Pharmacy Education (2023) 23(2) 163 - 167
https://doi.org/10.46542/pe.2023.232.163167

IAI SPECIAL EDITION

RESEARCH ARTICLE

The effect of e-booklet education on treatment behaviour of tuberculosis patients at Denpasar City health centre

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Keywords
Denpasar City
E-Book education
Primary health centre
Tuberculosis knowledge

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Abstract

Background: Tuberculosis (TB) is an infectious disease and is amongst the top ten leading causes of death from a single infectious agent. Non-adherence of TB patients to treatment often results in treatment drop out, causing more and more TB patients and antibiotic resistance. It is necessary to continuously provide knowledge through medical education so that patients undergo therapy regularly. **Objective:** This study aims to determine the effect of e-booklet education on the treatment behaviour of TB patients at the Denpasar City Health Centre. **Method:** This research is a quasi-experimental type of research with a one-group pre-test-post-test design method. This research used a research instrument in the form of a valid questionnaire with an R-value > R-table and Cronbach's alpha value > 0.6. E-booklet as a digital education has been compiled through focus group discussions with experts (doctors and pharmacists totalling five people). The sample in this study was 30 TB patients in four primary health centres in the city of Denpasar, which were selected by the purposive sampling method. **Results:** This study's results using the t-test showed a *p*-value = 0.0001, meaning there is a significant difference in knowledge before and after education. Before education (pre-test), the research subjects had an average score of 3.07. However, 14 days after education (post-test), the average score was 3.37. **Conclusion:** This study concludes that the provision of e-booklet education can increase TB knowledge in TB patients at the Denpasar City health centre.

Introduction

Tuberculosis (TB) is a disease caused by Mycobacterium tuberculosis (Mtb), and the organism has evolved with humans for more than 10,000 years (Kaforou *et al.*, 2022). Tuberculosis (TB) is ranked the 13th leading cause of death worldwide and is among the top ten leading causes of death from a single infectious agent (WHO, 2022). In Bali, 50 people out of every 100,000 suffer from pulmonary TB in healthcare facilities. The Bali Provincial Health Office reported that in 2017, 136 cases of tuberculosis were reported in Denpasar City (Dinkes Provinsi Bali, 2017).

Non-adherence reduces cure rates, leads to more severe disease, prolongs infectiousness and economic hardship, and contributes to the emergence of drug-resistant strains of TB. Known TB treatment adherence barriers include the long course of treatment (minimum of six months), medication side effects, stigma, income loss, poor clinical understanding of the disease and its treatment, lack of support during treatment, and healthcare systems barriers (e.g., stockouts of drugs and supplies, poor coordination of care) (Iribarren *et al.*, 2022). The most frequently reported factors associated with TB treatment non-adherence were being HIV sero-reactive, inability to pay for transport costs and the lack of knowledge of TB (Tola *et al.*, 2019).

Research evidence shows that lack of knowledge about a particular disease and its treatment, distance from the healthcare facility, perceived stigma, perception about the disease and its treatment, psychological

distress, change of residential place and economic status were among the factors that determine TB treatment non-adherence; the factors that have the most significant relationship with predicted treatment non-adherence are Marital status, antiretroviral therapy (ART) status, alcohol use disorder (AUD) and psychological distress symptoms (Tola *et al*., 2016).

Non-compliance behaviour towards TB treatment is one of the main challenges in controlling TB. Non-compliance increases the risk of disease transmission by prolonging the infection period, increases the risk of treatment failure and the risk of drug resistance. Other factors related to low treatment success rates include low motivation levels for patients to complete the course of treatment with antituberculosis drugs. There are also wider issues, such as lack of resources at an organisational level, adverse drug reactions, and the extended length of treatment, which were described as clinical-level barriers (Kunin *et al.*, 2022).

