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THE INFLUENCE OF HEALTH PROMOTION ON INCREASING HEALTH LITERACY AND FAMILY SOCIAL SUPPORT FOR MENTAL HEALTH OF COMORBID TB PATIENTS

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Abstract
Tuberculosis accompanied by comorbidities in patients also has an impact on psychological conditions. Module-based health promotion is provided so that the patient's family plays a role in supporting the patient's mental health.
The purpose of this study was to analyze the effect of module-based health promotion on improving family knowledge and attitudes regarding mental health of comorbid TB patients. This study was a quasi-experimental study using a pre-test and post-test quasi-experimental design, comparing the control group and the intervention group.
that based on the Mann Whitney test, there was an increase in knowledge and attitudes in terms of health literacy and social support with a p value = 0.000 < 0.05, which means there was a difference in knowledge scores between the pre-test and post-test after being given intervention in both the intervention group and the control group. However, there was a difference in knowledge and attitude scores in the intervention group and the control group, which showed a significant difference between the two groups.
Keywords: Health Literacy, Social Support, Family Support, Mental Health, Comorbid TB

1. INTRODUCTION

Comorbidities of tuberculosis (TB) and mental health problems are two significant issues, as they negatively affect treatment outcomes, quality of life especially related to TB patients' health, and increase the risk of disability. Mental disorders are common in patients with tuberculosis (TB), and factors such as low education, gender, and unemployment are associated with depression and anxiety disorders (Thungana et al., 2022)
Several studies have highlighted the high prevalence of mental disorders, such as anxiety and depression, in individuals with TB (JACOBS et al., 1953) . For example, a systematic review and meta-analysis reported a prevalence of 65.2% for comorbid TB and mental disorders, with anxiety and depression being the most common. Comorbid TB and mental disorders are associated with poor treatment outcomes, disability, and challenges in health-seeking behaviors and alcohol use. Factors such as poverty, homelessness, and substance use disorders are shared risk factors for TB and mental disorders. Integrating mental health services into the management of TB patients is critical to improving treatment outcomes and addressing the challenges faced by these individuals. Therefore, addressing comorbidities and risk factors for TB, including mental health conditions, is an essential component of TB care (World Health Organization, 2021) .
Based on the results of the study, it is important to note that individuals with TB, especially those with comorbidities, are a double burden. Unfortunately, although the psychological aspect is a new problem for TB sufferers, mental health services for TB patients have not been optimal to date. This also shows that the condition of TB comorbid sufferers is more or less the same. This condition makes patients really need *support* adequate *system to be able to deal with the disease. According to Friedman (2010) one of the support The system* that can be empowered is the family, because the family is an inseparable part of the individual. The family is a part of humans who are always in contact with individuals every day. The family is an important part when someone experiences various problems, one of which is a health disorder that can be a disease. According to WHO, TB patients with comorbidities are a condition that is not easy to overcome. For this reason, cooperation is needed from the patient himself and the people around the patient.
Humans as social beings certainly cannot live alone without the help of others. Physical needs (clothing, food, shelter), social needs (socialization, recognition and psychological needs including curiosity, security, feelings of religiosity), cannot be met without the help of others. Especially if the person is facing problems, both minor and

serious. At that time a person will seek social support from the people around him, so that he feels appreciated, cared for and loved. Social support as one of the functions of social ties that describes the general level and quality of interpersonal relationships that will protect individuals from the consequences of stress (Yusnitasari et al., 2016) , (Lafuse et al., 2022) . The social support received can make individuals feel calm, cared for, and feel confident and competent. The availability of social support will make individuals feel loved, appreciated and part of a group. Family are the closest people who have the potential to be a source of support and always be willing to provide assistance and support when individuals need it. Friedmen, (2010) stated that family social support functions effectively. full and can improve adaptation in family health (Septiani, 2019) , (Wahyuni. T et al, 2021) . Having support from the family can make TB sufferers feel accepted in their environment even though they are suffering from an infectious disease (Barik et al., 2020) ; (Suistyawati, 2017) . Social support is important for people with chronic diseases such as Tuberculosis because social support can affect individual behavior, such as reducing feelings of anxiety, helplessness and despair, which can ultimately improve health status. There is a feeling of excessive worry about the disease, which will actually hinder the patient's treatment process itself (Fatarona, 2018) .

