EFFECTIVENESS OF TEXT MESSAGE REMINDER FOR IMPROVING COMPLIANCE TO TUBERCULOSIS DRUG CONSUMPTION: A SYSTEMATIC REVIEW

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ABSTRACT

Background: Compliance in consumes tuberculosis drugs is needed to reduce the drop out rate or discontinuation of the drug. Text messages sent to tuberculosis patients are an alternative reminder for patients to take medication. This study aims to systematically review the effectiveness of text message reminders to improve compliance with tuberculosis drug consumption.
Subjects and Methods: A systematic review was conducted by searching for articles from 2 databases, namely PubMed and ProQuest. The keywords were "effectiveness", "tuberculosis", "adherence", and "reminder". The inclusion criteria were Randomized Controlled Trials (RCT) study or quasi-experimental study with or without a control group. The articles were selected by PRISMA flow diagram method.
Results: From the 10 articles collected, those reported that text messages reminders influenced patients to take medication. Five articles reported a significant increase in patient adherence to taking medication using text messages reminder than without text messages reminder ($p < 0.010$). Effective interventions to improve tuberculosis patient compliance in taking drugs are based on text messages obtained so that effective TB management is needed to increase the level of compliance in tuberculosis treatment completely.
Conclusion: Text messaging is appropriate to be used as a reminder to improve compliance in taking tuberculosis medication but the need for good TB management for health care providers to reduce complete non-compliance with drugs.

Keywords: adherence, tuberculosis, text messages reminder

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BACKGROUND

In 2016, there were 10.4 million incidents of tuberculosis, which is equivalent to 120 cases per 100,000 populations. Five countries with the highest incidence of cases are India, Indonesia, China, Philippines, and Pakistan. Guidelines from World Health Organization (WHO) for direct TB testing with the Directly Observed Treatment Short Course (DOTS) strategy.

This strategy requires TB patients to build awareness, self-motivation and adhere to 6 months of treatment regimens every day and this strategy has achieved a success rate of more than 85% in TB patients, but it has not been effective in achieving WHO targets and TB is still becoming the main public health problem. Compliance in the treatment of DOTS is very important. If a failure occurs, it will be a problem.

Therefore, this strategy includes treatment by using a standard rifampicin based regimen with 6 months for new TB cases and 8 months for repeated cases (Albino et al., 2014).

Globally, TB is one of the leading causes of death which is responsible for 1.7 million deaths in 2017. The duration of TB

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treatment leads to high levels of not compliance, especially during the first 2 months of intensive treatment phase when patients must take anti-TB drugs every day. Non-adherence to treatment can increase transmission, drug resistance, the need for more expensive treatment and death.

A reminder system that uses an innovative adherence strategy that involves simple communication technology is essential to manage the problem of non-compliance in low-resource facilities with a limited number of health personals and incompetent direct observers. The rapid development of the telecommunications industry made short message services (SMS) a promising approach to strengthen patient compliance and health awareness in many diseases such as diabetes, cardiovascular disease, tuberculosis, etc. (Fang et al., 2017).

The effectiveness of SMS reminders to improve TB medication adherence outcomes indeed still has inconsistent evidence and limitations caused by inappropriate controls. However, based on a systematic review, it was found that cellphones can provide health messages to patients directly, this greatly streamlines time in terms of area coverage and number of sufferers (Albino et al., 2014).

SUBJECTS AND METHODS

1. Study Design

In this article, the method used in systematic review was PRISMA-P (Preferred Reposting Items for Systematic Review and Meta-Analysis Protocol). Authors searched through 2 databases, ProQuest and PubMed. The keywords used were "Adherence", "Reminder Text Messages", "Tuberculosis", and "Effectiveness".

2. Inclusion and Exclusion Criteria

Inclusion criteria in this study were journaled articles that have been published in the last 5 years in English and used a Randomized Control Trial (RCT) study.

3. Data Extraction

In the initial stages, 1,235 articles were discovered. Multiple articles were issued totaling 1,065. There were 164 articles published. From the search results, 6 journals were relevant to be reviewed.

