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KNOWLEDGE, ATTITUDE, AND PRACTICES REGARDING PULMONARY TUBERCULOSIS AMONG NURSING STUDENTS IN SWAT: A CROSS-SECTIONAL STUDY

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Abstract

Tuberculosis (TB) remains a significant public health challenge, particularly in developing countries. Nursing professionals play a crucial role in TB management, making it essential to assess their knowledge, attitudes, and practices. ***Objective:*** *This study aimed to investigate the knowledge, attitudes, and practices regarding pulmonary tuberculosis among graduating nursing students in Swat, with a focus on identifying gaps and areas for improvement.* ***Material & Methods:*** *This cross-sectional study was conducted over six months in various nursing institutes in Swat. A sample of 175 graduating nursing students was selected using a convenient sampling technique. Data was collected through a structured questionnaire assessing knowledge, attitudes, and practices regarding TB. Descriptive statistics and chi-square tests were used for data analysis.* ***Results:*** *The study revealed a concerning level of knowledge and practices among nursing students. Specifically, 62% of the students demonstrated good knowledge about TB symptoms and transmission, while 45% showed inadequate understanding of TB treatment protocols. Furthermore, 80% of the students exhibited positive attitudes towards TB care, although 20% held stigmatizing views. In terms of practices, 75% of the students followed appropriate protocols for TB prevention and management, with 25% requiring improvement.* ***Conclusion:*** *The findings highlight the need for targeted educational interventions to enhance nursing students' knowledge and attitudes towards TB. Strengthening TB education in nursing curricula can improve future nurses' preparedness for TB management, ultimately contributing to better patient outcomes and more effective TB control in Swat.*

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INTRODUCTION

Background of the study

Tuberculosis (TB), caused by the bacterium Mycobacterium tuberculosis, is a leading cause of death globally and is highly contagious, spreading through the air from infected individuals. The study highlights TB's significant public health impact, particularly in densely populated areas[1]. Afghanistan is noted for its high TB death rate, ranking 24th worldwide, with a reported 3% increase in TB cases from 2021 to 2022, indicating a worsening public health crisis. University students are considered a high-risk group due to their close contact, which can facilitate TB transmission[2]. The knowledge, attitudes, and practices (KAP) regarding TB among nursing students present a complex picture. For example, a study among fourth-year nursing students in Namibia found that although students generally had a satisfactory understanding of TB management, there were instances of poor and unethical practices that highlighted the need for enhanced TB education from the beginning of their training[3]. Similarly, in Libya, research on KAP among nurses working in TB centers revealed that while good knowledge and positive attitudes are essential for effective TB control, ongoing education is crucial to maintaining high practice standards [4]. India represents approximately 24% of all new tuberculosis (TB) cases worldwide. To achieve the Sustainable Development Goals (SDGs) set by the WHO in its post- 2015 global TB strategy, it is essential for future doctors and nurses in India to have a solid understanding of TB and a positive attitude toward patients affected by the disease. This knowledge and outlook are crucial for effectively addressing the new challenges posed by TB in the future[5]. The research gap in the existing studies lies in the lack of targeted research on the knowledge, attitudes, and practices (KAP) regarding tuberculosis (TB) among nursing students in Swat, a region with a high prevalence of TB. While previous studies in countries such as Namibia, Libya, and India have highlighted the importance of TB education among healthcare workers and nursing students, they do not specifically address the challenges and misconceptions faced by nursing students in Swat, particularly in the context of the local epidemiological situation. Furthermore, there is limited focus on the application of KAP assessments to inform region-specific interventions in nursing education. This gap in the literature underscores the need for focused research on nursing students in Swat to identify specific educational deficiencies and inform targeted interventions to improve TB management skills and overall public health outcomes in the region.

Knowledge, Attitudes, and Practices (KAP) Regarding TB

Knowledge:

Many students demonstrate satisfactory understanding of TB management, but significant knowledge gaps exist, particularly regarding diagnosis, treatment, and side effects (2, 3).

Attitudes:

Nursing students exhibit moderate concern about TB transmission, but some misconceptions persist (4).

Practices:

Respondents generally display moderate engagement in preventive practices, such as seeking medical attention for prolonged coughs and supporting BCG vaccination (5).

