

Meta-Analysis: The Effect of Social Support on Medication Treatment Adherence in Tuberculosis Patients

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ABSTRACT

Background: Tuberculosis is a disease that can be cured by various methods of treatment. However, tuberculosis treatment is often not carried out properly and completely. The importance of medication adherence as a top priority in the effectiveness of treatment of tuberculosis patients through social support. The purpose of this study was to analyze the effect of social support on medication adherence in tuberculosis patients.

Subjects and Method: This meta-analysis study used the PRISMA flowchart guideline with PICO, Population= Tuberculosis patients. Intervention= social support. Comparison= without social support. Outcome= medication adherence. The search process was carried out between 2017 and 2022 using Google Scholar, PubMed, Sci-Hub, and Science Direct databases. The keywords used were "Medication Adherence" OR "Drug Adherence" OR "Adherence" OR "treatment adherence" AND "Tuberculosis" OR "multidrug resistant tuberculosis*" OR "Mycobacterium tuberculosis Infection" AND "Social Support" OR "Social Support System" OR "Psychosocial Support System" OR "Support System". Based on the database, there are 10 articles that fulfill the inclusion criteria. Study analysis was using review manager 5.3 software.

Results: There were 10 articles from the continents of Asia and Africa selected in this meta-analysis, the results showed that the presence of social support has the possibility to increase adherence to anti-tuberculosis treatment compared to without social support in tuberculosis patients and it was statistically significant (aOR= 2.10; CI 95%= 1.76 to 2.52; p< 0.001).

Conclusion: Tuberculosis patients who have strong social support about tuberculosis adherence are more likely to adhere to anti-tuberculosis treatment.

Keywords: tuberculosis, social support, medication adherence, meta-analysis.

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BACKGROUND

Tuberculosis is a disease that can be cured by various methods of treatment. However, tuberculosis treatment is often not carried out properly and completely (Muna, 2018). Charyeva's research (2019) states that tuberculosis sufferers are often associated with poor treatment adherence rates.

Meanwhile, to achieve complete recovery, tuberculosis sufferers are required to conduct disciplined and complete treatment in approximately six months. During the treatment period, tuberculosis patients are required not to leave the treatment program even though the symptoms of the disease are getting better during the course

of treatment because TB germs will begin to grow again if the patient stops treatment. However, in reality, tuberculosis sufferers often stop their treatment in the middle of the treatment period because they feel the symptoms of the disease have subsided and are associated as a sign of healing (Charyeva, 2019).

In research done by Chen (2020) it was stated that medication adherence in tuberculosis patients required social support because patients who have family members who often supervise treatment, family members who often provide spiritual encouragement, good doctor-patient relationships, more knowledge related to TB and high TB treatment policy support needs are more likely to have good medication adherence. Social support for people with tuberculosis is highly important because generally sufferers experience a lack of support due to the negative stigmas attached to sufferers. This indicates that there are non-medical aspects in the treatment of tuberculosis (Gebreweld et al., 2018).

Tuberculosis is a disease that can be cured by various methods of treatment. However, tuberculosis treatment is often not carried out properly and completely (Muna, 2018). During the treatment period, tuberculosis patients are required not to leave the treatment program even though the symptoms of the disease are getting better during the course of treatment because TB germs will begin to grow again if the patient stops treatment. Irregular treatment and incomplete drug combinations can lead to double immunity of TB bacteria to Anti Tuberculosis Drugs (OAT) or Multi Drug Resistance (MDR).

Therefore, providing positive social support related to healthy living behavior, medication adherence and achieving treatment outcomes has a positive effect on

reducing stress levels so as to support psychosocial patients in medication adherence (Li et al., 2018).

