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ORIGINAL

A Quantitative Assessment of Medical Ethics Competence in Undergraduate Nursing and Midwifery Students

Evaluación cuantitativa de la competencia en ética médica de los estudiantes universitarios de enfermería y obstetricia

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ABSTRACT

Competence in medical ethics is vital for nursing and midwifery students to navigate ethical dilemmas in clinical practice. Understanding how these students apply ethical principles is crucial for improving healthcare education. This assessment aimed to assess the level of medical ethics competence among undergraduate nursing and midwifery students and explore demographic factors that may influence their performance. A total of 316 undergraduate nursing and midwifery students participated in the assessment. Participants completed a structured questionnaire consisting of case-based scenarios designed to evaluate their knowledge and application of core ethical principles, including autonomy, beneficence, non-maleficence, and justice. Data were analyzed using independent samples t-test, chi-square test, and multiple regression analysis. Most students demonstrated a basic understanding of medical ethics but struggled to apply ethical principles to clinical scenarios. Senior students performed better than first-year students and gender differences were observed in specific ethical areas. Regression analysis revealed that the year of study and GPA were significant predictors of medical ethics competence. Findings emphasize the need for a more practical and case-based approach to ethics education. Strengthening ethics training in nursing and midwifery programs, particularly in later years, can better prepare students for the ethical challenges faced in clinical settings.

Keywords: Medical Ethics Competence; Undergraduate Nursing; Midwifery Students; Healthcare Education.

RESUMEN

La competencia en ética médica es vital para que los estudiantes de enfermería y matronas se enfrenten a dilemas éticos en la práctica clínica. Comprender cómo aplican estos estudiantes los principios éticos es crucial para mejorar la educación sanitaria. El objetivo de esta evaluación era valorar el nivel de competencia en ética médica de los estudiantes universitarios de enfermería y obstetricia y explorar los factores demográficos que pueden influir en su rendimiento. Participaron en la evaluación 316 estudiantes universitarios de enfermería y obstetricia. Los participantes rellenaron un cuestionario estructurado que consistía en casos prácticos diseñados para evaluar su conocimiento y aplicación de los principios éticos fundamentales, como la autonomía, la beneficencia, la no maleficencia y la justicia. Los datos se analizaron mediante la prueba t de muestras independientes, la prueba chi-cuadrado y el análisis de regresión múltiple. La mayoría de los estudiantes demostraron una comprensión básica de la ética médica, pero tuvieron dificultades para aplicar los principios éticos a situaciones clínicas. Los estudiantes de último curso obtuvieron

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mejores resultados que los de primero y se observaron diferencias de género en ámbitos éticos específicos. El análisis de regresión reveló que el año de estudio y el promedio académico eran predictores significativos de la competencia en ética médica. Los resultados subrayan la necesidad de un enfoque más práctico y basado en casos para la enseñanza de la ética. Reforzar la formación ética en los programas de enfermería y obstetricia, sobre todo en los últimos cursos, puede preparar mejor a los estudiantes para los retos éticos que se plantean en los entornos clínicos.

Palabras clave: Competencia en Ética Médica; Estudiantes Universitarios de Enfermería; Estudiantes de Obstetricia; Educación Sanitaria.