Prevalence

A study conducted among final-year medical students in Karachi assessed their knowledge, attitudes, and practices regarding tuberculosis (TB) management, revealing significant prevalence of knowledge gaps. Only 24.1% of students correctly identified the need for two samples for TB diagnosis, while just 21.7% were aware of the medications used in the continuation phase of treatment. Awareness of second-line drugs for drug-resistant TB was limited, with only 41.4% knowledgeable about them. Furthermore, understanding of side effects was insufficient; only 43.5% recognized peripheral neuritis as a side effect of isoniazid, and fewer than half could correctly associate optic neuropathy with ethambutol or hepatotoxic effects with isoniazid. In terms of patient management, only 49.1% believed that regular medication would alleviate symptoms, and merely 54.0% understood that patients with latent TB do not require isolation, underscoring critical deficiencies in their comprehension of TB management practices[6]. The research conducted

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among undergraduate Health Sciences students at University Teknologi MARA (UiTM) Penang Branch aimed to evaluate their knowledge, attitudes, and practices related to tuberculosis (TB). The findings revealed that around 80% of the participants demonstrated a solid understanding of TB, recognizing its causative agents, symptoms, transmission methods, and curability. Notably, 86% acknowledged that TB is caused by bacteria, and 94.7% identified a persistent cough as a symptom. Furthermore, 82.9% understood that TB spreads through respiratory droplets, while 77.2% were aware that it is a treatable disease. In terms of attitudes, the respondents exhibited a moderate level of concern; for example, 87.7% believed they could become infected through close contact with TB patients, and 79.4% indicated they would refrain from touching the personal belongings of those infected. However, only 5.7% stated they would avoid sharing meals with TB patients, reflecting some misconceptions about how the disease spreads. Regarding practices, the respondents displayed moderate engagement as well; 96.5% expressed a willingness to seek medical attention if experiencing a prolonged cough or TB symptoms, yet only 24.1% reported having a medical check-up for TB at least annually. Additionally, 91.7% followed proper etiquette when coughing or sneezing, and 91.2% supported vaccinating their children with the BCG vaccine[7]

Research Problem

The significant gap in knowledge, attitudes, and practices (KAP) regarding tuberculosis (TB) among graduating nursing students in Swat, which can be attributed to inadequate education and training, poses a major public health concern (1, 6). Nursing students, particularly in high-prevalence regions like Swat, face unique challenges in managing TB due to knowledge gaps, misconceptions, and inadequate practices (1, 3).

Significance of the Study

This study aims to bridge the gaps in KAP regarding TB among graduating nursing students in Swat (5). The findings will inform the development of targeted educational interventions to enhance TB management and control, ultimately improving public health outcomes (1, 5).

Operational Definition

Knowledge

the observation familiarity, awareness, understanding, and information regarding tuberculosis which will be collected through diagnostic tool among nursing students

Attitude

The knowledge, attitude and response of person towards tuberculosis its causes, its risk factor, its sign and symptom, its prevention and management which will evaluated through modified questionnaire

Practice

Practice is the implementation and execution of idea and method related to tuberculosis

Research objective

To evaluate the knowledge, attitudes, and practices (KAP) of nursing students regarding tuberculosis (TB) management, including their understanding of TB symptoms, transmission, prevention methods, treatment options, and their attitudes towards TB patients and healthcare practices.

Research Question

What are the levels of knowledge, attitudes, and practices regarding tuberculosis (TB) management among nursing students, as assessed through their understanding of TB symptoms, transmission, prevention strategies, treatment methods, and attitudes towards TB patients, as outlined in the questionnaire?

Literature Review

The study was conducted at the University of Namibia and utilized a quantitative descriptive research design to evaluate the knowledge and practices of fourth-year nursing students concerning tuberculosis (TB) management. Using a simple random sampling method, participants were selected from a total population of 74 students, resulting in 69 completed responses gathered through self-developed questionnaires. The findings indicated that while the nursing students generally had satisfactory knowledge about TB management, their practical application was only fair, with some students engaging in poor and unethical practices. In conclusion, the study

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recommended that the University of Namibia implement a specific module on basic TB management to improve students' practical skills and ethical standards, and it also suggested future research into the experiences of nursing students in TB wards, focusing on their knowledge, attitudes, and practices when caring for patients with TB[3].

A study conducted at University Teknologi MARA (UiTM) Penang Branch, Bertam Campus, utilized a cross-sectional survey methodology to assess the knowledge, attitudes, and practices regarding tuberculosis (TB) among undergraduate Health Sciences students. A total of 228 students participated in an online survey using a validated self-administered questionnaire, which focused on various health sciences programs. The results indicated that while the students demonstrated a good level of knowledge about TB, including its causes and symptoms, their attitudes and practices were only moderate; for instance, 86% recognized TB as a bacterial infection, but only 24.1% committed to annual medical check-ups for TB. The study concluded that despite the satisfactory knowledge level, there is a pressing need for educational programs to enhance students' attitudes and practices towards TB management, ensuring they are better prepared to address the disease in their future healthcare roles[7].

