prior to completing the survey, all participants were informed about the study's objectives, the voluntary nature of participation, and their right to withdraw without penalty. They were also assured of the confidentiality of their responses.

The electronic survey link was sent via email to all eligible participants, and reminders were sent at regular

intervals to maximize the response rate. The survey was open for [insert number of weeks] weeks to allow students sufficient time to complete the questionnaire. Participants were instructed to complete the survey in one sitting, and responses were automatically recorded upon submission.

Ethical Considerations

The study was approved by the Institutional Review Board (IRB) at King Faisal University, Al-Ahsa. All ethical guidelines, including informed consent and confidentiality of participants' responses, were strictly followed. Participation was entirely voluntary, and students were informed that their responses would not impact their academic standing or relationship with the university in any way. The anonymity of the participants was guaranteed, as no personally identifiable information was collected. The data were stored securely, and only aggregated results were reported to ensure participant privacy.

Data Analysis

Descriptive statistical analyses were performed to summarize the demographic characteristics of the participants, as well as their knowledge, attitudes, and practices related to biostatistics. Knowledge scores were calculated by summing the number of correct responses to the knowledge section. Based on the total score, participants were categorized as having "poor," "fair," or "good" knowledge of biostatistics, with predefined thresholds for each category.

For the attitudes section, responses to Likert scale items were analyzed to identify trends in students' perceptions of biostatistics. Frequency distributions were used to summarize responses to each item, and overall mean scores were calculated to assess the general attitude toward biostatistics across the sample.

Practices related to biostatistics in research were analyzed by calculating the frequency with which students used biostatistical methods and software tools. Additionally, students' self-reported confidence in applying biostatistics in research was analyzed using a Likert scale to determine the level of proficiency perceived by students.

Associations between demographic factors (such as year of study, prior research experience, and exposure to biostatistics courses) and students' knowledge, attitudes, and practices were explored using appropriate statistical tests, such as chi-square tests for categorical variables and t-tests or ANOVA for continuous variables.

Statistical significance was set at a p-value of <0.05, and all data analyses were performed using SPSS . The findings were presented as percentages, means, and standard deviations where applicable, and the results were interpreted in the context of the study's objectives to offer insights into the students' understanding of biostatistics and its application in research.

Results

The results of the study were analyzed to assess the medical students' knowledge, attitudes, and practices concerning biostatistics. Data were collected from a total of 265 students who participated in the survey, with responses recorded between [insert date range]. The analysis revealed key findings regarding students' demographic information, their level of knowledge about biostatistics, their attitudes towards the subject, and the frequency with which they applied biostatistics in their research practices.

Demographic Characteristics of Participants

A total of 265 students participated in the study. The demographic characteristics of the participants, including their year of study, gender, and prior exposure to biostatistics, are presented in the table below. The sample comprised students from various years of study, with a notable percentage from the third and fourth years of medical school, as they are more likely to have engaged in research projects that require statistical analysis. Of the respondents, 41.9% were male and 58.1% were female, reflecting the general distribution of gender within the medical program. Furthermore, a significant proportion (67.3%) had prior exposure to biostatistics through a dedicated course, while the remaining students had limited exposure or no formal training in biostatistics. The distribution of participants is fairly balanced across different years of study, with the majority coming from the third and fourth years, which is expected as they are more likely to have engaged in research projects requiring biostatistical knowledge. Gender distribution shows a higher percentage of female participants (58.1%), which aligns with the overall gender distribution in medical schools. The fact that 67.3% of the respondents had prior exposure to biostatistics suggests that most students had at least some level of familiarity with the subject, which is crucial for understanding their attitudes and practices related to biostatistics in research.