Treatment adherence is a key element of the global TB control programme, which is why the World Health Organization recommends 90% adherence for a successful treatment outcome (WHO, 2022). Based on the results of a study by Sari (2016) on evaluating adherence to therapy success in TB patients, it was stated that adherence to drug use contributed to the achievement of therapeutic success. Knowledge or cognition is essential in determining one's behaviour. The knowledge referred to in this study is knowledge about matters related to TB disease, ranging from causes, transmission, prevention, management, and complications. The rate of tuberculosis treatment success has been relatively low due to a high rate of medication dropout, which causes drug resistance and medication failure. Health counselling is a need for patients with tuberculosis to help them understand and accept their condition, which eventually increases their medication adherence (Efendi, Sjattar, & Syam, 2022).

The Indonesian Ministry of Health carries out a programme to address TB disease infections at Puskesmas (local health centres) through health counselling or other education methods for TB patients. One of the methods used is by providing e-booklets. The provision of digital-based education using e-booklets is an effective alternative and minimises contact with patients (which is especially important during the COVID-19 pandemic) whilst still allowing health providers to supply information. The provision of pre-test and post-test questionnaires through a Google form measured the effect of providing booklet-based education on attitude, subjective norms and perceived behavioural control in the treatment of TB patients.

Methods

Design

This research is a quasi-experimental type of research with a one-group pre-test-post-test design method.

Data collection

This study used a research instrument in the form of a valid questionnaire, with the lowest *r* being 0.605 and the largest *r* being 0.906. The reliability score of the questionnaire had Cronbach's alpha value of more than 0.6, which is 0.605.

In-depth interviews and focus groups with professionals (doctors and pharmacists totalling five people) provided the information used to construct the e-booklet. 30 TB patients from four Primary Health Centres in the city of Denpasar were randomly selected for this study using a selective sampling technique (Sugiyono, 2010). Patients who were eligible to participate in this study were: diagnosed with tuberculosis and undergoing treatment, between the ages of 19 – 50 years old, able to read, and could use social media such as WhatsApp and Telegram. In this study, non-participating respondents were disqualified.

Statistical analysis

The Wilcoxon test was used for data analysis to compare TB patients' attitudes before and after receiving e-booklet education.

Results

Characteristics of research subjects

Table I shows the characteristics of research subjects categorised based on age, gender, and education level. The age of the research subjects was in the range of 15-64 years. Most subjects were aged between 20 - 60 years old (83.3%). Of the participants, 15 (50.0%) were female, and the rest (50.0%) were male. Based on the education level of the participants, the lowest education level was elementary school, and the highest was undergraduate level. Around half of the respondents had a high school degree (53.4%), approximately a quarter (23.3%) had a diploma, whilst only a small number of the respondents had only an elementary school qualification (10.0%), a vocational high school degree (3.3%) or a junior high school degree (3.3%).

In the normality test, the respondent's characteristics obtained a significant result of $p = 0.833$, which means that the sample is normally distributed.

Table I: Characteristics of research subjects

Characteristics		Frequency	Percentage (%)
Age			
a.	Teenagers 11-19 years old	3	10.0
b.	Adult 20 - 60 years old	25	83.3
c.	Elderly > 60 years old	2	6.7
Total		**30**	**100**
Gender			
a.	Male	15	50.0
b.	Female	15	50.0
Total		**30**	**100**
Education			
a.	Elementary school	3	10.0
b.	Junior high school	1	3.3
c.	Senior high school	16	53.4
d.	Vocational high school	1	3.3
e.	Diploma	7	23.3
f.	Bachelor	2	6.7
Total		**30**	**100**

Knowledge descriptive analysis

Table II shows that respondents' average score of knowledge before education with the e-booklet (pre-test) was 3.07, with a standard deviation of 0.269. In comparison, the average score of knowledge for respondents after education with the e-booklet (post-test) was 3.37, with a standard deviation of 0.159. This shows an increase in knowledge of drug use in TB patients.

Table II: Knowledge descriptive analysis

	Average	Standard Deviation
Pre-test	3.07	0.269
Post-test	3.37	0.159

Statistical analysis

This study used the Shapiro-Wilk test for the normality test because the sample used was small, with less than 50 people. Based on Table III, which shows the normality test data, an overall *p*-value > 0.05 was obtained. This *p*-value shows that the data is normally distributed.