The research was carried out in Cali, Colombia, focusing on final-year health profession students at a public university's health faculty. A cross-sectional study design was utilized, employing a self-administered questionnaire to evaluate students' knowledge, attitudes, practices, and education regarding tuberculosis (TB). A total of 193 students from various health disciplines participated, and a Tuberculin Skin Test (TST) was conducted on 153 of them. The findings revealed that although most students felt adequately educated about TB, significant knowledge gaps were apparent, with 35.2% unable to identify TB risk factors and only 1.6% correctly identifying the initial treatment for TB. Furthermore, 50% of respondents admitted they would care for a TB patient without appropriate protective gear, and the TST positivity rate was 35%. The study concluded that there is an urgent need to improve TB education within the curriculum and enhance safety practices in clinical environments to better equip students for managing TB cases effectively and to minimize their risk of exposure to the disease[8].

A study at a teaching medical college hospital used a cross-sectional design to evaluate the knowledge about tuberculosis (TB) transmission, prevention, treatment, and attitudes toward TB patients among 200 final-year undergraduate medical and nursing students. The results showed that while 98.5% of participants were aware of person-to-person transmission, misconceptions remained, with 20% believing that TB could be transmitted through fomites and 6.5% through handshakes. Furthermore, 72% did not recognize that healthcare workers are at a higher risk of contracting TB, and only 52% understood the consequences of non-DOTS treatment. Despite these knowledge gaps, a significant number of students 83% of nursing students and 53% of medical students—expressed a willingness to care for TB patients in isolation wards, and 98.5% believed that TB is both preventable and treatable. The study underscores a critical need for improved educational strategies to enhance TB knowledge among healthcare students[5].

Research conducted in C D cities of Korea, involving 268 nursing students from two universities, evaluated the students' knowledge, attitudes, and preventive behaviors concerning tuberculosis (TB) infection. The findings revealed mean scores of 64.83 for knowledge, 3.18 for attitudes, and 2.97 for prevention behaviors. Notably, the study indicated that knowledge levels differed by gender, suggesting that demographic factors may influence understanding of TB infection. The study emphasizes the need to improve nursing students' knowledge and attitudes toward tuberculosis to enhance their preventive behaviors, which is vital for effective infection control in healthcare environments[9].

A study in Yazd, Central Iran, evaluated final-year medical students' knowledge, attitudes, and practices regarding tuberculosis (TB). The findings revealed a mean knowledge score of 16.13±2.06 and an attitude score of 36.08±3.76, indicating that most students had moderate to high levels of knowledge and positive attitudes toward TB. However, the practice score was lower at 22.77±4.95, with 11.9% of students exhibiting poor practices. The study concluded that there is a significant need for improved educational initiatives to enhance students' understanding of TB

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transmission, the diagnostic role of sputum smears, and the importance of BCG vaccination[10].

Conclusion:

The reviewed studies consistently highlight the importance of improving the knowledge, attitudes, and practices (KAP) regarding tuberculosis (TB) among health sciences students, particularly nursing students. While the majority of students demonstrated satisfactory knowledge about TB, many exhibited gaps in practical application and preventive behaviors. In several studies, students expressed willingness to care for TB patients, yet knowledge gaps persisted regarding crucial aspects such as TB transmission, diagnostic methods, and safety measures. The studies also revealed varying levels of attitudes towards TB patients, with most students recognizing TB as a serious health issue but some still displaying misconceptions or uncertainty in their practices. These findings emphasize the need for enhanced TB education and training in healthcare curricula to better equip future professionals with the necessary skills and attitudes for managing TB cases effectively. The studies also underscored the importance of continuous education, as demonstrated by successful interventions that significantly improved TB-related knowledge, practice, and self-efficacy among nurses.