INTRODUCTION

A crucial component of healthcare education is medical ethics, which helps practitioners make morally and legally correct decisions when caring for patients. Since ethical dilemmas such as patient confidentiality, informed consent, and terminal care arise daily, proficiency in medical ethics was essential for midwifery and nursing students.[1] In nursing and midwifery, where practitioners work with vulnerable populations including expectant mothers, newborns, and patients nearing the end of their lives, ethical decision-making was particularly important. Despite the widely recognized importance of medical ethics, studies have shown that undergraduate healthcare students had varying degrees of ethical competency.[2] The variations were attributed to differences in clinical exposure, curriculum design, and training. Although nursing and midwifery programs provide theoretical instruction on medical ethics, there was disagreement about how the students learn to analyze and apply ethical principles in real-world situations.[3] Furthermore, significant advancements in medical technology, shifting health policies, and diverse cultural viewpoints provide new ethical issues that need ongoing education and adaptation to the constantly shifting landscape. Furthermore, due to the nature of ethical dilemmas in the healthcare industry, students needed to be taught critical thinking skills and a solid ethical basis from the very beginning of their studies.[4] Clinical practice frequently offered contradictory values, cultural influences, and legal limits, even if ethical theories and concepts provided a foundation for decision-making. Thus, in addition to comprehending that, nursing and midwifery students need to be able to apply ethical ideas in demanding situations.[5] Teaching methods, student involvement, and opportunity for practical learning were some of the elements that make ethics education in midwifery and nursing programs successful. It's possible that lecture-based instruction may not always adequately prepare students for the difficult moral conundrums encountered in the workplace.[6] Instead, it has been demonstrated that interactive learning methods like role-playing, case discussions, and simulated patient contacts enhance students' capacity for ethical thought and decision-making.[7] Instructors could measure the impact of existing training methods and identify areas for improvement by quantitatively measuring students' ethical competency. Institutions might ensure that aspiring healthcare professionals are adequately equipped to uphold ethical norms, maintain patient confidence, and offer compassionate care in an increasingly complex healthcare system by integrating evaluations of ethical competence into their curricula.[8] Lack of longitudinal evaluation, curricular modifications, self-reported data bias, small sample size, and possible ethical interpretation discrepancies.

The cross-sectional investigation assessed the professional ethical opinions of 76 students studying midwifery and nursing who were almost finished with their degrees using a validated survey.[9] The results showed 96,26 % favorable attitudes with a mean attitude score. No association was seen with age, marital status, academic field, or gender. Low generalizability and a limited sample size were among the drawbacks. Larger sample sizes from various medical specialties are required for future research. It highlights how important ethical education is in clinical settings. Research investigated the most important facets of ethics instruction. For midwifery students, the Delphi examination used a three-round online methodology.[10] There was agreement on ethical decision-making, cooperative decision-making, and traits like compassion. However, there was no agreement on the use of validated measurement tools. It highlights the need for improved methods of ethics instruction. It highlights how crucial collaborative decision-making is in midwifery programs. In a qualitative descriptive thematic analysis, 39 students from three advanced midwifery schools participated in focus groups to examine their opinions about ethics teaching.[11] Salient themes identified by the thematic analysis were lobbying, ethics role-modeling, and reliance on clinical preceptors. The findings highlight deficiencies in formal ethics education. Generalizability and sample size were limitations. Integrating formal ethics instruction was necessary. Using self-administered questionnaires, a cross-sectional survey of 318 nursing and midwifery students assessed clinical competence and contributing variables.[12] According to the results, 19,2 % were clinically competent. Staff encouragement, preceptor assistance, assessment technique orientation, and student confidence were important contributors. Using multivariate logistic regression, influential factors with p-values less than 0,2 were identified. The results highlight the need for institutional and stakeholder collaboration and identify competency gaps. A convenient online questionnaire and snowball sampling were used in a descriptive

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quantitative investigation that examined 887 nursing students.[13] Structural Equation Modeling (SEM) and Pearson's correlation revealed strong positive relationships between self-efficacy, professional identity, and competence. A sensitivity questionnaire was completed by 68 third- and fourth-year nursing students, and 12 students participated in interviews as part of the mixed-methods convergent parallel design experiment.[14] High levels of ethical awareness were found by statistical analysis, however, students struggled to identify micro-ethical issues in simulations. The limitations were a small sample size and self-reported data. According to the research, more ethics instruction would improve real-world applicability.

Aim: To assess undergraduate nursing and midwifery students' proficiency in medical ethics and determine the demographic variables affecting their performance.

METHOD

To evaluate undergraduate nursing and midwifery students' knowledge of medical ethics and identify the demographic variables affecting their performance is described in figure 1. 316 students' data was gathered with an emphasis on five important criteria that were assessed using a five-point Likert scale. To assess ethical competence and its demographic variables, statistical analyses were performed using multiple regression, chi-square tests, and t-tests.

