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Shifting Attitudes and Reducing Stigma: Educational Program Outcomes in Pulmonary Tuberculosis Care

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Abstract
Background: Pulmonary tuberculosis is an infectious disease affecting the lungs. It is prevalent in crowded and poorly ventilated areas, posing significant public health challenges. **Objective:** Evaluate the effect of an educational program outcomes on shifting attitudes and reducing stigma for patients with pulmonary tuberculosis. **Methods:** Design: Quasi-experimental research design. Sample: Hundered-twenty patients diagnosed with pulmonary TB with age group ranged from 20-65 years from both sex. Setting: The study took place in Al-Badary Central Hospital (chest department) and Assiut Chest Hospital. Tools: A patient assessment sheet and validated questionnaires on attitude and stigma were utilized. **Results:** Statistical analysis clarified significant improvement in patients` attitude and to positive level stigma post-educational program ($p < 0.001$). **Conclusion:** The findings confirmed that educational interventions significantly enhance patients' positive attitudes and reduce tuberculosis-related stigma. **Recommendation:** It is crucial to incorporate targeted interventions addressing stigma and patient attitudes into tuberculosis management strategies.

Keywords: Attitude, Educational program, Pulmonary tuberculosis & Stigma

Introduction
Tuberculosis (TB) is a highly contagious infectious disease caused by Mycobacterium tuberculosis, primarily targeting the lungs. It spreads through airborne droplets released when an infected individual coughs or sneezes. It can present as latent, where the infection remains dormant without symptoms, or active **(Kamboj et al., 2023)**. Despite global prevention efforts, TB remains a major public health concern, with an estimated 10 million new cases reported worldwide in 2020. Egypt reported an incidence rate of 12 cases per 100,000 population in the same year, emphasizing the ongoing need for effective control strategies **(Chakaya et al., 2021)**.

Common symptoms of active TB include a persistent cough lasting three weeks or longer, often accompanied by the production of sputum or blood (hemoptysis). Additional symptoms may include chest pain, unintentional weight loss, fever, night sweats, chills, fatigue and loss of appetite, all of which can significantly impact the patient's overall health and quality of life **(Kamboj et al., 2023)**.

Tuberculosis is a condition that is often accompanied by significant social stigma, which can lead to discrimination in various social environments, including the home, workplace, and community. This stigma is a social phenomenon in which individuals are marginalized and excluded from normal social interactions due to their health condition. The presence of stigma can result in delayed diagnosis and treatment as individuals may conceal their illness from family members, coworkers, or friends **(Mukherjee et al., 2020)**.

The presence of TB-related stigma significantly impairs the effectiveness of disease diagnosis and treatment. Socially negative perceptions, reluctance to seek healthcare, and non-adherence to prescribed treatment are critical obstacles to TB control, particularly in resource-limited settings **(Bates et al., 2019)**.

Stigma serves as a key social determinant of health, shaped by community and institutional norms surrounding undesirable health conditions. Fear of societal and economic repercussions following a TB diagnosis often deters individuals from seeking timely medical care and worsening health inequities **(Smith et al., 2020)**.

For TB patients, stigma leads to discrimination and social isolation, severely impacting both treatment adherence and overall management of the disease. Stigma can manifest in three forms: enacted stigma, which involves overt exclusion or discrimination; felt stigma, which reflects internalized feelings of shame, fear, and guilt; and anticipated stigma, wherein individuals expect negative reactions from others because of their health condition **(Zhang et al., 2021)**.

The ongoing stigma associated with TB continues to block access to healthcare services, impacting patients' physical, social, and mental health. Many individuals choose to hide their diagnosis to avoid stigmatization, resulting in delayed diagnosis, poor adherence to treatment, and prolonged recovery **(Lee et al., 2021)**.

Nursing plays a critical role in shifting attitudes and reducing stigma surrounding pulmonary TB through targeted educational programs. Nurses are often the primary point of contact for individuals with TB, and their role in patient education, awareness, and advocacy is vital in improving outcomes. By providing accurate information about TB transmission, treatment, and prevention, nurses can challenge misconceptions and reduce the stigma associated with the disease. Educational programs designed for both patients and healthcare providers can enhance understanding of the importance of adherence to TB treatment regimens and promote positive attitudes towards those affected by the disease **(Hahn & Rajan, 2017)**.