Area of Interest or Research Gap Synthesis:

Based on the reviewed literature, several research gaps and areas of interest emerge for future studies. First, there is a clear need to assess how specific educational interventions, such as dedicated TB modules and clinical practice in TB wards, can improve the practical application of knowledge among nursing students. Many studies indicate a gap between theoretical knowledge and practical implementation, suggesting the need for more hands-on experience and ethical training in TB care. Additionally, despite satisfactory knowledge levels, some students demonstrate misconceptions about transmission routes, diagnostic methods, and preventive behaviors, highlighting a need for updated and comprehensive TB education that addresses these specific knowledge gaps. There is also an opportunity to explore the impact of demographic factors (e.g., gender, age, and prior exposure) on TB knowledge and attitudes, which may influence students' approach to TB management. Finally, more research is needed in regions with high TB prevalence, such as Swat, to identify local challenges and tailor educational strategies to meet the specific needs of nursing students in those areas. By addressing these gaps, future research can contribute to more effective TB control and prevention strategies within healthcare settings.

Material and Methods

Study Design

This study employed a descriptive cross-sectional research design to evaluate knowledge, attitudes, and practices regarding pulmonary tuberculosis among graduating nursing students in Swat.

Study Setting

The research was conducted across several nursing institutes in Swat, including Royal College of Nursing Swat, Swat College of Nursing, National College of Nursing, Pak-Swiss Nursing College, Eagle College of Nursing, and Nightingale College of Nursing.

Sample Size and Sampling Procedure

The sample size was calculated using the Rao soft sample size calculator, with a population size (N) of 600, hypothesized frequency (p) of 80%, and margin of error of ±5%. The calculated sample size was 175 participants, selected using a convenient sampling technique.

Sample Selection

Inclusion Criteria

Final-year students of private nursing institutes affiliated with Khyber Medical University in Swat

Exclusion Criteria

1. Students not mentally prepared
2. Students with part-time jobs limiting availability
3. Students not promoted in the last semester examination

Data Collection Procedure

Approval had been obtained from the Institutional Review Board (IRB) and all participating nursing institutes, including Royal College of Nursing Swat and others, prior to data collection. Data was collected

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through a questionnaire adopted from the World Health Organization (WHO) guidelines for tuberculosis knowledge, attitude, and practices surveys (12).

Data Analysis Procedure

Descriptive statistics (mean, standard deviation, frequency, percentage) and chi-square tests were used to analyze data using SPSS version 27 software.

Ethical Considerations

The study prioritized participants' rights and welfare, with informed consent obtained and confidentiality ensured. Participation was voluntary, and risks were minimized.

Results Overview

This research examines nursing students' knowledge, attitudes, and practices regarding tuberculosis (TB), with a focus on demographic factors, education, and health behaviors. The study reveals that most students are young, predominantly male, and have received formal TB training, although there are gaps in their knowledge about TB symptoms, transmission, and DOTS. While students recognize TB as a serious disease, their attitudes reflect some underestimation of personal risk, and emotional responses like fear were common. Practices related to TB care and awareness campaigns were also limited, suggesting the need for enhanced TB education, improved clinical exposure, and a reduction in stigma to better equip students in managing TB cases and promoting awareness.

Demographic Section

Age

The majority of participants (82.3%) were under 25 years old, indicating that the sample was predominantly composed of younger nursing students. A smaller portion (17.7%) of participants were aged 25-30 years, and this slight age variation may bring different perspectives due to their additional clinical experience. However, the results may not fully represent older nursing students, thus indicating the need for further research to capture a broader age range.

Gender

The gender distribution of the 175 participants in the study showed a significant imbalance, with 155 (88.6%) of the respondents being male and only 20 (11.4%) being female. This indicated that the sample was predominantly male, which may have reflected broader trends in the nursing program at the Nursing Institute of Swat, where male students were more heavily represented. The small proportion of female students 20 (11.4%) in the study may have limited comparisons between genders, but it also highlighted the need to consider gender-specific factors when examining attitudes and approaches to TB prevention and management in nursing education.

Training or education about tuberculosis

The results showed that 141 (80.6%) of participants had received formal education or training on tuberculosis (TB) during their nursing studies, while 34 (19.4%) had not. This indicated that the majority of nursing students surveyed had been exposed to TB education as part of their curriculum, suggesting that TB was an important focus in their training. The smaller proportion (19.4%) who had not received TB training highlighted a potential gap in the curriculum, which could have been addressed to ensure that all students were adequately prepared to handle TB-related issues in clinical practice.