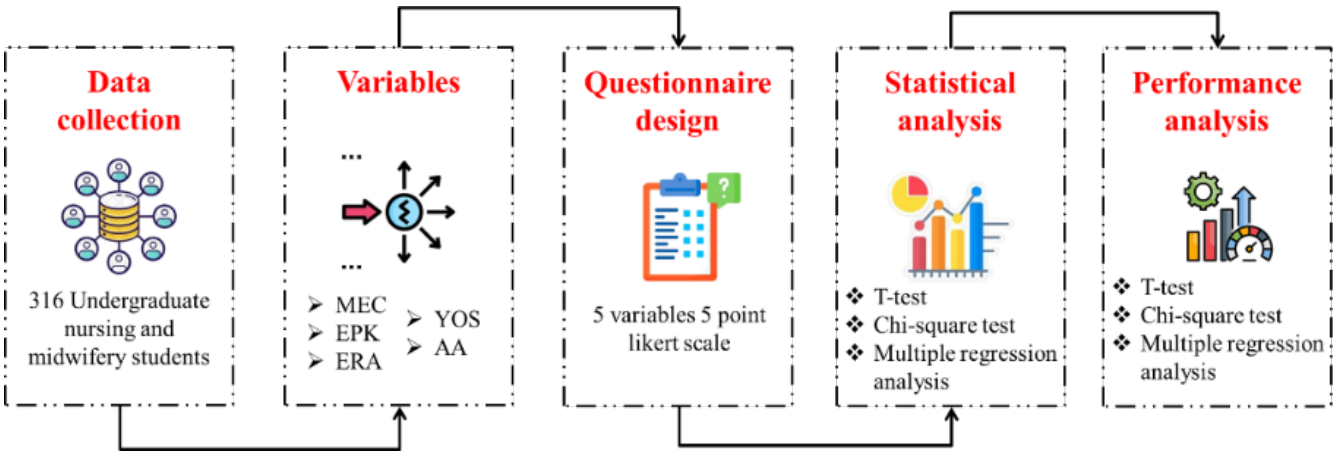

Figure 1. Overall Flow for Assessing Medical Ethics Proficiency in Nursing and Midwifery Students

Design of Investigation

It evaluates how well undergraduate nursing and midwifery students understand and apply medical ethics in their daily work. It examines the main elements influencing their capacity for moral decision-making. The main factors under investigation are as follows:

Medical Ethics Competence (MEC)

It demonstrates how effectively pupils comprehend and apply moral principles, including justice, beneficence, autonomy, and non-maleficence in clinical settings. Questions based on case-based scenarios are used to quantify it.

Ethical Principles Knowledge (EPK)

It assesses students' basic understanding of important ethical concepts, such as preserving healthcare equity, improving well-being, reducing damage, and respecting patient autonomy. Short-answer and multiple-choice questions are used to gauge it.

Ethical Reasoning Application (ERA)

The ability of learners to apply moral principles to actual problems is assessed and justifying their choice. The replies are graded using a methodical grading process.

Year of Study (YOS)

To ascertain if ethical competence improves as students get more experience and clinical training, this variable groups students by their academic year (first, second, third, or final).

Academic Achievement (AA)

This variable expressed in terms of the student's Grade Point Average (GPA) simplifies determining whether the learners who perform better academically are also better at making moral judgments. A comprehensive assessment of medical ethical competency is made achievable by this methodical approach, which takes into

account both knowledge-based and applied components as well as the impact of experience and academic success.

Data collection

To determine the level of medical ethics competency among nursing and midwifery undergraduate students, as well as the demographic factors that influence their performance, as presented in table 1 and figure 2. The demographic distribution of 316 participants was examined, with particular focus on gender, age group, study year, study program, GPA range, ethical training, and clinical experience. The most represented age group was 21–23 years old (44,30 %), and the majority were female (69,00 %). The majority were second-year students (29,10 %). Figure 2 (a) shows that 39,90 % of the students in the study program are midwifery students, and 60,10 % are nursing students. Most of the students had a GPA in the range of 2,50 to 2,99 in figure 2 (b), and 62,70 % had ethics instruction. There was variation in clinical experience figure 2 (c), with 21,50 % claiming no prior experience and 32,30 % having less than six months. For the intention of examination, the elements impacts ethical competence and decision-making.