Previous studies have shown that social support affects the quality of life of TB patients. Patients with adequate social support from family, friends and community tend to have a better quality of life. (Septiani, 2019) . TB patients with comorbid diseases need more social support, because support from these people can indirectly reduce the psychological burden related to the disease they suffer from which will ultimately increase the body's resistance so that physical conditions do not decline further (Tetrapoik et al., 2020) . Social support is important for people with chronic diseases because social support can affect individual behavior, such as reducing feelings of anxiety, helplessness and despair, which can ultimately improve health status (Tetrapoik et al., 2020) , (Oliviera et al., 2017) . Increasing health status means improving the quality of life of sufferers. Family and community support play a major role in increasing treatment compliance, with supervision and encouragement for sufferers (As a Requirement to Obtain a Degree et al., 2011) . In addition, good social support will increase life satisfaction and social self-confidence, enable patients to adapt to crises and reduce the stress of changing patient roles, thus also reducing the risk of psychological distress.

The level of health literacy, both in terms of access to information and understanding in families of comorbid TB patients, also contributes to efforts to maintain the mental health of patients. Health literacy will increase personal, cognitive and social skills that determine ability individuals to gain access, understand, and use information to promote good health behavior. This including outcomes such as increased knowledge and understanding of the determinants of health, and changes in attitudes and motivation in relation to health behaviors. The concept of health literacy allows individuals to have the ability to write, read, speak, and have knowledge about culture and concepts related to healthy behavior. This individual's ability when interacting with the health system health services, education systems and various social factors culture in the residence, workplace and community will create a healthy environmental atmosphere for comorbid TB patients. For patient families, health literacy is one of the important pillars in the treatment and recovery efforts of comorbid TB patients. By accessing sources of information either directly through health workers, or media that present various literacies regarding preventive and curative efforts for comorbid TB patients. A complete understanding in handling comorbid TB cases will also have a positive impact on the patient's mental health condition.

2. RESEARCH METHODS

2.1 Sampling Technique

Determination of samples using *random techniques sampling* based on the formula: .

$$Y = [\frac{1+(H-1)p}{H} - \frac{Gp^2}{1+(G-1)p}]$$

$$Y = [\frac{1+(2-1)0.3}{2} - \frac{1x\ 0.3^{\ 2}}{1+(1-1)\ 0.3}] = 0{,}56$$

$$n_1 = n_2 = 0.56[2(\frac{[1.64 + 0.84]16{,}6}{4})^2]$$

$$[2(\frac{41.168}{4})^2] = 0.56$$

$$[2(\frac{[2.48]16{,}6}{4})^2] = 0.56$$

$$= 0.56\ [2(10.292)^2] = 118.63 = 119$$

The minimum amount is increased by 10% to anticipate respondents *dropping out* (Fauziyah, 2010) , with the following calculation:

$$n' = \frac{n}{1-f}$$

information :

n ' = number of samples after correction
n = number of samples based on previous estimates
f = predicted percentage of sample *drop out* (10%)

$$n' = \frac{119}{1-0,1} = \frac{119}{0,9}$$

= 132.2 rounded up to 132 respondents

Based on the sample calculations above, the number of samples in the study was 132. respondents with the number of intervention groups 66 respondents and the control group 66 respondents .

2.2 Data Collection

Data collection was conducted using a sociodemographic questionnaire that captured key details such as age, gender, education, and occupation. In addition, the questionnaire included questions about respondents' knowledge and attitudes regarding social support and health literacy regarding mental health of comorbid TB patients.

2.3 Types of Research

This research is a *quasi-experimental* research design using *non-equivalent control group design.* As an intervention media, the research team has compiled a module as a media and its feasibility has been tested by a team of experts and tested on 30% of total respondents. To test the feasibility of the module, descriptive data analysis was carried out based on the score or average (Mean), Median (Md), Mode (Mo) and Standard Deviation (SD) of each assessment aspect.