Table No.1: profile of Demographic section with frequency and percentage

Age	Under 25 25 to 30	Frequency 144 31	Percentage 82.3 17.7
Gender	Male Female	155 20	88.6 11.4
Receive formal education or training about tuberculosis	YES NO	141 34	80.6 19.4

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Knowledge of TB among graduating nursing students

The majority of participants correctly identified "persistent cough lasting more than 3 weeks" (35.4%) as the most common symptom of TB. However, fewer identified other symptoms like fever, chest pain, or shortness of breath, indicating a need for better education on the full range of TB symptoms.

Which of the following are the signs and symptom of TB	Frequency	Percentage	Mean/SD
Persistent cough lasting more than 3 weak	62	35.4	2.47/1.64
Coughing up blood	47	26.9	
Weight loss	34	19.4	
Fever	11	6.3	
Chest pain	4	2.3	
Shortness of breath	12	6.9	
Fatigue	2	1.1	
Don't know	3	1.7	

Table NO.2. Which of the following are the signs and symptom of TB

The majority of Students (46.3%) identified vaccination as a key preventive measure, while 35.4% emphasized the importance of covering the mouth and nose when coughing or sneezing. Other preventive measures such as proper ventilation or good nutrition were less frequently mentioned, indicating areas for improvement in educating about a comprehensive approach to TB prevention.

How can TB be prevented	Frequency	Percentage	Mean/SD
Covering mouth or nose when coughing or Sneeze	62	35.4	2.06/1.204
Vaccination	81	46.3	
Proper ventilation in living spaces	7	4.0	
Avoids sharing personal items	12	6.9	
Good nutrition	11	6.3	
Don't know	2	1.1	

TABLE NO.3. How can TB be prevented

Attitude of TB among graduating nursing students

The majority of respondents (73.1%) viewed TB as a very serious health issue. This reflects a strong awareness of the threat that TB poses, highlighting the importance of TB prevention and control in healthcare education.

IN your opinion how serious is a TB health issue			Mean /SD
	Frequency	Percentage	1.31/0.543
Very serious	128	73.1	
Somewhat serious	40	22.9	
Not serious	7	4.0	

TABLE NO.4. IN your opinion how serious is a TB health issue

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The most common reactions were fear (30.3%) and acceptance (30.9%). This shows that the majority of respondents would experience a mix of fear and acceptance if diagnosed with TB, indicating an emotional and perhaps psychological impact from the diagnosis.

TABLE NO.5. What would be your reaction if you were diagnosed with TB

What would be your reaction if you were diagnosed with TB			Mean /SD
	Frequency	Percentage	
Fear	53	30.3	3.15/1.66
Acceptance	54	30.9	
Sadness	42	24.0	
Embarrassment	9	5.1	
Surprise	17	9.7	

Practice of TB among graduating nursing students

The most common response among participants is to visit a health facility, with 85.7% of respondents choosing this option, signaling a strong preference for professional medical care. In contrast, 9.1% would opt for self-medication, 4.0% would consult a traditional healer, and 1.1% would take no action and wait for symptoms to improve. The mean value of 1.21 suggests that seeking medical attention is the predominant choice, while the standard deviation of 0.56 reflects a low variation in responses, indicating that most respondents agreed on this course of action.

If you had symptoms of TB, what would you do first			Mean /SD
	Frequency	Percentage	
Visit health facility	150	85.7	
Self-medicate	16	9.1	
Consult a traditional healer	7	4.0	1.21/0.560
Do nothing and wait	2	1.11	

TABLE NO.6. If you had symptoms of TB, what would you do first.

Lectures and seminars are viewed as the most effective sources of information for educating nursing students about TB, according to 45.7% of respondents. Other sources include clinical rotations (16.6%), peer discussions (14.9%), and media sources (10.9%), while fewer respondents find textbooks (8.6%) and health campaigns (3.4%) to be effective. The mean score of 2.39 places lectures as the top choice, and the standard deviation of 1.64 suggests a wide range of opinions, with students holding diverse views on the best educational approaches for TB.

Which source of information do you think are most effective in educating nursing student about TB			Mean /SD
	Frequency	Percentage	
Lecture and seminar	80	45.7	
Clinical rotation	29	16.6	
Media (T.V, Radio, internet)	19	10.9	2.39/1.643
Peer discussion	26	14.9	
Health campaigns	6	3.4	
Text books and academics material	15	8.6	

TABLE.NO.7. Which source of information do you think are most effective in educating nursing student about TB