Nurses can offer emotional support to patients, helping them cope with the psychological and social challenges posed by TB stigma. These interventions not only empower patients to engage in their care but also foster a more supportive and inclusive environment that encourages early diagnosis and reduces the delay in treatment. As such, nursing interventions focused on shifting attitudes and reducing stigma contribute to the broader goal of improving public health outcomes and ensuring equitable access to care for all individuals with pulmonary TB **(Fitzpatrick & Johnson, 2018).**

Significance of the Study

While TB predominantly affects low- and middle-income countries, TB continues to impact populations worldwide. In Egypt, the Al-Badary Central Hospital and Chest Hospital in Assiut City report approximately 120 new TB cases annually, highlighting the pressing need for targeted, effective interventions. A key challenge in TB management is the lack of awareness among patients regarding prevention, diagnosis, and treatment. Compounding this issue is the stigma surrounding TB, which contributes to social isolation, emotional distress, and reluctance to seek care, further complicating disease control efforts. This study aimed to implement educational program designed specifically for TB patients to improve attitudes towards TB and reducing stigma.

Aim of the study

Evaluate the effect of an educational program outcomes on shifting attitude and reducing stigma for patients with pulmonary tuberculosis.

Specific objectives:

- Assess patients' attitude and stigma about pulmonary tuberculosis.
- Design educational program for patients with pulmonary tuberculosis
- Evaluate the impact of implementing the educational program on patients' attitude and stigma

Research hypothesis

The study hypothesized that post- educational program mean scores for attitude and stigma would significantly higher than pre- educational program.

Methods

Research Design

A quasi-experimental research design (pretest/posttest) was adopted to evaluate the effectiveness of a nursing educational program on the knowledge, practices, attitude and stigma of patients with TB.

Study setting:

At Al-Badary Central Hospital (chest department) and Assiut Chest Hospital.

Sample and sample size:

One hundred twenty patients diagnosed with pulmonary TB with age group ranged from 20-65 years from both sex were included. They selected according to **Thompson, (2012)** using the following equation:

N=Total population size of 120 from different level during year 2021-2022

Z = Confidence levels is 0.95 and is equal to 1.96

D= The error ratio is = 0.05

P= The property availability ratio and neutral = 0.50

Data Collection Tools

Tool I. Assessment sheet for patients with pulmonary TB: it included the following:

- Demographic variables including age, sex, education level, marital status, residence, and occupation).
- Health history and symptoms and treatment of TB.

Tool II. Patients' attitude questionnaire toward tuberculosis:

It was designed to assess the attitudes of patients regarding various aspects of TB. It was adapted from the work of **Puspitasari et al., (2022)** to better understand patient perceptions and attitudes towards TB, a critical factor in the management and prevention of the disease. The questionnaire is structured to evaluate patients' recognition of TB, their knowledge and attitude toward TB examinations, their perspectives on treatment, and their awareness of preventive education regarding TB. These four main topics are broken down into 13 specific questions, allowing for a comprehensive assessment of patients' attitudes toward the disease and its management.

The scoring system of the questionnaire used a 4-point Likert scale, ranging from 1 to 4, with 1 representing "strongly disagree," 2 for "disagree," 3 for "agree," and 4 for "strongly agree." This allowed for a quantitative measurement of attitudes, where higher scores indicate more positive or knowledgeable attitudes toward TB-related aspects such as recognition, diagnosis, treatment, and prevention. The total score for each patient ranged from 13 to 52, with a higher score reflecting more favorable attitudes and a lower score indicating a need for further educational intervention.

Tool III. Tuberculosis related stigma scale :-

It was a tool used to assess the level of stigma experienced by individuals diagnosed with TB. This scale was developed by **Datiko et al., (2020)** and was specifically designed to capture the psychological and social impacts of TB-related stigma on patients. The tool consisted of 12 items, each focusing on a different aspect of stigma related to TB. The questions covered a range of emotional and social responses experienced by individuals with TB, such as the feelings of hurt caused by others' reactions to the diagnosis, the loss of friendships when disclosing the illness, and the isolation felt by those with TB. These items designed to reflect the various ways in which stigma manifests in the lives of individuals with TB and how it can negatively affect their mental and social well-being.

The scoring system for this scale utilized a 4-point Likert scale, where each item rated based on the degree of agreement with the statement. The responses are coded from 0 to 4, where 1 representing "strongly disagree," 2 corresponding to "disagree," 3indicating "agree," and 4 reflecting "strongly agree." The total possible score on the scale ranged from 0 to 4, with higher scores indicating a higher level of perceived stigma. A higher score suggesting that the individual experienced stronger feelings of social rejection, isolation, and emotional distress related to their TB diagnosis.

Procedure: The development of study tools and educational materials was guided by an extensive review of the literature.