The total score is obtained from:

"Total overall/Maximum score"

Where the total Maximum Score is obtained from:

"Number of Questions x Number of Respondents x Maximum Score"

With the criteria (Sugiyono, 2019) :

81 – 100 is very decent.
61 – 80 Eligible.
41 – 60 is pretty decent.
<40 is not eligible.

Further research was conducted in two stages. **First,** *a pre-test* to obtain initial data on family knowledge and attitudes; **second,** intervention was conducted on the treatment group, then *a post-test was conducted* to obtain final data. At the end of this series of stages, the researcher analyzed the effect of the intervention on the level of knowledge and attitudes of respondents and then compared the results with the control group. The quasi-experimental design with control groups and validated pre–post measures was appropriate to rigorously assess the module's effectiveness on family health literacy and social support.

Pre and Post Test Control Group design can be seen in the following image:

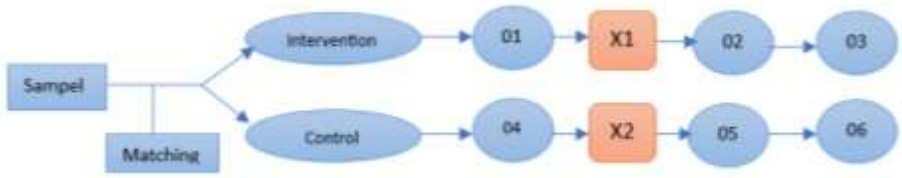

Figure 1. Pre and Post Test Control Group design

Note:	01	:	*Pre-test of* treatment group
	02	:	*post test* in the treatment group
	03	:	Second post test in the treatment group
	04	:	*Pre-test* control group
	05	:	*post test* on control group
	06	:	Second post test on control group
	X1	:	Treatment in the form of providing modules and assistance
	X2	:	Only given modules

2.4 Data Analysis

To determine whether there is an influence of health literacy and social support on the mental health conditions of comorbid TB patients in the pre and post groups, a parametric statistical test was conducted using *a paired sample t-test* . If the assumption of *the paired sample t-test* does not meet the requirements, an alternative test

from the non-parametric *Wilcoxon Sing Rank Test statistic is used* . Furthermore, *the Independent sample t-test* is used in the intervention and control groups. However, if the assumption is not met, the *Mann-Whitney test is used*

3. RESEARCH RESULTS

a. Respondent Characteristics

Table 1Characteristics of Respondents in the Intervention Group and Control Group

Characteristics	Intervention Group		Control Group	
	n	%	n	%
Age	**66**	**100%**	**66**	**100%**
18-31	26	39.4%	20	30.3 %
32-45	35	53.0 %	25	37.9 %
46-59	5	7.6 %	16	24.2 %
>60	0	0.0 %	4	7.6 %
Total	**66**	**100**	**66**	**100%**
Gender				
Man	25	38 %	31	47 %
Woman	41	62%	35	53%
Work	**66**	**100%**	**66**	**100%**
civil servant	16	24.2 %	10	15.2 %
housewife	21	31.8 %	28	42.4 %
Self-employed	14	21.2 %	16	24.2 %
Etc	15	22.7 %	12	18.2 %
Total	**66**	**100**	**66**	**100**
Education	**66**	**100%**	**66**	**100%**
SD	1	1.5 %	1	1.5 %
JUNIOR HIGH SCHOOL	4	6.1 %	12	18.2 %
SENIOR HIGH SCHOOL	40	60.6 %	40	60.6 %
D3	6	9.1 %	3	4.5 %
S1	14	21.2 %	10	15.2 %
S2	**1**	**1.5 %**	**0**	**0 %**
Total	**66**	**100**	**66**	**100**

b. Statistical Test

1. Module Feasibility Test By Target

Before using the module as an intervention medium, the module was first tested on 30% of the total respondents. The feasibility test of the material was carried out by experts and a team of experts.