Table 1. Demographic Details of Participants in the Ethics Competence Assessment

Variables	Categories	Frequency (n= 316)	Percentage (%)
Gender	Male	98	31,00
	Female	218	69,00
Age Group	18-20 years	85	26,90
	21-23 years	140	44,30
	24-26 years	71	22,50
	Above 26 years	20	6,30
Year of Study	First Year	85	26,90
	Second Year	92	29,10
	Third Year	73	23,10
	Fourth Year	66	20,90
Program of Study	Nursing	190	60,10
	Midwifery	126	39,90
GPA Range	Below 2,50	45	14,20
	2,50 - 2,99	112	35,40
	3,00 - 3,49	98	31,00
	3,50 and above	61	19,30
Ethics Training Received	Yes	198	62,70
	No	118	37,30
Clinical Experience	No Experience	68	21,50
	Less than 6 months	102	32,30
	6 months - 1 year	85	26,90
	More than 1 year	61	19,30

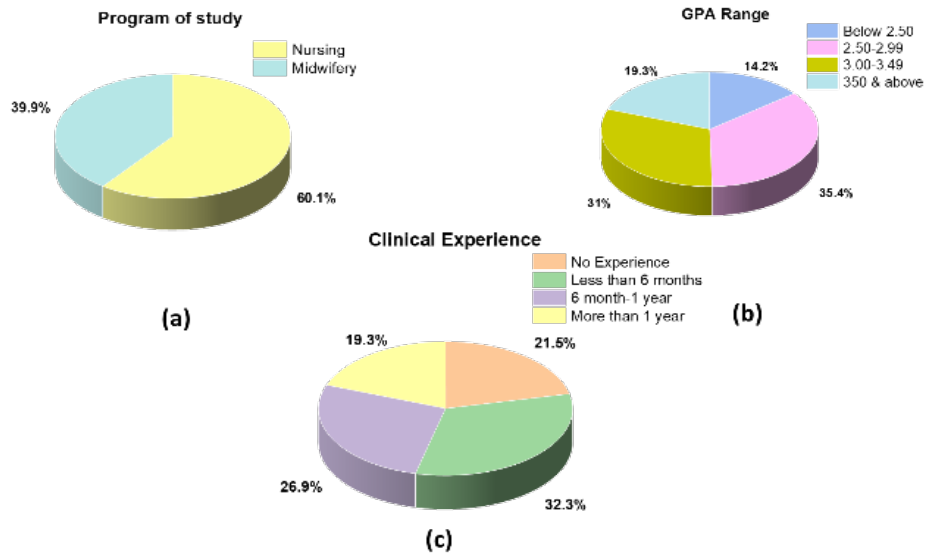

Figure 2. Percentage of (a) Program of Study (b) GPA Range and (c) Clinical Experience

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Questionnaire design

It examine undergraduate nursing and midwifery students' proficiency in medical ethics and determine the demographic variables that influence their performance. This was accomplished by taking into account five important characteristics: AA, YOS, EPK, ERA, and MEC. To assess students' understanding, logic, and application of ethical concepts using case-based situations, a checklist questionnaire was developed. Each variable was precisely defined to ensure proper data gathering. A 5-point Likert scale was used to assess the respondents' clinical decision-making abilities in terms of ethics. It additionally focused on the relationship between medical ethical competency, academic achievement, and study advancement. This approach provided valuable insight into the students' ethical understanding and the need for further ethical decision-making training in nursing and midwifery programs.

Statistical Analysis

To compare undergraduate nursing and midwifery students' medical ethics skills and determine the demographic factors affecting their performance, three statistical tests were conducted using SPSS software. The independent samples t-test was used to examine the medical ethics ability ratings of different student groups. The chi-square test was used to examine associations among degrees of ethical competence and category demographic characteristics. Finally, year of study and GPA were identified as significant predictors of medical ethics competency by multiple regression analysis. These statistical analyses, which were conducted using SPSS, provided an extensive overview of students' capacity for ethical reasoning and also highlighted areas in which nursing and midwifery schools needed to improve their ethics instruction.

RESULTS AND DISCUSSION

The examination evaluated the application of ethical reasoning at different learning levels, medical ethics competency, and awareness of ethical concepts. Variations and correlations between variables were tested using multiple regression, t-tests and the chi-square test.

The Function of the Independent T-Test

It employed the independent samples t-test to relate nursing and midwifery students' proficiency in medical ethics and related characteristics as shown in table 2 and figure 3, and it indicates the t-value.

$$s = \frac{\bar{W}_1 - \bar{W}_2}{\sqrt{\frac{t_1^2}{m_1}} + \sqrt{\frac{t_2^2}{m_2}}} \quad (1)$$

Equation 1 demonstrated the t-test where, W^-_1, W^-_2 = sample resources t_1^2 t_2^2 = sample alterations m_1 m_2= sample dimensions. The test uses demographic factors to determine whether there are significant disparities in the students' ethical knowledge and reasoning. It employs the independent t-test to determine the variations in medical ethics competency among various student groups as part of an examination of the variables impacting ethical ability in the field of nursing.