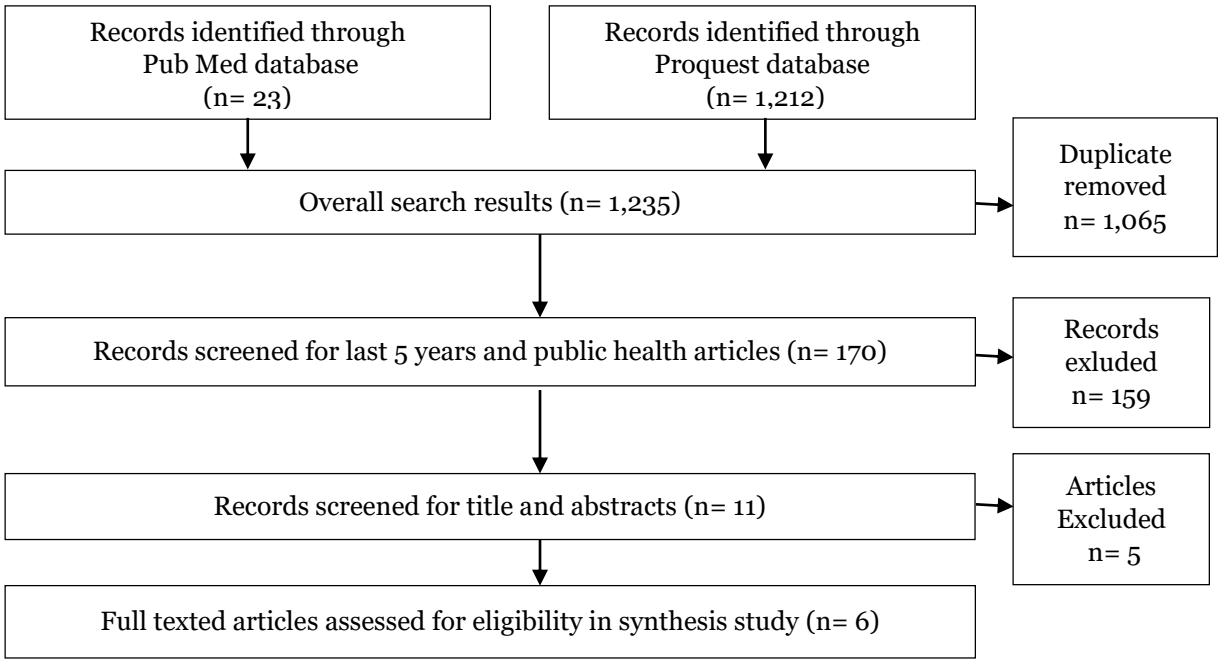

Figure 1. The Flowchart of PRISMA

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Table 1. Article Search Results

No	Author (Year)	Title	Journal	Methods	Results	Conclusion
1.	Liu et al. (2014)	Reminder systems to improve patient adherence to tuberculosis clinic appointments for diagnosis and treatment (Review)	Cochrane library	RCT	To assess the impact of an increased attendance reminder system on TB diagnosis, prophylaxis and treatment clinic appointments, and their effects on TB treatment outcomes.	The policy for sending reminders to contact people for appointments, has small benefits but high potential. This study would be useful because it is technology based, especially in areas with low resources.
2.	Oren et al. (2017)	Promoting adherence to treatment for latent TB infection through mobile phone text messaging: study protocol for a pilot RCT	BioMed Central	Study Protocol RCT	To determine the appropriateness and acceptance of text messages with regard to compliance with latent TB patients, it was tested randomly and controlled.	This pilot study would look at the feasibility of using text messages to improve adherence to latent TB treatment. As well as to evaluate the process steps and challenges, and the development of these text messages to improve effectiveness in medication adherence.
3.	Tetra DFS et al. (2019)	Preparing Short Message Service Reminders to Improve Treatment Adherence among Tuberculosis Patients in Sleman District, Indonesia	Indian Journal of Community Medicine	Sequential Explanatory	Reminder messages can be sent directly to TB patients or indirectly to the patient's family. Reminder messages that are shown to increase adherence must contain motivation, information, and facilitation for TB patients to overcome obstacles during treatment. Texting must also be short, informal, and easy to understand. Treatment adherence was significantly higher among the intervention groups compared to the control group after being measured by demographic, accessibility, and drug reaction variables.	SMS through mobile phone is an appropriate form of media to remind TB patients and to improve adherence to treatment in low-resource facilities.
4.	Mohammed et al. (2016)	Impact of a Daily SMS Medication Reminder System on Tuberculosis Treatment Outcomes: A RCT	PloS One	RCT	It was found that there was no significant difference between Zindagi SMS or the control group with treatment (p= 0.782).	In a randomized controlled scale, the effectiveness of treatment reminders by SMS in tuberculosis patients showed no change.