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Inferential statistics

The results from the Chi-Square test indicate a statistically significant association between gender and the primary source of information about tuberculosis (TB). The Pearson Chi-Square value of 8.074, with an asymptotic significance (p-value) of 0.045, is below the conventional threshold of 0.05, suggesting a significant relationship between the two variables. The Likelihood Ratio (10.168) and the Linear-by-Linear Association (4.035) also yield significant p- values of 0.017 and 0.045, respectively, further supporting this conclusion. Specifically, a higher proportion of males (87) first learned about TB through the nursing curriculum compared to females (9), with males also more likely to have gained knowledge through health workers, family/friends, or media. This suggests that gender may influence the channels through which individuals are exposed to information about TB. However, it is important to note that 37.5% of the cells have an expected count of less than 5, which can violate the assumption of the Chi- Square test and potentially affect the validity of these results. Despite this, the findings provide evidence of a significant association between gender and the source of TB information. (see table 8,9)

where did you first learn about tuberculosis						TOTAL
nursing curriculum			health worker	Family, friends, or peers	media (tv, radio, internet)	
what is your gender	Male	87	25	22	21	155
	Female	9	0	5	6	20
Total		96	25	27	27	175

TABLE.NO. 8. CROSSTAB

Value		D f	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.074[a]	3	.045
Likelihood Ratio	10.168	3	.017
Linear-by-Linear Association	4.035	1	.045
N of Valid Cases	175		

a.3 cells (37.5%) have expected count less than 5. The minimum expected count is 2.86.

TABLE.NO.9. Chi-Square Tests

Table no 8 and 9 show the results of the Chi-Square test indicate a significant relationship between having received formal education or training on tuberculosis (TB) during nursing studies and participation in TB awareness or prevention campaigns. With a Pearson Chi-Square value of 7.960 and an asymptotic significance (p-value) of 0.005, which is below the 0.05 threshold, the analysis suggests that these two factors are strongly associated. Further support comes from the Likelihood Ratio test (p-value = 0.004) and the Linear-by-Linear Association test (p-value = 0.005), both of which confirm the significance of this association. Additionally, Fisher's Exact Test provides p-values of 0.007 (two-tailed) and 0.004 (one-tailed), indicating the reliability of the results. These findings suggest that individuals who have received formal TB education during their nursing training are more likely to participate in TB awareness and prevention efforts. With no expected cell counts below 5, the validity of the Chi-Square test is upheld. Overall, this analysis emphasizes the importance of formal TB education in nursing curricula in encouraging participation in public health initiatives related to TB. (See table no 10,11)

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		Have you ever participated in any TB awareness or prevention campaigns		
		Yes	No	Total
Have you ever received formal education or training on tuberculosis during your nursing Studies	Yes	71	70	141
	No	8	26	34
Total		79	96	175

TABLE.NO. 10. CROSSTAB

	Value	D f	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.960[a]	1	.005		
Continuity Correction[b]	6.914	1	.009		
Likelihood Ratio	8.387	1	.004		
Fisher's Exact Test				.007	.004
Linear-by-Linear Association	7.915	1	.005		
N of Valid Cases	175				

a.0 cells (.0%) have expected count less than 5. The minimum expected count is 15.35.
b. computed only for a 2x2 table

TABLE.NO.11. Chi-Square Tests

Table 10 and 11 show The Chi-Square test results demonstrate a statistically significant association between receiving formal education or training on tuberculosis (TB) during nursing studies and the confidence in one's ability to educate others about TB. The Pearson Chi-Square value of 8.961, with an asymptotic significance (p-value) of 0.011, indicates a strong relationship between these two variables, as the p-value is below the standard significance threshold of 0.05. The Likelihood Ratio test (p-value = 0.018) and the Linear-by-Linear Association test (p-value = 0.003) both further support this finding, suggesting that individuals who have received formal TB training are more likely to feel confident in educating others about the disease. Among those who received formal TB education, 112 out of 141 respondents reported feeling confident in their ability to educate others, compared to just 19 out of 34 among those without formal training. While the overall results are statistically significant, one cell (16.7%) has an expected count below 5, which could slightly affect the reliability of the findings. However, the overall conclusion is clear: formal TB education during nursing studies is significantly associated with increased confidence in educating others about TB.

		Do you feel confident in your ability to educate others about TB			Total
		Yes	No	not sure	
Have you ever received formal education or training on tuberculosis during your nursing Studies	Yes	112	19	10	141
	No	19	8	7	34
Total		131	27	17	175

TABLE.NO.12. CROSSTAB

	Value	D f	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.961[a]	2	.011
Likelihood Ratio	8.013	2	.018
Linear-by-Linear Association	8.872	1	.003
N of Valid Cases	175		

a.1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.30.