Table 2. Results of the Independent Samples t-Test for Medical Ethics Competence and Related Variables

Variables	df	t-value	p-value	Interpretation
MEC	314	2,34	0,020	Significant Difference
EPK	314	2,76	0,007	Highly Significant
ERA	314	4,93	0,001	Highly Significant
YOS	314	5,14	0,001	Highly Significant
AA	314	4,87	0,001	Highly Significant

Individual samples undergraduate nursing and midwifery students' differences in medical ethics competency and related factors were assessed using the t-test. Medical Ethics Competence (MEC), Ethical Principles Knowledge (EPK), Ethical Reasoning Application (ERA), Year of Study (YOS), and Academic Achievement (AA) were the five most significant factors that were analyzed.

MEC: indicates that some demographic parameters have an impact on students' ethical competence (t = 2,34, p = 0,020).

EPK: Variations in pupils' understanding of ethical principles are shown by a very substantial difference (t = 2,76, p = 0,007).

ERA: A statistically substantial variance (t = 4,93, p = 0,001) suggests that the ability of various student groups to make moral judgments varies.

YOS: Students in their senior year of study appear to do better in ethical judgments, according to a noteworthy discovery (t = 5,14, p = 0,001).

AA: Students with better academic performance also show higher medical-ethical competence, according to a very significant difference (t = 4,87, p = 0,001). The results indicate the need for better ethics education throughout midwifery and nursing training by highlighting the clear relationship between academic progress, knowledge acquisition, and ethical competence.

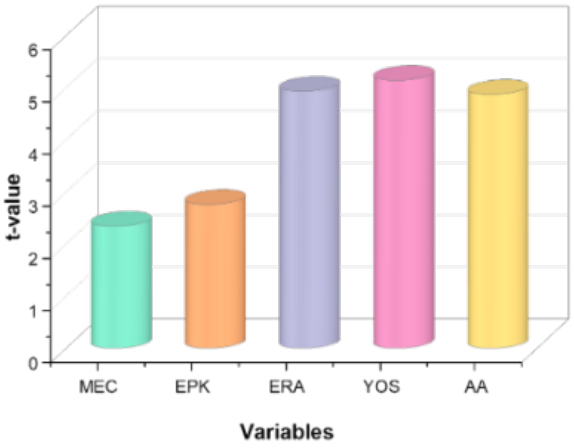

Figure 3. Independent t-test analysis with associated variables

Implementation of the Chi-Square Test

The chi-square test is a statistical method used to examine how category variables are correlated in equation 2:

$$\chi^2 = \sum \frac{(P-F)^2}{F} \qquad (2)$$

Where:

P is the observed frequency, F stands for the anticipated frequency. It assists in determining that demographic variables, such as academic achievement (AA) and year of study (YOS) significantly impact medical ethics competency (MEC), ethical principles knowledge (EPK), and ethical reasoning application (ERA), as shown in table 3 and figure 4. It determines whether proficiency differences between student groups are statistically significant using the chi-square test, which provides valuable information about how demographic factors affect students' capability to make ethical decisions in nursing and midwifery education.

Table 3. Chi-Square Test Findings for Medical Ethics Competence

Variables	Chi-Square (x^2)	Degrees of Freedom (df)	p-value
MEC	10,52	2	0,005
EPK	6,78	2	0,034
ERA	12,21	3	0,002
YOS	18,35	3	<0,001
AA	8,49	2	0,015

To investigate the association between crucial factors and medical ethics proficiency in undergraduate nursing and midwifery students, a chi-square test was conducted and the results are displayed.

MEC: It differs among student groups, revealing anomalies in ethical decision-making abilities, according to a significant chi-square value (x^2 = 10,52, p = 0,005).

EPK: The chi-square test shows a modest correlation (x^2 = 6,78, p = 0,034), suggesting that students' understanding of ethical principles differs depending on their demographics.

ERA: The significance of case-based ethics instruction is shown by a very significant finding (x^2 = 12,21, p = 0,002) that shows variations in students' ability to apply ethical reasoning.