Validity and reliability

A study content reviewed by 3 expert (2 medical-surgical nursing staff and one chest specialist). The reliability of the instruments was determined using Cronbach's Alpha. Both tools were reliable suitable or fit to be relied on or dependable and giving the same result on successive trials above (0.07). Identified by **Puspitasari, et al., (2022)** for tool II Patients' attitude questionnaire toward tuberculosis and by **Datiko, et al., (2020)** for tool III tuberculosis-related stigma scale

Ethical considerations

Ethical approval was secured from the Faculty of Nursing Research Ethical Committee, Assiut University, under code (1120230554, Approval Date: 29/11/2023) as well as the necessary hospital administrations. Patients were provided with clear explanations about the study's goals, and oral consent was obtained and the freedom to withdraw.

Pilot study:

To ensure the clarity and effectiveness of the tools, a pilot study was conducted with a subgroup of 10% of the sample (who were excluded from the final study). This pilot helped identify any issues with the tools' applicability.

Educational Program: The nursing educational program consisted of two sessions, each lasting 30 to 40 minutes, depending on patient comfort.

Theoretical Session: This session focused on enhancing patients' understanding of TB-related attitudes and stigma. It included information on the recognition of TB, stressing the importance of promptly informing family members or healthcare providers if diagnosed with TB. The stigma-related content covered topics such as the emotional impacts of TB, including feelings of shame or guilt, fears of social exclusion, and concerns about being wrongly associated with other conditions like human immunodeficiency virus. It also highlighted the social consequences, such as losing friends or isolating oneself to avoid spreading the disease.

Practical Session: Focused on Healthy life style: preventive examination, preventive education and route of infection

Teaching Strategies:

A variety of interactive teaching methods were employed, including lectures, group discussions, visual aids, and printed materials, to ensure that the information was accessible and engaging for patients. Practical demonstrations and individual feedback were incorporated to reinforce key concepts and address any misconceptions, ensuring that the program was comprehensive and aligned with evidence-based practices.

The program was designed to cater to the specific needs of TB patients, aiming to reduce stigma, improve attitudes toward treatment, and enhance disease management.

Follow-up and evaluation

Post-intervention evaluation were performed at the outpatient units of both the Chest Department at Al-Badary Central Hospital and the Chest Hospital in Assiut City. These scheduled three and six months following the intervention to evaluate potential shifts in patients' perceptions and levels of stigma associated with TB.

Statistical design:

The data underwent normality assessment using the Anderson-Darling test to ensure variance homogeneity before proceeding with statistical analysis. Categorical data were summarized as frequencies and percentages (N, %), while continuous data were presented as mean and standard deviation (mean, SD). Comparisons between categorical variables were conducted using the Chi-square test and Fisher's exact test, whereas continuous variables were analyzed using the t-test. Statistical significance was determined at a two-tailed p-value of less than 0.05. All statistical analyses were carried out using IBM SPSS software, version 23.0.

Results:

Table (1): Frequency & percentage distribution the studied patients medical data and health history (n= 120)

Variables	N	%
Chronic disease		
Hypertension	53	44.2
Diabetes	28	23.3
Atherosclerosis	4	3.3
Renal failure	1	.8
Any other disease	25	20.8
have you had more than one symptoms /episode In the last 12 months	112	93.3
In the last 12 months, has this condition prevented you from going to work /school?	84	70.0
Symptoms have you experienced in the last 12 months		
Shortness of breathing	116	96.7
Weight loss	101	84.2
Wheezing	114	95.0
Night sweats	104	86.7
Cough	117	97.5
Loss of appetite	100	83.3
Symptoms during		
Ordinary activity	78	65.0
Unaccustomed activity	28	23.3
Year around	5	4.2
Seasonal	9	7.5
Frequency of exacerbation		
1-2timesper month	19	15.8
3-4 times per month	53	44.2
more than 4 times	48	40.0
Number of emergency		
Non	41	34.2
1-2 time	56	46.7
3-4 times	13	10.8
More than 4 time	10	8.3
In the last years , have you ever been admitted to an intensive care unit or been intubated?	19	15.8
Medication (s)/treatment (s) in the last years		
Tuberculosis drug	9	7.5
Bronchodilator, Inhaler, Mucophine syrup	111	92.5

Table (2): Frequency & percentage of the studied patient's attitude level pre, post 3& 6 months of program implementation