This study is a systematic review and meta-analysis study. This study used secondary data which was data from the results of previous studies. Meta-analysis is a way of summarizing and quantitatively synthesizing the most accurate estimates. Many studies show the effect of social support on medication adherence in tuberculosis patients. Most existing studies have small sample sizes. Therefore, researchers are interested in examining the effect of social support on medication adherence in tuberculosis patients using a meta-analysis. This study aimed to analyze the effect of social support on medication adherence in tuberculosis patients.

SUBJECTS AND METHOD

1. Study Design

This study uses a systematic review and meta-analysis design with PRISMA flow-chart guidelines. This study article was obtained from the electronic databases of Google Scholar, PubMed, Sci-Hub, and Science Direct. Some of the keywords used were: "Medication Adherence" OR "Drug Adherence" OR "Adherence" OR "treatment adherence" AND "Tuberculosis" OR "multidrug resistant tuberculosis" OR "Mycobacterium tuberculosis Infection" AND "Social Support" OR "Social Support System" OR "Psychosocial Support System*" OR "Support System".

2. Inclusion Criteria

The inclusion criteria used in this study were full-text articles with an observational study design. The articles were published in English and Indonesian from 2017 to 2021. The articles used a cross-sectional study design with social support interventions and the outcome was medication adherence.

3. Exclusion Criteria

In this study, the exclusion criteria included articles which were not using multivariate analysis and primary studies that had been meta-analyzed.

4. Operational Definition of Variables

The articles included in this study were PICO-adjusted. The article search was carried out taking into account the eligibility criteria determined using the following PICO model: Population= Tuberculosis patients; Intervention= social support; Comparison= without social support; Outcome= medication adherence.

Social support is part of the social bond that describes the level and degree of standards through individual bonds that provide protection for other individuals from the effects of heavy pressure.

Medication adherence is a description of the patient's behavior in following the treatment program for certain diseases correctly and completely.

5. Instruments

This study is guided by PRISMA flow diagrams and assessment of the quality of research articles using the Critical Appraisal Checklist for Cross-sectional Study from the Center for Evidence Based Management (CEBM, 2014). Here are 12 questions on the check-list that were used:

The 12 cross-sectional study questions used are as follows:

1. Do the study objectives clearly address the study problem?
2. Are study methods appropriate in providing answers to study questions?
3. Is the study subject selection method clearly written?

4. Does sampling create bias?
5. Can the study sample be representative of the designated population?
6. Is the sample size determination based on pre-study considerations?
7. Is the measurement method achievable?
8. Are the study instruments valid and reliable?
9. Is there a value of statistical significance?
10. Is a Confidence Interval (CI) assigned to the main outcome?
11. Are there any confounding factors that have not been taken into account?
12. Can the results be implemented in your study?

6. Data Analysis

Research data were analyzed using the Rev-Man 5.3 application, to calculate the effect size and heterogeneity of the study. The results of data processing are presented in the form of forest plots and funnel plots.

RESULTS

Process of searching article was carried out by searching several journal databases PubMed, Sciondirect, Googlescholar, it can be seen using the PRISMA FLOW flowchart shown in Figure 1.

Figure 2 showed the primary research that met the criteria consisted of 810 articles from 3 continents namely Asia (Pakistan, Vietnam, Indonesia, Nepal), and Africa (Ethiopia).

Table 1 shows the research quality assessment of 15 articles using the Critical Appraisal Checklist for Cross-sectional. Table 2 showed a summary of the articles of cross-sectional that were included in the meta-analysis.

Table 1. Assessment of the Quality Studies by Center for Evidence Based Management (CEBM, 2014)

Primary Study	Criteria												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Tola et al. (2017)	2	2	2	2	2	2	2	2	2	2	2	2	24
Saqib et al. (2019)	2	2	2	2	2	2	2	2	2	2	2	2	24
Vo et al. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Ajema et al. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Siregar et al. (2018)	2	2	2	2	2	2	2	2	2	2	2	2	24
Mohammedhussein et al. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Mengesha et al. (2022)	2	2	2	2	2	2	2	2	2	2	2	2	24
Yadav et al. (2021)	2	2	2	2	2	2	2	2	2	2	2	2	24
Gashu et al. (2021)	2	2	2	2	2	2	2	2	2	2	2	2	24
Duko et al. (2019)	2	2	2	2	2	2	2	2	2	2	2	2	24