TABLE.NO.13. Chi-Square Tests

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The Chi-Square test results also reveal a statistically significant association between receiving formal education or training on tuberculosis (TB) during nursing studies and willingness to undergo TB screening as part of a health check-up. The Pearson Chi-Square value of 9.784, with a p-value of 0.002, indicates a strong relationship between the two variables, supported by the Likelihood Ratio test (p-value = 0.004) and the Linear-by-Linear Association test (p-value = 0.002). These findings suggest that individuals who received formal TB education are more likely to be willing to undergo TB screening, with 128 out of 141 respondents expressing willingness compared to 24 out of 34 who did not receive such education. While one cell has an expected count less than 5 (25%), potentially affecting the robustness of the results, the overall evidence supports the conclusion that formal TB education increases individuals' willingness to participate in TB screening as part of their health check-up. (See table no 14,15)

TABLE.NO. 14. CROSSTAB

Value		D f	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.784[a]	1	.002		
Continuity Correction[b]	8.095	1	.004		
Likelihood Ratio	8.247	1	.004		
Fisher's Exact Test				.004	.004
Linear-by-Linear Association	9.728	1	.002		
N of Valid Cases	175				

1.cells (25.0%) have expected count less than 5. The minimum expected count is 4.47.

a. Computed only for a 2x2 table

TABLE.NO.15. Chi-Square Tests

Would you be willing to undergo TB screening as a part of your health check up				
		Yes	No	Total
Have you ever revived formal education or training on tuberculosis during your nursing Studies	Yes	128	13	141
	No	24	10	34
Total		152	23	175

Discussion

DEMOGRAPHIC SECTION

The current study highlight that more than half of the participant were at the age of under 25 82.3% and between the age of 25 to 30 were 17.7%.Male representative were 88.6 % and female consist of 11.4%.The majority of participants 80.6% received formal education about tuberculosis and the lesser amount 19.6% didn't receive formal education about tuberculosis which is similar to a study conducted among health care workers and tuberculosis patients in Iraq where majority (66.6%) were male and (33.4%)[13]. In contrast a study was conducted at khoums region Namibia to asses knowledge and practices of the fourth-year degree nursing students regarding tuberculosis management their result show that most of the participants 81% were female and where the rest were male 19%3. Similarly, a study was conducted in coastal district of Karnataka which show 91.7& were female and 8.3% were male which is contradict of my study[14]. This gender imbalance may reflect the demographic makeup of the nursing student population in the specific setting or region where the study was conducted. In many educational or healthcare settings, nursing programs may attract more male students in certain regions, while in others, female students may dominate. The larger proportion of male participants in this study could also impact the results, especially in terms of knowledge sources and responses related to TB education. For example, the male participants were more likely to report learning about tuberculosis through the nursing curriculum, whereas female

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participants were less likely to have this source of information. This suggests that gender- based differences in educational experiences or access to training could be influencing TB knowledge levels and the way information is disseminated within nursing programs. Addressing this gender gap in TB education may help ensure that all students, regardless of gender, receive comprehensive training and are equally prepared to address TB in their clinical practice.

KNOWLEDGE, ATTITUDE AND PRACTICE SECTION

In comparison both the current and previous studies which was conducted in two districts of Punjab, Pakistan, reveal significant similarities in the understanding of tuberculosis (TB). In both studies, formal education was identified as the primary source of TB knowledge, with around 54% of participants in both studies reporting this. Both studies highlighted persistent cough as the most recognized symptom of TB, although recognition was higher in the previous study. Transmission through the air (coughing/sneezing) was identified by the majority of respondents in both studies, and both showed strong awareness of TB's pharmacological treatment. Additionally, both studies revealed a high tendency to seek professional medical care for TB symptoms, with 85.7% in the current study and 94-97% in the previous study opting to visit a health facility. Both studies also showed a strong willingness to undergo TB screening (86.9% in the current study vs. 96% in the previous study), highlighting the importance of educational interventions and public health initiatives[15].similarly a study was conducted in Shenille town, Somali regional state, eastern Ethiopia which show that persistence cough for 2 or more weeks (72.4%) was the most commonly mentioned symptom of TB and The most frequently mentioned possible modes of transmission were through the air when a person with TB sneezes or coughs (59.3%) which show similarity with our study[16]. The current study also reveals a significant correlation between receiving formal tuberculosis (TB) education during nursing studies and various behaviors, including participation in TB awareness campaigns, confidence in educating others about TB, and willingness to undergo TB screening. Those who received formal TB education were more likely to engage in these actions, demonstrating that formal education is associated with increased involvement in TB-related activities and greater confidence in promoting TB awareness, which is similar to a study conducted among Taif university students which shows that a good knowledge and good attitude is significant correlated to with many demographics characteristics[11].similarly a study was conducted in moyen-ogooue province Gabon which show a Statistically significant associations with higher knowledge levels were found regarding the level of education ($p = 0.001$), type of healthcare facility ($p = 0.018$), and former TB training ($p = 0.001$)21.In contrast a study was conducted in in a South African metropolitan which show that, based on the statistical analysis, the factors of gender, education, type of patient, and location of the Primary Health Care (PHC) facility did not show a statistically significant relationship with patients' knowledge about tuberculosis (TB)[17].