Variables	Patients` responses	Pre		Post 3 months		Post 6 months		Sig X2
		N	%	N	%	N	%	
Recognition of TB If I got TB, I should immediately inform my family and/or my lecturers	Strongly disagree	6	5.0	3	2.5	3	2.5	61.674 p=0.00
	Disagree	5	4.2	3	2.5	2	1.7	
	Agree	93	77.5	65	54.2	40	33.3	
	Strongly agree	16	13.3	49	40.8	75	62.5	
I think TB can be transmitted without even realizing it	Strongly disagree	17	14.2	4	3.3	3	2.5	160.260 P=0.00
	Disagree	79	65.8	14	11.7	13	10.8	
	Agree	19	15.8	89	74.2	75	62.5	
	Strongly agree	5	4.2	13	10.8	29	24.2	
I may experience obstacles in my family and academic life if I were infected with TB	Strongly disagree	12	10.0	22	18.3	36	30.0	22.374 P=0.001
	Disagree	82	68.3	81	67.5	63	52.5	
	Agree	23	19.2	13	10.8	13	10.8	
	Strongly agree	3	2.5	4	3.3	8	6.7	
I think that TB is a very serious disease	Strongly disagree	8	6.7	4	3.3	4	3.3	59.214 P=0.00
	Disagree	43	35.8	9	7.5	8	6.7	
	Agree	58	48.3	91	75.8	78	65.0	
	Strongly agree	11	9.2	16	13.3	30	25.0	
Preventative examinations I think, regular medical examinations every year can prevent TB	Strongly disagree	15	12.5	0	0.0	0	0.0	144.417 P=0.00
	Disagree	58	48.3	8	6.7	8	6.7	
	Agree	42	35.0	95	79.2	75	62.5	
	Strongly agree	5	4.2	17	14.2	37	30.8	
I think a person should be examined for TB if there is a TB patient among his family or friends	Strongly disagree	17	14.2	0	0.0	0	0.0	146.759 P=0.00
	Disagree	60	50.0	11	9.2	9	7.5	
	Agree	38	31.7	93	77.5	74	61.7	
	Strongly agree	5	4.2	16	13.3	37	30.8	
Treatment If I were diagnosed with TB I would take anti-TB drugs regularly for at least 6 months, as directed by the doctor	Strongly disagree	2	1.7	1	0.8	1	0.8	112.978 P=0.00
	Disagree	19	15.8	1	0.8	1	0.8	
	Agree	88	73.3	59	49.6	32	26.7	
	Strongly agree	11	9.2	58	48.3	86	71.7	
If a friend discontinued taking anti-TB drugs, I would persuade him to continue regular TB treatment	Strongly disagree	4	3.3	1	0.8	2	1.7	88.214 P=0.00
	Disagree	12	10.0	1	0.8	2	1.7	
	Agree	93	77.5	56	46.7	39	32.8	
	Strongly agree	11	9.2	62	51.7	76	63.9	
I would encourage those with TB around me to obtain treatment	Strongly disagree	6	5.1	1	0.8	1	0.8	68.094 P=0.00
	Disagree	25	21.2	3	2.5	5	4.2	
	Agree	79	66.9	78	65.0	61	50.8	
	Strongly agree	8	6.8	38	31.7	53	44.2	
I think TB can be cured if it is detected and treated early	Strongly disagree	7	5.8	1	0.8	1	0.8	115.821 P=0.00
	Disagree	49	40.8	4	3.3	6	5.1	
	Agree	58	48.3	66	55.0	55	45.8	
	Strongly agree	6	5.0	49	40.8	58	48.3	
Preventative education 12.I am interested in finding out more about TB disease	Strongly disagree	84	70.0	71	59.7	70	58.3	7.577 P=.271
	Disagree	21	17.5	24	20.2	21	17.5	
	Agree	12	10.0	18	15.1	25	20.8	
	Strongly agree	3	2.5	6	5.1	4	3.3	
I think education about TB is very much needed	Strongly disagree	48	40.0	8	6.7	7	5.8	134.479 P: 0.00
	Disagree	35	29.2	5	4.2	5	4.2	
	Agree	32	26.7	75	62.5	73	60.8	
	Strongly agree	5	4.2	32	26.7	35	29.2	

Table (3): Frequency & percentage distribution of the studied patient's stigma level pre, post 3& 6 months of program implementation