Table 2Module Feasibility Test by Target

No	Assessment Aspects	Score	Eligibility criteria
1	Functions and Benefits of Media	413	
2	Module Display Characteristics	485	
3	Advantages and Attractions of the Module	201	
4	Understanding of Material	207	
5	Quality of Learning Materials	206	
6	Total Maximum Score (Question Items x Number of Respondents x Maximum Score)	**22x20x4 = 1760**	
Total Score		**1512**	
Total maximum score/Total score = 0.85909 = 85%			Very Worth It

2. Statistical Test of Health Literacy Variables

a. Knowledge

Table 3Differences in Family Knowledge Scores Regarding Health Literacy Pre-test and Post-test of Intervention Group and Control Group

Variables	Pre-test	Post test	p_{value}

	Mean ±SD	Mean ±SD	
Intervention	10.09 ±1.32	13.56 ±1.36	0.000**
Control	9.27 ±1.20	11.48 ±1.27	0.000**
p_{value}	0.000*	0.000*	
* Mann-WhitneyU ** Wilcoxon Signed Ranks			

In table 2. using the Mann Whitney test on knowledge, the mean pre-test value was 10.09 and there was an increase in the mean post-test of 13.56 with a p value = 0.000 < 0.05, which means there is a difference in knowledge scores between the pre-test and post-test after the intervention was given. Furthermore, in the knowledge of the control group, the mean pre-test value was 9.27 and there was an increase in the mean post-test of 11.48 with a p value = 0.000 < 0.05, which means there is a difference in knowledge scores between the pre-test and post-test in the control group. However, the difference in knowledge scores between the pre-test and post-test was higher in the intervention group. This shows that there is a significant difference between the knowledge scores of the intervention group and the control group.

b. Attitude

Table 4Differences in Family Attitude Scores Regarding Health Literacy Pre-test and Post-test of Intervention Group and Control Group

Variables	Pre-test Mean ±SD	Post test Mean ±SD	p_{value}
Intervention	17.65 ±1.96	27.50 ±2.56	0.000**
Control	16.52 ±1.39	18.18 ±1.62	0.000**
p_{value}	0.000*	0.000*	
* Mann-WhitneyU ** Wilcoxon Signed Ranks			

In table 3. using the Mann Whitney test on the attitude variable, the mean pre-test value was 17.65 and there was an increase in the mean post-test value of 27.50 with a p value = 0.000 < 0.05, which means there is a difference in attitude scores between the pre-test and post-test after the intervention was given. Furthermore, on the attitude score of the control group, the mean pre-test value was 16.52 and there was an increase in the mean post-test of 18.18 with a p value = 0.000 < 0.05, which means there is a difference in attitude scores between the pre-test and post-test in the control group. However, the difference in attitude scores between the pre-test and post-test was higher in the intervention group. This shows that there is a significant difference between the knowledge scores of the intervention group and the control group.

3. Statistical Test of Social Support Variable

a. Knowledge

Table 5Differences in Family Knowledge Scores Regarding Social Support Pre-test and Post-test of Intervention Group and Control Group

Variables	Pre-test Mean ±SD	Post test Mean ±SD	p_{value}
Intervention	10.85 ±1.69	13.18 ±1.60	0.000**
Control	11.09 ±2.84	11.88 ±2.34	0.000**
p_{value}	0.204*	0.000*	
* Mann-WhitneyU ** Wilcoxon Signed Ranks			

In table 4. using the Mann Whitney test on knowledge, the mean pre-test value was 10.58 and there was an increase in the mean post-test of 13.18 with a p value = 0.000 < 0.05, which means there is a difference in knowledge scores between the pre-test and post-test after the intervention was given. Furthermore, in the knowledge of the control group, the mean pre-test value was 11.09 and there was an increase in the mean post-test of 11.88 with a p value = 0.000 < 0.05, which means there is a difference in knowledge scores between the pre-test and post-test in the control group. However, the difference in pre-test and post-test knowledge was higher in the intervention group. This shows that there is a significant difference in knowledge scores between the intervention group and the control group.