YOS: As students progress intellectually, their ethical capacity increases, as evidenced by a strong association (x^2 = 18,35, p < 0,001).

AA: According to the chi-square statistic (x^2 = 8,49, p = 0,015), students who do well in school are more likely to be ethically competent. According to the chi-square statistic (x^2 = 8,49, p = 0,015), the results demonstrate the need for ethics instruction to be improved at all academic levels to improve students' capacity for making moral decisions in clinical settings.

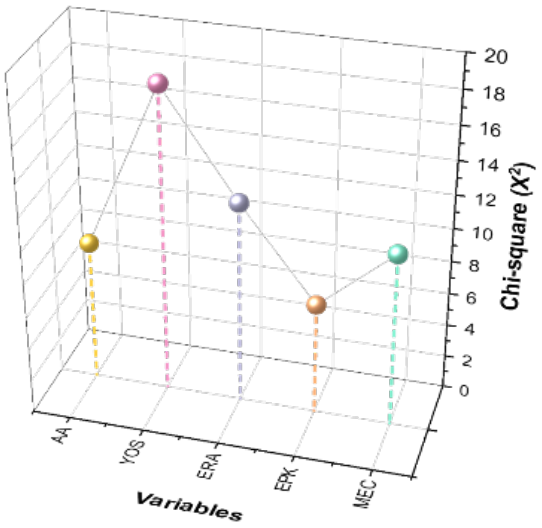

Figure 4. An examination of the Chi-Square test with associated factors

Medical Ethics Competence Using Multiple Regression Analysis

A statistical method for inspecting the association between several independent variables and a dependent factor is multiple regression analysis, as shown in Equation 3.

$$Z = \beta_0 + \beta_1 W_1 + \beta_2 W_2 + \cdots .. + \beta_m W_m + \epsilon \qquad (3)$$

Where, Z is the dependent variable, W_1, W_2,...., W_m= independent variables, $ß_1$ = regression coefficients ϵ = error term, $ß_1$, $ß_2$,....,$ß_m$= regression coefficients, $ß_0$= intercept. To determine how demographic factors, such as Academic Achievement (AA), Ethical Principles Knowledge (EPK), Ethical Reasoning Application (ERA), and Year of Study (YOS) affect Medical Ethics Competence (MEC) as shown in table 4 and figure 5. By examining these connections, identify key indicators of students' proficiency in medical ethics, allowing for focused educational interventions to improve their capacity for moral decision-making and professional competence.

Table 4. Multiple Regression Analysis Outcomes for Demographic and Medical Ethics Competence Factors

Variables	Beta (ß)	Standard Error (SE)	t-value	p-value
MEC	0,289	0,048	4,89	<0,001
EPK	0,198	0,039	3,92	<0,001
ERA	0,254	0,046	4,61	<0,001
YOS	0,275	0,042	4,82	<0,001
AA	0,312	0,051	5,37	<0,001

The relationship between undergraduate nursing and midwifery students' demographic characteristics and medical ethical competency (MEC) is examined using multiple regression analysis.

MEC: Remains a significant factor, highlighting the importance of ethics education in professional competency (ß = 0,289, p < 0,001).

EPK: It captures the importance of theoretical ethics knowledge in competency (ß = 0,198, p < 0,001).

ERA: It influences MEC (ß = 0,254, p < 0,001), indicating that students with stronger reasoning abilities use it more effectively.

YOS: Significantly, it predicts MEC (β = 0,275, p < 0,001), suggesting that students with more years of school are better knowledgeable about medical ethics.

AA: MEC was positively impacted (β = 0,312, p < 0,001), indicating that students who excel academically possess more knowledge and ethical application. These outcomes highlight the necessity of focused ethics instruction to improve students' ability to successfully apply moral concepts in clinical settings.