Variables	Patients` responses	Pre		Post 3 months		Post 6 months		Sig X2
		N	%	N	%	N	%	
People who have TB feel hurt of how others react to knowing they have TB	Strongly disagree	3	2.5	4	3.3	6	5.1	10.823 p=0.09 4 ns
	Disagree	18	15.0	21	17.5	21	17.5	
	Agree	90	75.0	82	68.3	70	58.3	
	Strongly agree	9	7.5	13	10.8	23	19.2	
-People who have TB lose friends when they share with them they have TB	Strongly disagree	12	10.0	26	21.7	38	31.7	26.148 P=0.00
	Disagree	77	64.2	79	65.8	63	52.5	
	Agree	28	23.3	13	10.8	13	10.8	
	Strongly agree	3	2.5	2	1.7	6	5.0	
People who have TB feel alone	Strongly disagree	4	3.3	7	5.8	10	8.3	7.547 P=0.27 3ns
	Disagree	41	34.2	48	40.0	51	42.5	
	Agree	68	56.7	58	48.3	49	40.8	
	Strongly agree	7	5.8	7	5.8	10	8.3	
People who have TB keep their distance from others to avoid spreading TB germs.	Strongly disagree	4	3.3	0	0.00	0	0.00	177.487 P=0.00
	Disagree	69	57.5	3	2.5	4	3.3	
	Agree	36	30.0	103	85.8	75	62.5	
	Strongly agree	11	9.2	14	11.7	41	34.2	
People who have TB are afraid to tell those outside their family that they have TB	Strongly disagree	4	3.3	3	2.5	6	5.1	8.117 P=0.23 0ns
	Disagree	36	30.0	26	21.7	23	19.2	
	Agree	64	53.3	72	60.0	64	53.3	
	Strongly agree	16	13.3	19	15.8	27	22.5	
People who have TB are afraid of going to TB clinics because other people may see them there	Strongly disagree	9	7.5	10	8.3	15	12.5	6.807 P=0.33 9ns
	Disagree	53	44.2	61	50.8	57	47.5	
	Agree	52	43.3	42	35.0	37	30.8	
	Strongly agree	6	5.1	7	5.8	11	9.2	
People who have TB are afraid to tell others that they have TB because others may think that they also have AIDS.	Strongly disagree	21	17.5	49	40.8	64	53.3	61.563 P=0.00
	Disagree	65	54.2	64	53.3	52	43.3	
	Agree	29	24.2	5	4.2	2	1.7	
	Strongly agree	5	4.2	2	1.7	5	4.2	
People who have TB feel guilty because their family has the burden of caring for them	Strongly disagree	6	5.1	4	3.3	8	6.7	16.434 P=0.01 2
	Disagree	41	34.2	34	28.3	30	25.0	
	Agree	69	57.5	76	63.3	64	53.3	
	Strongly agree	4	3.3	6	5.1	18	15.0	
People who have TB will choose carefully who they tell about having TB.	Strongly disagree	5	4.2	3	2.5	6	5.1	60.616 P=0.00
	Disagree	20	16.7	4	3.3	4	3.3	
	Agree	88	73.3	97	80.8	65	54.2	
	Strongly agree	7	5.8	16	13.3	45	37.5	
People who have TB feel guilty for getting TB because of their smoking, drinking, or other careless behavior.	Strongly disagree	8	6.7	8	6.7	8	6.7	37.81 P=0.00
	Disagree	29	24.2	18	15.0	16	13.3	
	Agree	80	66.7	85	70.8	65	54.2	
	Strongly agree	3	2.5	9	7.5	31	25.8	
People who have TB are worried about having AIDS.	Strongly disagree	25	20.8	59	49.2	74	61.7	74.646 P=.0.00
	Disagree	62	51.7	59	49.2	42	35.0	
	Agree	26	21.7	2	1.7	3	2.5	
	Strongly agree	7	5.8	0	0.0	1	0.8	
People who have TB are afraid to tell their family that they have TB.	Strongly disagree	23	19.2	58	48.3	72	60.0	47.811 P: 0.00
	Disagree	69	57.5	52	43.3	36	30.0	
	Agree	24	20.0	8	6.7	9	7.5	
	Strongly agree	4	3.3	2	1.7	3	2.5	

Table (4): Mean distribution of the studied patients attitude pre, post 3& 6 months of program implementation