b. Attitude

Table 6. Differences in Family Attitude Scores Regarding Social Support Pre-test and Post-test of Intervention Group and Control Group

Variables	Pre-test Mean ±SD	Post test Mean ±SD	p_{value}
Intervention	18.41 ±2.14	30.55 ±1.80	0.000**
Control	17.23 ±2.00	17.82 ±1.78	0.000**
p_{value}	0.003*	0.000*	
* Mann-WhitneyU ** Wilcoxon Signed Ranks			

In table 5. using the Mann Whitney test on attitudes, the pre-test mean value was 18.41 and there was an increase in the post-test mean of 30.55 with a p value = 0.000 < 0.05, which means there is a difference in attitude scores between the pre-test and post-test after the intervention was given. Furthermore, in the control group attitude, the pre-test mean value was 17.23 and there was an increase in the post-test mean of 17.82 with a p value = 0.000 < 0.05, which means there is a difference in attitude scores between the pre-test and post-test in the control group. However, the difference in attitude scores between the pre-test and post-test was higher in the intervention group. This shows that there is a significant difference in attitude scores between the intervention group and the control group.

4. DISCUSSION

Mental health is an integral part of overall human health, encompassing emotional, psychological, and social well-being. However, public perception of mental health is often still filled with stigma and misconception. Many studies show that mental health in the general public is still narrowly identified with conditions of "madness" or severe mental disorders, such as schizophrenia or psychosis, while other milder mental disorders, such as stress, anxiety, or depression, tend to be ignored (Sartorius, 2007) .

This phenomenon is largely due to low mental health literacy in various communities. Many people do not understand the early symptoms of mental disorders, so they only perceive a condition as a mental health problem after the individual shows extreme or abnormal behavior. As a result, individuals with mild symptoms are reluctant to seek help for fear of being labeled "crazy", which results in delayed diagnosis and treatment.

In addition, cultural construction also plays a major role in shaping this perception. In a study of medical anthropology, Kleinman (1980) found that in many traditional cultures, there is no neutral term to describe mental disorders. Instead, all forms of cognitive or emotional behavioral deviations are often directly associated with "madness" or supernatural phenomena. This reinforces stigma and exacerbates discrimination against individuals with mental health problems. The stigma that exists in individuals with comorbid tuberculosis is a complex problem, which is often triggered by a lack of adequate health literacy in the community, leading to late diagnosis, poor treatment compliance, and adverse social consequences. (Retnakumar & George, 2022) . Stigma in this context involves identifying individuals with TB as a distinct group and often associating them with negative character traits and blaming them for their illness (DeSanto et al., 2023) .

Consequently, the stigma of mental disorders becomes a major obstacle in mental health services, both in the form of self-stigma (shame and low self-esteem from the patient himself) and public stigma (social rejection by society). Sartorius (2007) emphasized that overcoming this stigma must be an integral part of the strategy to improve mental health services. Therefore, increasing mental health literacy, using more neutral terms, and anti-stigma campaigns are very important in building collective awareness that mental health is a broad spectrum, not only related to "crazy" conditions, but also includes various dimensions of psychological well-being.

Family support is a critical element in managing the mental well-being of individuals with comorbid tuberculosis, a disease known to present substantial psychological challenges in addition to its physical demands. The interaction between mental health and family dynamics is bidirectional, yet some families may prioritize individualized care, ignoring or dismissing the need for a family-centered approach (Negash et al., 2022) . Family relationships can significantly impact mental health, either precipitating or exacerbating mental illness, or alleviating emotional and behavioral problems, leading to improved outcomes (Saroca & Sargent, 2022) . It is well established that strong family support serves as a protective buffer, offering significant benefits to those struggling with chronic conditions. Specifically, this support improves treatment adherence, fosters resilience, and enhances overall psychological health, leading to marked improvements in patients' quality of life.