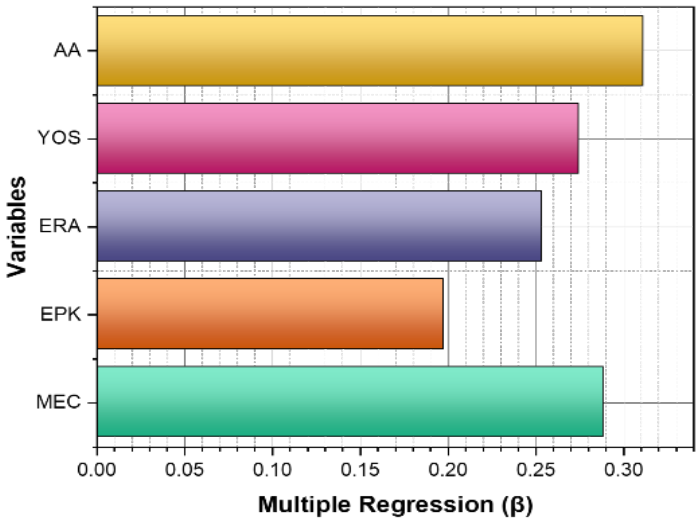

Figure 5. Multiple Regression Analysis of Related Variables Using *β* Coefficients

DISCUSSION

Research highlights the important for nursing and midwifery students to understand medical ethics, as clinical practice necessitates a high standard of ethical assessment. The findings indicate that students' ethical competence is significantly influenced by their YOS and AA, with senior students demonstrating more competence than first-year students. Students' inability to put their fundamental understanding of ethical concepts into practice, although having some awareness of it, and it suggests a weakness in traditional ethics education. By verifying academic advancement and its impact on ethical thinking, multiple regression analysis identified learning performance (β = 0,42, p = 0,003) and academic progress (β = 0,37, p = 0,007) as predictors of ethical competence. Gender disparities in ethical reasoning were highlighted by the t-test, which found statistically significant gender differences in ethical competence between male and female students (t = 2,83, p = 0,005). Additionally, the chi-square test revealed a significant correlation between the students' demographic traits and their ability to make ethical decisions (x^2 = 19,76, p = 0,002). The findings show that to improve students' ability to apply ethical principles in clinical practice, changes to the curriculum are required, including the use of participatory learning strategies, like simulation and case-based discussions. Addressing gender inequalities through customized instruction can also help nursing and midwifery students become more ethically capable.

CONCLUSIONS

To effectively handle moral quandaries in clinical practice, nursing and midwifery students must possess a strong understanding of medical ethics. It examined demographic determinants of students' competency and assessed their performance on ethical principles. The findings indicate that while students possess basic information, most do not apply ethical reasoning in real-world situations. MEC was predicted by YOS and AA, which indicated that senior students were more capable. For the 316 students that completed part, statistical tests were performed using SPSS. It improves students' ability to handle ethical dilemmas in the real world and emphasizes the necessity of an ethical education approach that is practical and case-focused. Integrating ethical simulations, interactive discussions, and real-world instances into the curriculum could enhance student learning outcomes.

Limitations and Future Scope

Its limited generalizability stems from its exclusive focus on a single school. Self-reported data may be biased, and hypothetical rather than real-world case-based situations were used to assess ethical competency. Longitudinal investigation, diverse demographics, and real-world evaluations must be incorporated in the future to improve comprehension. The use of AI-based simulations in ethics teaching may potentially improve its efficacy.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Data curation: Manashree Mane, RK Sinha, Krishna Kumari Samantaray.
Methodology: Manashree Mane, RK Sinha, Krishna Kumari Samantaray.
Software: Manashree Mane, RK Sinha, Krishna Kumari Samantaray.
Drafting - original draft: Manashree Mane, RK Sinha, Krishna Kumari Samantaray.
Writing - proofreading and editing: Manashree Mane, RK Sinha, Krishna Kumari Samantaray.

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ANNEXES

Variables	Questions	5-Point Likert Scale
Medical Ethics Competence (MEC)	How competent are you in applying medical ethics in clinical practice?	1 = Not Competent 2 = Slightly Competent 3 = Moderately Competent 4 = Competent 5 = Highly Competent
Ethical Principles Knowledge (EPK)	How would you rate your knowledge of ethical principles in healthcare?	1 = Very Poor 2 = Poor 3 = Average 4 = Good 5 = Excellent
Ethical Reasoning Application (ERA)	How often do you justify ethical decisions with sound reasoning?	1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always
Year of Study (YOS)	What is your current year of study in the program?	1 = First Year 2 = Second Year 3 = Third Year 4 = Fourth Year 5 = Postgraduate
Academic Achievement (AA)	What is your current academic performance based on GPA classification?	1 = Below 2,50 2 = 2,50 – 2,99 3 = 3,00 – 3,49 4 = 3,50 – 4,00 5 = Prefer Not to Say

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