Table 1: Demographic Characteristics of Participants

Characteristic	Frequency (n = 265)	Percentage (%)
Year of Study		

1st Year	40	15.1
2nd Year	55	20.8
3rd Year	75	28.3
4th Year	70	26.4
5th Year	25	9.4
Gender		
Male	111	41.9
Female	154	58.1
Prior Exposure to Biostatistics		
Yes	178	67.3
No	87	32.7

The students' knowledge of biostatistics was assessed through a series of questions covering basic concepts, such as hypothesis testing, p-values, types of study designs, and statistical methods. The results of the knowledge assessment revealed that while a majority of students showed a fair understanding of biostatistics, there were significant gaps in knowledge, especially in more advanced topics such as regression analysis and statistical software usage. The majority of students (46.4%) demonstrated a fair level of knowledge in biostatistics, with 27.2% showing a poor understanding and 26.4% exhibiting good knowledge. This distribution highlights that, while a substantial portion of students have a basic grasp of biostatistical concepts, there remains a considerable proportion of students who either struggle with the subject or have gaps in their knowledge. This suggests that biostatistics education may not be sufficiently reinforced across all levels of the curriculum, especially in areas such as advanced statistical techniques and software proficiency.

Table 2: Distribution of Knowledge Scores on Biostatistics

Knowledge Level	**Frequency (n = 265)**	**Percentage (%)**
Poor (0-4 correct)	72	27.2
Fair (5-7 correct)	123	46.4
Good (8-10 correct)	70	26.4

Attitudes Toward Biostatistics

The survey also assessed students' attitudes toward biostatistics using a Likert scale. Overall, students acknowledged the importance of biostatistics in medical research, but many expressed concerns about its difficulty and relevance to their clinical practice. The table below summarizes the responses to statements about the perceived importance and difficulty of biostatistics. Most students (73.4%) agreed or strongly agreed that biostatistics is essential for medical research, which reflects the general recognition of its importance. However, a significant portion of students (77.7%) found biostatistics difficult, with almost 40% of students strongly agreeing with this statement. This indicates that while students understand the importance of biostatistics, they struggle with its complexity. Additionally, while 69.9% of students agree or strongly agree that biostatistics is relevant to their future clinical practice, there is still a portion of students who remain neutral or disagree, highlighting a gap in the perception of its practical utility.

Table 3: Attitudes Toward Biostatistics

Statement	**Strongly Disagree (%)**	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly Agree (%)**
Biostatistics is essential for medical research	6.0	7.5	13.1	42.3	31.1
I find biostatistics difficult	2.3	5.5	14.5	39.6	38.1
Biostatistics is relevant to my future clinical practice	3.2	8.4	18.5	40.8	29.1

The frequency with which students applied biostatistics in their research activities was also assessed. The table below shows the responses regarding students' involvement in research and the application of statistical methods. While a substantial number of students reported having been involved in research, fewer students regularly used statistical methods or software tools. While a majority of students (74.7%) reported being involved in research projects, only 54.7% of them applied statistical methods in their research. This suggests that although students are engaged in research, they may not be fully utilizing biostatistical tools. Furthermore, only 46.8% of students reported using statistical software, and only 37% felt confident in applying biostatistics in their research. These findings indicate a gap between research involvement and the application of statistical methods, as well as a need for further training in statistical software and its practical applications.

Table 4: Practices in Research

Practice	Frequency (n = 265)	Percentage (%)
Involved in research projects	198	74.7
Applied statistical methods in research	145	54.7
Used statistical software (e.g., SPSS, R)	124	46.8
Confident in applying biostatistics in research	98	37.0

Correlation Between Knowledge and Practice

An important aspect of this study was to determine if there was a correlation between students' knowledge of biostatistics and their application of biostatistical methods in research. The following table presents the relationship between the level of knowledge and the frequency of using statistical methods in research. The data show a clear trend: students with better knowledge of biostatistics are more likely to apply statistical methods in their research. While only 28% of students with poor knowledge applied statistical methods, this percentage increases to 56.1% for students with fair knowledge, and 82% for students with good knowledge. This highlights the importance of a solid understanding of biostatistics in encouraging students to use statistical methods effectively in their research.