Note: Answer: Yes=2, No =1, Can't tell=0

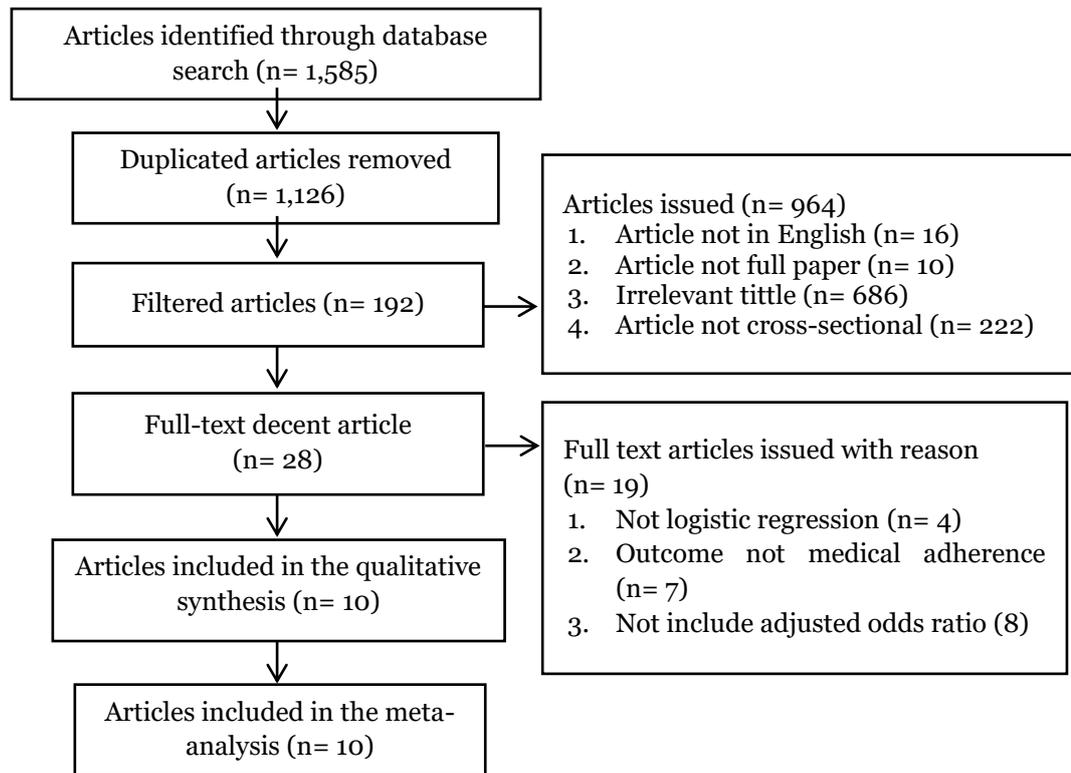


Figure 1. Results of Prisma Flow Diagrams



Figure 2. Research Distribution Map

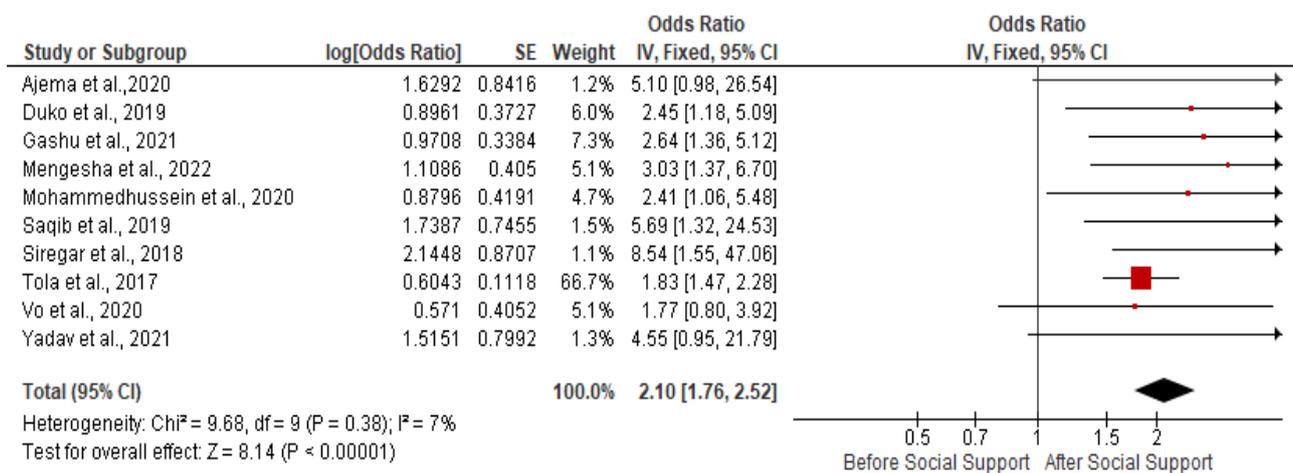


Figure 3. Forest plot of the effect of social support on treatment adherence in tuberculosis patients

The forest plot in Figure 3 showed that the effect of social support on medication adherence in tuberculosis patients showed that tuberculosis patients who have strong social support about tuberculosis treatment are likely to adhere to anti-tuberculosis treatment 2.10 times compared to tuber-

culosis patients who do not have social support about tuberculosis treatment. The results of the study on the effect of social support on medication adherence in tuberculosis patients were statistically significant (aOR= 2.10; 95% CI= 1.76 to 2.52; $p < 0.001$).