The overall *p*-value < 0.05 was obtained for the homogeneity test using the Levene test. This value shows that the data groups have different variances or are not homogeneous. Based on the results of testing the assumptions of normality and homogeneity, it was found that the two assumptions were not fulfilled. Therefore, further analysis was carried out with non-parametric tests.

Hypothesis testing

Table III: Hypothesis test

Hypothesis (H_0)	Testing	*p*-value
Pre-test-post-test distribution	Wilcoxon	0.0001

Based on Table III, the results of hypothesis testing using the Wilcoxon test obtained a significance value of 0.0001. Thus, it can be concluded that there are differences in the level of knowledge before and after the provision of e-booklet education regarding knowledge of TB.

Discussion

Most TB patients in this study were still economically productive, aged between 20 – 60 years old. The productive age (15 - 49) is when a person is at the stage of working/producing something both for himself and others. This study's results are similar to those from Nurjana (2015) and found that the majority of pulmonary TB patients were between the ages of 15 – 49 years old, which is the most economically productive age. According to Nurjana (2015), the proportion of TB sufferers was almost equal between males (1.9%) and females (1.8%). Nurjana (2015) also demonstrated that the patient's education level is related to the incidence of TB: the lower a person's education, the greater the risk of developing pulmonary TB. This result is related explained by relating education to the knowledge that will later be related to efforts to seek treatment: The higher a person's education, the better their knowledge about TB is likely to be. Individuals with a higher level of education control so as not to be infected, and treatment efforts if infected are usually maximised. A study conducted on TB patients proved that educational programmes were useful for increasing their knowledge and understanding of the disease conditions, prevention, management, treatments and self-care (Choudhary & Parwez, 2022).

Looking at the results of the present study, the descriptive analysis showed that before the provision of e-booklet education, 30 research subjects obtained an average pre-test score of 3.01. The average value increased to 3.37 after the provision of e-booklet education, with a gap between the pre-test and post-test of 15 days. The positive effect of education in this study is demonstrated by comparing the total score of the respondent's pre-test and post-test scores.

In the statistical test of the comparison of pre-test and post-test with the Wilcoxon test, significance results of 0.00 were obtained by the authors. From the study's results, all respondents experienced an increase in knowledge, thus indicating that the provision of education increased the respondents' knowledge. The results of this study are in line with the research conducted by Ummami (2016) using pamphlets.

The results show that after being provided health education, there is an increase in knowledge about preventing TB transmission. This study suggests that Puskesmas should always provide information to patients with pulmonary TB about health through digital education in a pandemic situation. Alternative forms of Education include direct counselling, health education, and other activities which can be conducted in the Puskesmas work programme. Having a variety of methods for educating patients is essential to improve the attitude of pulmonary TB sufferers in undergoing TB treatment. Through a good attitude towards treatment which must be carried out routinely over six months, it is hoped that medication adherence will increase, dropout cases will decrease, and there will be no patient relapse (extension of treatment). The discoveries of this study support the findings of earlier researchers.

Limitations

The researchers realised that there were still limitations in the research conducted. Some of these limitations are as follows: the researchers only used an intervention group with the one-group pre-test-post-test method, so the researchers could not compare the results of the educational effect. Besides that, this study did not analyse other factors that affect the increase in knowledge other than education using e-booklets.

Conclusion

Based on this study's results, the following conclusions were obtained: Providing education through e-booklets can significantly improve TB treatment behaviour in TB patients at the Denpasar City Health Centre.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgement

This article was presented at the 2022 Annual Scientific Conference of the Indonesian Pharmacist Association. The authors would like to thank the Denpasar City health centre and International Bali University.

The authors also would like to thank their research reviewers and fellow researchers involved in this study.

Source of funding

The International Bali University funded this research through the 2021 UNBI grant.