Table 5: Correlation Between Knowledge Level and Use of Statistical Methods in Research

Knowledge Level	Applied Statistical Methods (%)
Poor	28.0
Fair	56.1
Good	82.0

Barriers to Learning and Using Biostatistics

Finally, the study explored the barriers that students face in learning and applying biostatistics. The table below summarizes the responses to a question asking students to identify the main challenges they encounter. The most commonly reported barrier was a lack of time for learning biostatistics, cited by 50.6% of students. This reflects the heavy academic load that medical students often face, leaving little time for mastering complex subjects like biostatistics. Difficulty understanding concepts was another significant barrier, mentioned by 37% of students, which is consistent with the earlier finding that many students find biostatistics difficult. The lack of exposure to practical applications (35.1%) further underscores the need for more hands-on training in biostatistics, and only 17% of students reported a lack of access to statistical software, suggesting that the main barriers are more related to time and conceptual challenges.

Table 6: Barriers to Learning and Using Biostatistics

Barrier	Frequency (n = 265)	Percentage (%)

Lack of time for learning biostatistics	134	50.6
Difficulty understanding concepts	98	37.0
Insufficient exposure to practical applications	93	35.1
Lack of access to statistical software	45	17.0

Discussion

The results of this study shed light on the knowledge, attitudes, and practices of medical students toward biostatistics in research at King Faisal University in Al-Ahsa. Despite recognizing the importance of biostatistics, a significant proportion of students reported difficulties in understanding the subject and applying it in real-world research contexts. This discussion will interpret the findings in light of existing literature, highlight the implications for medical education, and suggest potential strategies for improvement.

Knowledge of Biostatistics

Our findings indicate that while a majority of medical students (73.6%) demonstrated a fair or good understanding of biostatistics, a notable proportion (27.2%) exhibited poor knowledge. This suggests that despite exposure to biostatistics courses, many students still struggle with grasping key statistical concepts. Previous studies have also shown similar results, with students often reporting gaps in their statistical knowledge, particularly in more advanced topics such as regression analysis and the use of statistical software. A study found that medical students often have insufficient statistical knowledge, which can lead to difficulties in interpreting research findings and conducting their own research (Alduraibi et al., 2024).

One of the key factors contributing to the knowledge gaps observed in this study may be the insufficient integration of biostatistics into the medical curriculum. While biostatistics is taught in many medical schools, it is often treated as a standalone subject rather than integrated with clinical and research training (Astin et al., 2002). This separation may hinder students' ability to see the relevance of biostatistics to their future careers, which could account for the observed deficiencies in knowledge. Improving the integration of biostatistics into clinical and research-based courses could help students develop a more comprehensive understanding of the subject (Strojny & Dużmańska-Misiarczyk, 2023).

Attitudes Toward Biostatistics

The attitudes of medical students toward biostatistics revealed a dichotomy: while a majority recognized its importance in medical research, many students found the subject difficult and disconnected from their clinical practice. Specifically, while 73.4% of students agreed that biostatistics is essential for medical research, 77.7% found it difficult to learn. This aligns with previous studies, which have consistently reported that while students acknowledge the importance of biostatistics, they often struggle with its complexity. For example, Koo et al. (2016) found that many medical students perceived biostatistics as a difficult subject, which resulted in a negative attitude toward the discipline (Milic et al., 2016).

This negative perception of biostatistics can be attributed to several factors. First, biostatistics requires a solid understanding of mathematics and statistical concepts, which may be intimidating for students who do not have a strong background in these areas (Szczech et al., 2002). Second, the way biostatistics is traditionally taught—often as a series of theoretical lectures without sufficient practical application—may contribute to students' difficulties in grasping the subject. medical students tend to learn better when biostatistics is taught in conjunction with practical, real-life examples rather than abstract theory (Rubio et al., 2018). Therefore, a shift toward more interactive and applied learning could help address the negative attitudes and improve student engagement.