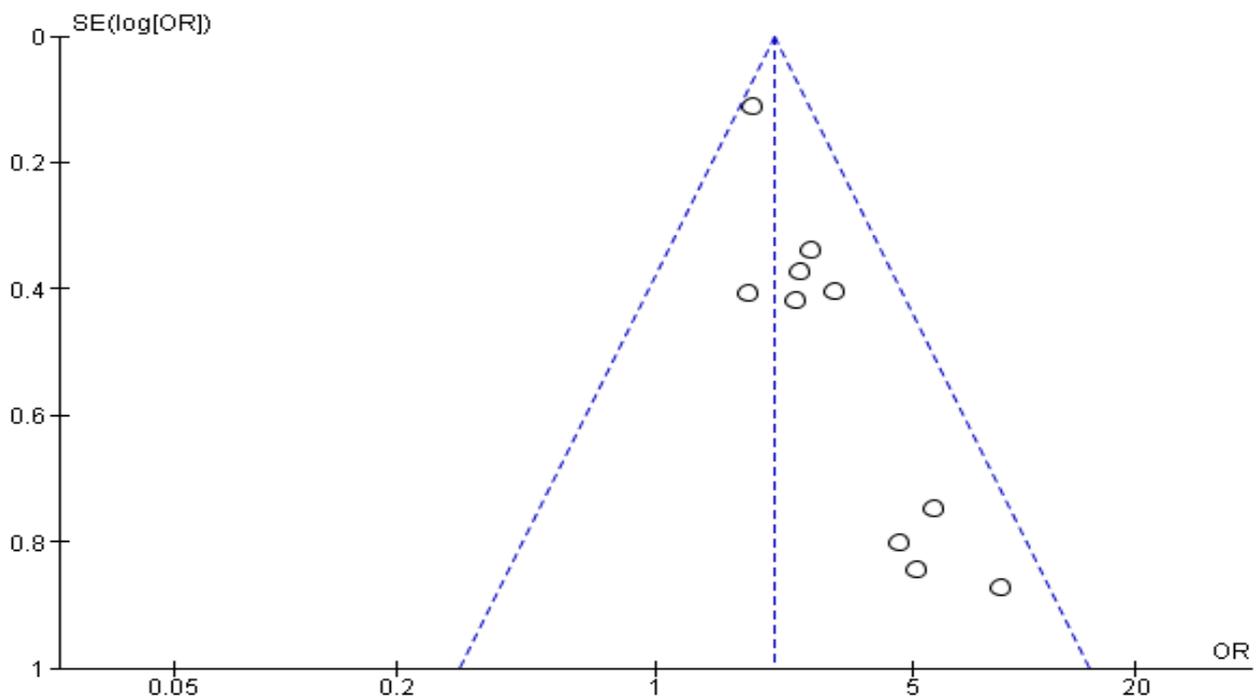


Figure 4. Funnel plot of the effect of social support on treatment adherence in tuberculosis patients

The interpretation of the funnel plot results shows a publication bias if the shape of the funnel plot is asymmetrical on the right and left sides. Figure 4 showed the distribution of studies with larger-than-average estimates lower-than-average.

Thus, Figure 4 indicates publication bias that overestimated the true effect.

There is a 2 plot on the left side on the funnel plot and had standard error (SE) between 0 and 0.4, and on the right side there is an eight plot with standard error between 0.2 and 1.

Table 2. Description of Primary Research included in the Meta-Analysis

No	Author	Country	Study Design	Sample	Population	Intervention	Comparison	Outcome	aOR (CI 95%)
1.	Tola et al. (2017)	Ethiopia	Cross-sectional	698	Tuberculosis patients (average age: 18-45 years old)	Social support	No social support	Treatment adherence, knowledge, economic status	1.83 (1.47 to 2.28)
2.	Saqib et al. (2019)	Pakistan	Cross-sectional	269	Tuberculosis patients (average age: 15-60 years old)	Social support	No social support	Treatment adherence, marital status	5.69 (1.32 to 24.53)
3.	Vo et al. (2020)	Vietnam	Cross-sectional	5,502	Tuberculosis patients (average age: 22-55 years old)	Social support	No social support	Treatment adherence, TB status	1.77 (0.80 to 3.92)
4.	Ajema et al. (2020)	Ethiopia	Cross-sectional	289	Tuberculosis patients (average age: 15-45 years old)	Social support	No social support	Treatment adherence, knowledge, TB status	5.10 (0.98 to 26.54)