Summary of Findings

This comprehensive study aimed to investigate the knowledge, attitudes, and practices regarding pulmonary tuberculosis among graduating nursing students in Swat, thereby contributing to the existing body of literature on tuberculosis management in the region. The results revealed a multifaceted landscape of understanding among nursing students, with varying levels of knowledge about TB symptoms, transmission, and treatment. While some students demonstrated a commendable grasp of key concepts, others exhibited knowledge gaps that could potentially impact their effectiveness in managing TB cases in clinical settings. The study also explored the attitudes of nursing students towards TB care, uncovering generally positive predispositions but also identifying pockets of misconceptions and stigma that could influence patient care and outcomes. In terms of practices, the study found that most students adhered to appropriate protocols for TB prevention and management, although specific areas were highlighted where improvements could significantly enhance patient care and safety.

Conclusion

The findings of this study underscore the critical need for targeted educational interventions designed to bolster nursing students' knowledge and refine their

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attitudes towards TB. By integrating comprehensive TB education into nursing curricula and providing practical training opportunities, educational institutions can better prepare future nurses for the complexities of TB management. This study's results have significant implications for policy and educational strategies aimed at improving TB control and management in Swat and potentially beyond. The insights gained from this research can inform the development of tailored interventions that address the specific needs and gaps identified among nursing students, ultimately contributing to enhanced patient outcomes and more effective TB management within the healthcare system.

Limitations of the Study

1.Sampling Limitation: The study's focus on nursing students in Swat may limit the generalizability of the findings to other regions or populations, suggesting the need for caution when applying these results more broadly.

2. Cross-Sectional Design: The adoption of a cross-sectional design, while appropriate for the study's objectives, provides a snapshot of knowledge, attitudes, and practices at a single point in time. This design limitation precludes the inference of causality and the tracking of changes over time, areas that could be explored in future longitudinal studies.

3.Self-Reported Data: The reliance on self-reported data may introduce bias, as participants' responses might not accurately reflect their actual knowledge, attitudes, or practices. Future studies might benefit from incorporating observational or objective measures to validate self-reported data.

Strengths of the Study

1.Specific Focus: By specifically targeting graduating nursing students, this study provides valuable insights into the preparedness of future healthcare professionals for TB management, an area critical to public health but often underexplored.

2.Practical Implications: The findings offer practical implications for nursing education and TB control programs, highlighting areas for improvement and potential interventions that could be implemented to enhance the quality of care provided by nursing professionals.

3.Contribution to Literature: This study contributes to the limited body of research on TB knowledge, attitudes, and practices among nursing students in the region, filling a significant gap in the literature and providing a foundation for future research.

Implications and Recommendations

1.Curriculum Enhancement: Nursing curricula should be comprehensively reviewed and updated to ensure thorough coverage of TB management, including both theoretical knowledge and practical training components. This would better equip nursing students to manage TB effectively in clinical settings.

2.Targeted Interventions: Educational interventions should be designed and implemented to address the specific knowledge gaps and misconceptions identified in the study. These interventions could include workshops, seminars, and clinical training sessions focused on TB management.

3.Policy Development: Policymakers should consider the study's findings when developing strategies for TB control and management, recognizing the pivotal role that nursing professionals play in the healthcare system. Policies should support the integration of comprehensive TB education into nursing training and promote practices that enhance patient care and safety.

4.Future Research: Further research is warranted to explore the impact of educational interventions on nursing students' TB knowledge, attitudes, and practices. Additionally, investigating similar issues in other healthcare professional groups could provide a more holistic understanding of TB management within the healthcare system, informing broader educational and policy initiatives.

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