The findings of our study reveal that family support in Indonesia emerges organically as a form of shared care that is inherent among family members. This practice reflects broader cultural traits and social values that characterize Indonesian family life and society. The Indonesian family system exhibits distinct characteristics compared to Western countries, particularly influenced by Eastern cultural values that emphasize collectivism,

harmony, and indirect communication. In Indonesia, family and society are central to social life, with a strong emphasis on shared care, respect for elders, and maintaining social harmony through indirect communication styles (Cher, 2022) . For example, a study by Pardede and Mulder (2022) highlighted that in Indonesia, family decisions are often collective, reflecting the importance of family cohesion and support. This collectivist approach influences communication patterns, where indirectness is used to maintain harmony and avoid conflict. Such communication styles are deeply rooted in the cultural fabric of Indonesian society (Pardede & Mulder, 2022) . Furthermore, research by Mailin et al. (2023) emphasize that Indonesian society values relationships and community, often prioritizing group needs over individual desires. This cultural orientation encourages a less confrontational and more nuanced communication style, aimed at maintaining group harmony (Mailin Mailin et al., 2023) .

Support from family and the wider community plays an important role in encouraging treatment adherence by providing supervision and emotional support to patients. A strong social support system increases individual life satisfaction and self-confidence, thus facilitating better crisis adaptation and reducing psychological distress. Therefore, this family orientation should be strengthened through ongoing health education initiated by health professionals and institutions, to improve family understanding of various health challenges, with special emphasis on mental health support for tuberculosis patients with comorbid conditions.

Given the complexity of tuberculosis and its treatment, which often involves long-term medication and potential social stigma, mental health support cannot be overlooked. The interplay between social support, particularly from family, and mental health in TB patients with comorbid conditions is an important area of health care. The presence of tuberculosis, an infectious disease often associated with significant physical and social challenges, can be further complicated by the presence of other co-occurring illnesses, or comorbidities, which can have a significant impact on mental well-being (Scheunemann et al., 2023). Mental health education should be an ongoing process, involving multiple sectors and stakeholders. This underscores that the management of comorbid tuberculosis (TB) goes beyond biological eradication of the pathogen, emphasizing the importance of psychosocial support to maintain patient mental health.

The results of this study demonstrate for practitioners that the module-based health promotion can be directly applied in educating families of comorbid TB patients. This practical approach makes it easier for health workers to translate research findings into effective health education strategies and family-centered care programs. This study also highlights its relevance and timeliness, considering that tuberculosis remains a major global health burden and mental health issues among TB patients are often underrecognized. The integration of mental health literacy and family support into TB care is highly relevant in the current context, especially in Indonesia where psychosocial support services for TB patients are still limited. These findings provide timely evidence that supports ongoing efforts to strengthen comprehensive and patient-centered TB management.

5. CONCLUSION

The findings of this study indicate significant differences in family knowledge and attitudes regarding health literacy and social support before and after an educational intervention. These results suggest that targeted educational programs can effectively improve family members' understanding and capacity to support TB patients, especially those with comorbidities. Furthermore, this study highlights that TB management should not be limited to biological eradication of the disease, but should also integrate mental health support as an essential component of patient care. Holistic TB management requires ongoing and structured education that involves not only health care providers but also families, communities, and broader support networks. By fostering greater awareness and sensitivity to the psychosocial challenges faced by TB patients, such educational initiatives have the potential to improve treatment adherence, enhance psychological resilience, and ultimately contribute to better health outcomes.

6. Research Limitations and Recommendations

The limitations of this study include:

1. The data collected in this study heavily relied on the subjective perceptions of patients and their families, which may introduce social desirability bias in answering the questionnaire.
2. Limited resources limit the number of participants and the geographic scope of the study.

The recommendations from this research are:

- Conducting a longitudinal study to see the dynamics of changes in patients' mental conditions and the role of family support throughout the TB treatment process.
- Develop and test community-based interventions, such as mental health education programs for families of TB patients, and systematically evaluate their effectiveness.
- Expanding the research population to various regions with different socio-cultural backgrounds in Indonesia to examine variations in family support patterns for patient mental health.
- Incorporating the perspective of health workers as additional informants to obtain data triangulation regarding psychosocial support for TB patients.

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