References

Choudhary, M.S., & Parwez, D.S. (2022) Impact of Health Education Package on Knowledge and Attitude Regarding Transmission of Tuberculosis and Factors Contributing to the Treatment Compliance among Tuberculosis Patients in Urban Community of Sikar City (Rajasthan), *Scholars Journal of Applied Medical Sciences*, **10**(2), 181–186 https://doi.org/10.36347/sjams.2022.v10i02.005

Dinas Kesehatan Provinsi Bali. (2017). Profil Kesehatan Provinsi Bali tahun 2017. Denpasar: Dinas Kesehatan Bali

Efendi, S., Sjattar, E.L., & Syam, Y. (2022) Health counseling support medication adherence to regular pulmonary tuberculosis patients, *Clinical Epidemiology and Global Health*, **15**, 101055 https://doi.org/10.1016/j.cegh.2022.101055

Iribarren, S.J., Milligan, H., Chirico, C., goodwin, K., Schnall, R., Telles, H., Iannizzotto, A., Sanjurjo, M., Lutz, B.R., Pike, K., Rubinstein, F., Rhodehamel, M., Leon, D., Keyes, J., & Demirism G. (2022) Patient-centered mobile tuberculosis treatment support tools (TB-TSTs) to improve treatment adherence: A pilot randomized controlled trial exploring feasibility, acceptability and refinement needs, *The Lancet Regional Health Americas*, **13**, 100291 https://doi.org/10.1016/j.lana.2022.100291

Kaforou, M., Broderick, C., Vito, O., Levin, M., Scriba, T.J., & Seddon, J.A. (2022) Transcriptomics for child and adolescent tuberculosis*, *Immunological Reviews*, **309**(1), 97–122 https://doi.org/10.1111/imr.13116

Kementerian Kesehatan Republik Indonesia. (2017). Profil kesehatan Indonesia 2016. Jakarta: Kementerian Kesehatan Republik Indonesia

Kunin, M., Timlin, M., Lemoh, C., Sheffield, D. A., Russo, A., Hazara, S., & McBride, J. (2022). Improving screening and management of latent tuberculosis infection: development and evaluation of latent tuberculosis infection primary care model. *BMC Infectious Diseases*, **22**(1), 1–11 https://doi.org/10.1186/s12879-021-06925-8

Nurjana, M.A. (2015). Faktor Risiko Terjadinya Tuberculosis Paru Usia Produktif (15-49Tahun) di Indonesia. *Media Penelitian dan Pengembangan Kesehatan,* **25**(3), 163-170

Sari, S.R. (2016). Evaluasi Kepatuhan Terhadap Keberhasilan Terapi Tuberkulosis Paru Pada Pasien Rawat Jalan Di Rsud. Dr. R.M. Djoelham Binjai. Program Studi Pendidikan Ners Universitas Airlangga: jurnal. Halaman: 13

Tola, H.H., Shojaeizadeh, D., Tol, A., Garmaroudi, G., Yekaninejad, M.S., Kebede, A., Ejeta, L.T., Kassa, D., & Klinkenberg, E. (2016). Psychological and Educational Intervention to Improve Tuberculosis Treatment Adherence in Ethiopia Based on Health Belief Model: A Cluster Randomized Control Trial. *PloS one*, **11**(5) https://doi.org/10.1371/journal.pone.0155147

Tola, H.H., Holakouie-Naieni, K., Tesfaye, E., Mansournia, M. A., & Yaseri, M. (2019). Prevalence of tuberculosis treatment non-adherence in Ethiopia: A systematic review and meta-analysis. *International Journal of Tuberculosis and Lung Disease*, **23**(6), 741–749 https://doi.org/10.5588/ijtld.18.0672

Ummami, Y.H. (2016) Pengaruh pendidikan kesehatan tentang tuberkulosis terhadap peningkatan pengetahuan dan sikap penderita dalam pencegahan penularan tuberkulosis di Puskesmas Simo, *Naskah Publikasi*, 1–15