Variables		Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum	F
				Lower Bound	Upper Bound			Sig.
Recognize tuberculosis	Pre	9.8333	1.58953	9.5460	10.1207	5.00	15.00	F:46.28 P: 0.001
	post 3month	11.2417	1.50068	10.9704	11.5129	8.00	16.00	
	post 6month	11.7000	1.60671	11.4096	11.9904	8.00	16.00	
	Total	10.9250	1.75281	10.7433	11.1067	5.00	16.00	
Preventive exam	Pre	4.5667	1.29468	4.3326	4.8007	2.00	8.00	F:117.29 P: 0.001
	post 3month	6.1167	.76897	5.9777	6.2557	4.00	8.00	
	post 6month	6.4750	.94346	6.3045	6.6455	4.00	8.00	
	Total	5.7194	1.31698	5.5829	5.8559	2.00	8.00	
Treatment	Pre	10.9167	2.38899	10.4848	11.3485	.00	16.00	F:85.90 P: 0.001
	post 3month	13.6134	1.68799	13.3070	13.9199	6.00	16.00	
	post 6month	14.0924	1.91777	13.7443	14.4406	6.00	16.00	
	Total	12.8687	2.45453	12.6136	13.1238	.00	16.00	
Preventive education	Pre	3.4000	1.49171	3.1304	3.6696	2.00	8.00	F:38.11 P: 0.001
	post 3month	4.7395	1.39892	4.4855	4.9934	2.00	8.00	
	post 6month	4.8250	1.35760	4.5796	5.0704	2.00	8.00	
	Total	4.3203	1.55725	4.1587	4.4820	2.00	8.00	
Total attitude	Pre	28.3500	6.10090	27.2472	29.4528	.00	45.00	F:115.83 P: 0.001
	post 3month	35.7627	3.79986	35.0699	36.4555	27.00	46.00	
	post 6month	37.1176	4.13783	36.3665	37.8688	26.00	48.00	
	Total	33.7227	6.15017	33.0825	34.3628	.00	48.00	

Table (5): Mean distribution of the studied patient's stigma pre, post 3& 6 months of program implementation

	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum	F
			Lower Bound	Upper Bound			Sig.
Pre	17.7833	3.27759	17.1909	18.3758	6.00	33.00	F: 3.241 P: .040
post 3month	18.8333	3.02742	18.2861	19.3806	11.00	29.00	
post 6month	18.2333	3.30453	17.6360	18.8307	10.00	29.00	
Total	18.2833	3.22555	17.9490	18.6177	6.00	33.00	

Table (6): Correlation between studied patient's attitude and stigma pre ,post 3 months and 6 months of program implementation

Correlation		Stigma	Attitude
Stigma	Pearson Correlation		.014
	Significant (2-tailed)		.876
Attitude	Pearson Correlation	.014	
	Significant (2-tailed)	.876	
Stigma	Pearson Correlation		-.117-
	Significant (2-tailed)		.204
Attitude	Pearson Correlation	-.044-	
	Significant (2-tailed)	.635	
Stigma	Pearson Correlation		.019
	Significant (2-tailed)		.838
Attitude	Pearson Correlation	.019	
	Significant (2-tailed)	.840	

The study includes 120 participants. Older adults (50–65 years) were slightly more represented (38.3%). Males made up the majority (60%), while females comprised 40% of the sample. Marital status showed that most participants were married (70.8%), followed by singles (26.7%), and a small percentage were divorced (2.5%). Regarding educational background, a considerable portion had limited formal education, with 30% being illiterate and 8.3% having completed primary school. Only 12.5% had attained university-

level education or higher. Employment varied across the sample, with manual laborers (27.5%) and housewives (24.2%) being the most common, both groups often having restricted access to health information and preventive care. Office employees accounted for 17.5%, while 22.5% were unemployed, and machinery workers represented a smaller segment (8.3%). The majority of participants lived in rural areas (62.5%), while 37.5% resided in urban settings.

Table (1): The medical data shows that hypertension (44.2%) and diabetes (23.3%) were the most common chronic diseases among participants. Most often (93.3%) experienced multiple health episodes in the past year, with 70% unable to attend work or school due to their condition. Common symptoms included cough (97.5%), shortness of breath (96.7%), and wheezing (95%). Frequent exacerbations were reported, with 44.2% were experiencing 3-4 episodes monthly and 40% were having more than four. Emergency care was required by 46.7% (1-2 visits), and 15.8% had intensive care unit admissions. Most of participants (92.5%) used bronchodilators, inhalers, or mucophine syrup, emphasizing the need for effective disease management strategies.

Table (2): Demonstrates significant improvements in participants' attitudes level toward TB after the intervention. Recognition of TB improved, with the percentage of participants strongly were agreeing to disclose a TB diagnosis rising from 13.3% pre-intervention to 62.5% at six months. Awareness of TB transmission also increased, with agreement rising from 20% to 86.7%. Preventive attitudes strengthened, as those were believing in regular medical check-ups for TB prevention increased from 39.2% to 93.3%. Commitment to TB treatment adherence improved, with 98.4% were expressing willingness to follow prescribed treatment compared to 82.5% pre-intervention. The need for TB education was more acknowledged, with agreement rising from 30.9% to 90%. Overall, the findings reflected enhanced awareness, reduced stigma, and improved preventive and treatment attitudes after the intervention.