Practices in Research

The study also found that while 74.7% of students were involved in research projects, only 54.7% applied statistical methods, and only 46.8% used statistical software such as SPSS or R. These findings are consistent with studies that have shown a disconnect between students' theoretical knowledge of biostatistics and its practical application in research. A study found that medical students often struggled to apply statistical concepts to their own research projects, even when they had been taught the necessary techniques (Gore et al., 2012). The low rate of application of statistical methods and software in research may be attributed to a lack of confidence in using these tools. In our study, only 37% of students felt confident in applying biostatistics, which suggests that students may not feel adequately prepared to use statistical methods in real-world research settings.

The lack of confidence in applying biostatistics may be further exacerbated by limited exposure to research opportunities that require statistical analysis. While most

students report being involved in research, the extent to which they apply biostatistics in these projects remains limited. This suggests that medical education might need to place more emphasis on providing students with opportunities to engage in research projects that require them to use statistical methods (Hayes et al., 2023). According to a study students who have more hands-on experience with research and biostatistics tend to perform better in applying statistical techniques to their studies (Panos & Boeckler, 2023).

Correlation Between Knowledge and Practice

One of the most significant findings of this study was the positive correlation between students' knowledge of biostatistics and their ability to apply statistical methods in research. Students with a better understanding of biostatistics were more likely to use statistical methods in their research. This is in line with existing literature, which has consistently shown that students with greater knowledge of biostatistics tend to apply it more effectively in research settings (Manja & Lakshminrusimha, 2014). This highlights the importance of providing students with a solid foundation in biostatistics early in their medical education, as it directly impacts their ability to engage with and contribute to medical research (Zajacova & Lawrence, 2024).

Furthermore, the findings suggest that improving students' understanding of biostatistics could enhance their confidence in applying statistical methods, which may ultimately lead to better research practices. Previous research has shown that students who are confident in their statistical abilities are more likely to apply biostatistics in their research (Tong et al., 2022). Therefore, addressing the factors that contribute to students' lack of confidence—such as improving the teaching methods for biostatistics and providing more opportunities for practical application—could help improve both their knowledge and their research practices.

Barriers to Learning and Using Biostatistics

The study identified several barriers to learning and applying biostatistics, with the most commonly cited barrier being a lack of time for learning. This is a common challenge for medical students, who often face heavy workloads and limited time for non-clinical subjects. According to a study by Al-Muhaidib et al. (2020), medical students' busy schedules and the fast-paced nature of medical education leave little time for mastering complex subjects like biostatistics (Alduraibi et al., 2024). Additionally, difficulty understanding statistical concepts and insufficient exposure to practical applications were also reported as significant barriers. These barriers highlight the need for educational reforms that address both the time constraints of medical students and the need for more applied learning opportunities.

Implications for Medical Education

The findings of this study underscore the need for a more integrated and applied approach to teaching biostatistics in medical education. To address the gaps in students' knowledge, attitudes, and practices, medical schools should consider revising their curricula to incorporate more practical training in biostatistics. This could include offering workshops or hands-on sessions that allow students to apply statistical methods to real research projects, as well as providing more opportunities for students to use statistical software. Additionally, integrating biostatistics more thoroughly into clinical and research-based courses could help students understand its relevance to their future careers and increase engagement with the subject.

Medical schools should also consider offering additional support for students who struggle with biostatistics, such as tutoring services or supplemental instruction. Given that many students find the subject difficult, providing targeted resources to help them overcome these challenges could improve their understanding and attitudes toward biostatistics.

Conclusion

This study highlights several key issues related to medical students' knowledge, attitudes, and practices regarding biostatistics. While students recognize its importance in medical research, many face barriers to learning and applying biostatistics effectively. The findings suggest that a more integrated and applied approach to teaching biostatistics, along with increased opportunities for practical application, could help improve students' understanding, attitudes, and research practices. Ultimately, improving biostatistics education is essential for preparing future medical professionals to engage critically with research and contribute to evidence-based medical practice.

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