5.	Siregar et al. (2020)	Indonesia	Cross-sectional	105	Tuberculosis patients (average age: 17-60 years old)	Social support	No social support	Treatment adherence, knowledge, educational status	8.54 (1.55 to 47.06)
6.	Mohammedhussein et al. (2020)	Ethiopia	Cross-sectional	410	Tuberculosis patients (average age: 18-45 years old)	Social support	No social support	Treatment adherence, medication status	2.41 (1.06 to 5.58)
7.	Mengesha et al. (2022)	Ethiopia	Cross-sectional	400	Tuberculosis patients (average age: 15-77 years old)	Social support	No social support	Treatment adherence, TB status	3.03 (1.37 to 6.70)

No	Author	Country	Study Design	Sample	Population	Intervention	Comparison	Outcome	aOR (CI 95%)
8.	Yadav et al. (2021)	Nepal	Cross-sectional	180	Tuberculosis patients (average age: 15-65 years old)	Social support	No social support	Treatment adherence, TB status	4.55 (0.95 to 21.79)
9.	Gashu et al. (2021)	Ethiopia	Cross-sectional	307	Tuberculosis patients (average age: 25-40 years old)	Social support	No social support	Treatment adherence, educational status	2.64 (1.36 to 5.12)
10.	Duko et al. (2019)	Ethiopia	Cross-sectional	417	Tuberculosis patients (average age: 18-50 years old)	Social support	No social support	Treatment adherence, knowledge	2.45 (1.18 to 5.09)

DISCUSSION

This systematic review and meta-analysis used the theme of the effect of social support on medication adherence in tuberculosis patients. The independent variable analyzed was social support. The dependent variable analyzed was medication adherence.