Table (3): Shows significant changes in the stigma level related to TB among participants across the study period. For example, participants' perception of being hurt by others' reactions to TB decreased, with those strongly were agreeing rising from 7.5% pre-intervention to 19.2% at six months. However, no significant change was found in responses to certain stigma items, such as feeling alone or afraid to tell others about TB. Notably, the stigma surrounding TB transmission and its association with AIDS showed marked improvement. The percentage of participants who feared that TB could be linked to AIDS dropped from 24.2% pre-intervention to 1.7% by the end of the study. Similarly, concerns about being judged for smoking or other behaviors leading to TB decreased significantly. Participants also reported less fear of sharing their TB diagnosis with family, with those expressing this fear were dropping from 19.2% to 7.5%.

Other stigma-related factors, such as fear of attending TB clinics or losing friends, also demonstrated significant reductions, indicating improved attitudes toward TB over time. Overall, these findings suggested a positive shift in participants' perceptions and reduction of stigma associated with TB throughout the intervention period.

Table (4): Shows significant improvement in participants' attitudes over the course of the study. The mean scores for recognizing tuberculosis, preventive exams, treatment, and preventive education increased progressively from pre-intervention to post-3 months and post-6 months, with all differences being statistically significant ($p<0.001$). Specifically, participants' attitudes toward recognizing TB and preventive exams improved from an initial mean of 9.83 and 4.57, respectively, to 11.70 and 6.48 at 6 months. Similarly, attitudes towards treatment and preventive education also showed significant increases, with scores rising from 10.92 and 3.40 at baseline to 14.09 and 4.83 by 6 months. Overall, the total attitude score increased from 28.35 pre-intervention to 37.12 at the 6-month mark, reflecting a positive shift in participants' knowledge and attitudes regarding tuberculosis.

Table (5): Presents the mean distribution of patient stigma among participants over the course of the study. The mean stigma score at baseline (pre-intervention) was 17.78, which slightly increased to 18.83 at the 3-month mark and then decreased slightly to 18.23 at 6 months. The changes observed were statistically significant ($p=0.040$), indicating that participants' stigma scores fluctuated over time. Despite the slight reduction in stigma between the 3-month and 6-month assessments, the overall mean score remained relatively stable, with a final total mean of 18.28. This suggests a slight increase in stigma perception during the study period, with some variations across the different time points.

Table (6): Presents the correlation between stigma and attitude at pre-intervention, 3 months post-intervention, and 6 months post-intervention. The Pearson correlation coefficients at all-time points (pre, post 3 months, and post 6 months) indicated very weak correlations between stigma and attitude. At pre-intervention, the correlation was 0.014 ($p=0.876$), at 3 months post-intervention, it was -0.117 ($p=0.204$), and at 6 months post-intervention, it was 0.019 ($p=0.838$). These results demonstrated that there is no significant relationship between stigma

and attitude at any of the time points, as the p-values were all greater than 0.05. Thus, the data suggested that changes in stigma were not strongly associated with changes in patient attitudes over the course of the study.

Discussion

This study provides valuable insights into the attitudes and stigma surrounding TB among participants, with particular emphasis on the effect of educational program. The findings offer a comparison with existing literature, highlighting significant similarities and differences in terms of demographic characteristics, medical data and the impact of the educational program on participants' attitudes and stigma.

The results indicated that participants predominantly belonged to the 50-65 age group, with a higher representation of males and married individuals. Additionally, the majority had a basic education level, reflecting a demographic profile that contrasts with previous studies. Study of **Almuhanna et al., (2017)** found that TB prevalence was higher among younger females, particularly in the 18-28 and 40-50 age groups. Furthermore, their study indicated a higher level of education among participants, whereas the present study found a greater proportion with basic education. This discrepancy could be attributed to regional and contextual differences in TB epidemiology and suggests that interventions must be tailored to specific demographic groups to maximize effectiveness.

The researcher believes that these findings provide valuable information regarding demographic characteristics linked to TB prevalence in the local community, where older age groups may be more vulnerable to the disease due to environmental or occupational factors. Therefore, educational interventions targeting these age groups are essential.

The majority of participants in this study resided in rural areas, which aligns with research by **Chakaya et al., (2021)**, who noted significant differences in TB knowledge and awareness between urban and rural populations. In rural settings, there is often a wider gap in health knowledge, making it crucial to focus educational efforts in these underserved areas. Moreover, the study found that many participants worked in high-risk occupations, such as dusty environments, which is consistent with study conducted by **Kootbodien et al., (2019)** who stated that environmental exposure to dust and biomass smoke significantly contributes to the prevalence of pulmonary TB. Addressing these occupational and environmental risks through preventive measures is essential in reducing TB incidence in such populations.