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5.	Albino et al. (2014)	Perceptions and Acceptability of Short Message Services Technology to Improve Treatment Adherence amongst Tuberculosis Patients in Peru: A Focus Group Study	PloS One	FGD	Three themes emerge from the health literacy data, namely information that poses challenges to successful TB treatment adherence, treatment motivations that facilitate TB adherence and positive SMS reception to improve adherence.	Overall, the use of SMS works well and shows that SMS technology is an efficient way to send motivational texts and educational information, and reminds patients about treatment compliance, especially for low-income patients.
6.	Fang et al. (2017)	Effect of Short Message Service on Management of Pulmonary Tuberculosis Patients in Anhui Province, China: A Prospective, Randomized, Controlled Study	Medical Science Monitor	RCT	A total of 350 patients were studied, including 160 cases in the SMS group and 190 for the control groups. There are 270 males and 80 females. Treatment in the SMS group (96.25%) was significantly higher than the (86.84%) group. Both the treatment rate was interrupted and the missed dose in the SMS group was lower than the control group (p= 0.001). After the treatment, the rate of re-examination of patients in the SMS group was significantly higher than in the control group (except those who re-examined after treatment for 5 months).	Management of pulmonary TB patients through SMS can effectively strengthen the level of compliance with the treatment of complete pulmonary TB patients, reduce the level of missed doses and interrupted care, and increase the degree of patient awareness to re-examine. Therefore, SMS can be a promising new therapeutic strategy for pulmonary TB cases.

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RESULTS

Of the 6 journals reviewed, 3 journals stated that stated that text messaging had a role in maintaining compliance with tuberculosis patients in taking the drug obtained ($p < 0.001$). The details of the article's extraction showed in Figure 1.

Three other journals said that patient compliance in taking drugs cannot be reviewed from text messages because of the influence of family motivational factors, the control group that drops out during treatment often occurred. Therefore, the effectiveness of text message reminders has not yet fully influenced patient compliance in taking drugs.

DISCUSSION

Text messages have an effect on tuberculosis patient's compliance in motivating themselves to take drugs. This was consistent with research stated that the management of pulmonary TB patients through text messages can effectively strengthen the level of complete treatment of pulmonary TB patients and reduce the level of missed doses and the level of interrupted care, and further increase awareness of re-examination of patients (Fang et al., 2017).

This was in line with the theory of compliance, there are several types of terminology commonly used in the literature to describe patient compliance including compliance, adherence, and persistence. Compliance is passively following the doctor's advice and orders to carry out therapy that is being carried out. Adherence is the extent to which medication is prescribed by health care providers. The level of adherence for patients is usually reported as a percentage of the prescribed dose of the drug actually taken by the patient during the specified period (Osterberg et al., 2005).

In line with the results of study done by Albino et al. (2014) which stated that the use of SMS to remind TB patients in taking drugs to be efficient required motivation given by health personnel and families, health educational information about the importance of regularity in taking drugs, and alerting patients about compliance treatment especially for patients with low incomes.

In contrary, Mohammed et al. (2016) stated that the SMS reminder did not have a change for the control group studied because it has the Zindagi SMS application in Pakistan.

The use of message reminders did not guarantee the effectiveness if it was reviewed from 5 dimensions of compliance according to WHO: 1. Socioeconomic including age, social status, poverty level, low education; 2. The health system includes patient relationships with service providers, poor drug distribution systems, short consultations; 3. Therapy including drugs, administration techniques, and duration of treatment; 4. Conditions; 5. Patients (Hsu et al., 2013).

Compliance in taking TB drugs has not been very effective by using text messages because many factors affected both family motivation, educational information both in terms of providers and the need for good TB management with the Directly Observed Treatment Short Course (DOTS) strategy by utilizing technological developments. However, SMS can still help in overcoming patient's compliance.

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