The primary studies that fulfilled the criteria were 10 articles, 6 studies on the African continent in Ethiopia and 4 studies on the Asian continent in Pakistan, Indonesia, Nepal, and Vietnam. This study showed that social support for action was statistically significant in influencing treatment adherence of tuberculosis patients.

The results of the forest plot showed that social support can increase medication adherence in tuberculosis patients by 2.10 times compared to no social support.

Siregar (2020) stated that the role of social support, one of which is family support, is very much needed in the success of treatment. Family support increases patient compliance in taking medication. Lack of social support was associated with non-adherence and had an 8.54 times risk for non-adherence to tuberculosis treatment.

Tuberculosis is a disease that can be cured by various methods of treatment, however, tuberculosis treatment is often not carried out properly and completely (Muna, 2018). In the research of Charyeva (2019), it is stated that tuberculosis sufferers are often associated with poor treatment adherence rates. Meanwhile, to achieve complete recovery, tuberculosis sufferers are required to undergo disciplined and complete treatment in approximately six months. During the treatment period, tuberculosis patients are required not to leave the treatment program even though the symptoms of the disease are getting better during the course of treatment

because TB germs will begin to grow again if the patient stops treatment. However, in reality, tuberculosis sufferers often stop their treatment in the middle of the treatment period because they feel the symptoms of the disease have subsided and are associated as a sign of healing (Charyeva, 2019).

Irregular treatment and incomplete drug combinations can lead to double immunity of TB bacteria to Anti Tuberculosis Drugs (OAT) or Multi Drug Resistance (MDR). Research done by Muna (2018) explains that the causes of non-compliance with tuberculosis sufferers in treatment programs are lack of education about treatment, poor environmental hygiene, boredom of taking medication for a long time, feeling healed, economic factors and minimum access to health services. Previous studies regarding the analysis of the success of tuberculosis treatment show that there are many factors that support the success of the tuberculosis treatment program apart from the internal side of the patient, such as psychosocial support and material support (Charyeva et al., 2019).

Furthermore, Hoorn (2016) found that factors such as psychoemotional, socio-economic and various supports given to tuberculosis sufferers had a significant effect on the percentage increase in their treatment program. It can be concluded that there are many factors in the success of the tuberculosis treatment program, both from the patient's internal and external environment.

Social support such as family and people around is one of the important factors that influence the success of the tuberculosis treatment program (Irnawati et al., 2016). Social support for people with tuberculosis is highly important because generally sufferers experience a lack of support due to the negative stigmas at-

tached to sufferers. This indicates that there are non-medical aspects in the treatment of tuberculosis (Gebreweld et al., 2018). In a study done by Deshmukh et al., (2018) found that social support from family and relatives was proven to be able to increase patient compliance in carrying out their treatment program.

There are various forms of social support that can be given to people with tuberculosis, such as providing education about treatment, providing enthusiasm and motivation, reminding to always take medication and running all treatment programs. Various studies have proven that positive social support related to healthy living behavior, medication adherence and achieving treatment outcomes has a positive effect on reducing stress levels so that it supports the patient's psychosocial (Li et al., 2018). From the previous explanation, it is important to discuss more deeply about the role of social support on treatment adherence of tuberculosis patients.

Based on this description, it can be seen that the meta-analysis that the researchers carried out was in line with several studies related to the effect of social support on medication adherence in tuberculosis patients.

AUTHOR CONTRIBUTION

Lily Nabillah is the MAIN researcher who selected the topic, searched for and collected study data. Argyo Demartoto and Bhisma Murti analyzed the data and reviewed study documents.

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This study is self-funded.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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