The analysis of participants' medical data and health history revealed significant findings concerning chronic diseases and symptom patterns. Hypertension emerged as the most commonly reported chronic disease, followed by diabetes, with other conditions like atherosclerosis and renal failure were being less frequent. This distribution underscores the prevalence of comorbid conditions that may influence overall health status and susceptibility to respiratory issues. A substantial majority of participants report were experiencing multiple symptoms or episodes in the past year, with a significant portion indicating that these health issues have restricted their ability to attend work or school, reflecting a notable impact on quality of life. Respiratory symptoms are highly prevalent, including shortness of breath, cough, wheezing, and night sweats. The high frequency of these symptoms suggests a considerable burden of respiratory conditions within this population.

A study by **Sotgiu et al., (2016)** found that comorbidities like diabetes and hypertension significantly increase the risk of worse tuberculosis outcomes. Another study by **Lönnroth et al., (2015)** suggested that the presence of these chronic conditions can influence the progression of respiratory diseases and complicate the management of pulmonary tuberculosis.

In addition, the high prevalence of respiratory symptoms (shortness of breath, cough, wheezing, and night sweats) aligns with findings from previous research on tuberculosis, which commonly presented with these symptoms. A study by **Zumla et al., (2015)** indicated that night sweats and cough are prominent clinical features in tuberculosis patients, especially in the early stages.

The educational program in this study led to a significant improvement in participants' attitudes toward TB, with continued gains observed at 3 and 6 months post-intervention. This improvement reflects the effectiveness of the nursing educational program in bridging gaps in knowledge and attitudes. However, the findings contrast with those of **Datiko et al., (2020)**, who reported that many individuals expressed fear, sadness, or hopelessness when considering a TB diagnosis. The current study, however, observed more positive shifts in attitudes, with participants indicating that they would inform their family members or lecturers if diagnosed with TB and recognize its seriousness. These findings support the importance of health education in reshaping attitudes toward TB, as seen in similar studies by **Onyeonoro et al., (2014) & Agho et al., (2014)**, which reported improved healthcare-seeking behavior and increased awareness of the importance of early diagnosis and treatment.

Despite these improvements, the study also highlighted that a negative attitude toward TB persists in some communities. This finding is in line with **Akalu et al., (2020)**, who noted that some TB contacts displayed a positive attitude toward prevention, but stigma and fear continued to influence behaviors. These attitudes can delay diagnosis and treatment, which emphasizes the importance of ongoing stigma reduction and attitude evaluation, especially in high-risk groups. Similarly, **Duko et al., (2020)** highlighted the prevalence of stigma among TB contacts, showing that stigma remains a significant barrier to care.

The study also examined the level of stigma among participants, which was moderate, with some participants feeling compassion for TB patients but also distancing themselves from them. This is consistent with previous studies, such as those by **Smith; Zhu, (2016)** & **Junaid et al., (2021)**, which found that while participants expressed compassion, they often preferred to avoid TB patients. The moderate level of stigma observed in this study is concerning, as stigma can lead to social isolation and discourage individuals from seeking care or disclosing their condition. Despite efforts to reduce stigma, it remains a barrier to early diagnosis and treatment. A multi-pronged approach involving health education, community engagement, and anti-stigma campaigns is necessary to address this issue comprehensively.

The findings of this study align with previous research, such as that by **Naseer et al., (2013)**, which indicated that perceived stigma is often linked to the fear of discrimination and negative attitudes toward TB patients. The study used a stigma scale to assess participants' perceptions, and while some reduction in stigma was observed, it was still prevalent. This suggests that more comprehensive interventions are needed to further reduce stigma and improve attitudes toward TB patients.

Limitations

- Small sample size and regional focus.

Conclusion:

This study provides valuable insights into the impact of educational interventions on TB-related attitudes and stigma. The significant improvements in participants' attitudes and the moderate reduction in stigma underscore the effectiveness of nursing education program in changing public perceptions of TB.

Recommendations:

The persistence of stigma and negative attitudes in some communities highlights the need for ongoing, multi-level interventions to reduce stigma and promote early diagnosis and treatment. Future research should focus on long-term interventions, explore the sustainability of these changes, and include larger, more diverse samples to enhance the generalizability of the findings. The researcher believes that the results of this study can inform the development of tailored interventions aimed at reducing TB-related stigma and improving health behaviors in high-risk populations.

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