

THE EFFECTIVENESS OF SI PETRUK'S EXERCISE ON THE LEVEL OF TUBERCULOSIS PREVENTION KNOWLEDGE AND COUGH ETIQUETTE IN HIGH SCHOOL STUDENTS IN INDONESIA

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ABSTRACT

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*. Indonesia occupying the 3rd position with the most cases globally. Many factors influence TB transmission, including host factors related to knowledge and habits. It is crucial to conduct an intervention with a demonstration method assisted by audiovisual media that are considered adequate, namely SI PETRUK (Tuberculosis Prevention Education and Cough Etiquette) exercises. This study aims to determine the effect of SI PETRUK exercises on the knowledge level of TB prevention and cough etiquette in high school dormitory students/equivalent in Indonesia. The design of this study was quasi-experimental one-group pretest-posttest design. Interventions are carried out online and offline by complying with health protocols. The samples consisted of 453 people spread over ten schools. Data were measured using the results of the pretest and posttest questionnaires. Bivariate analysis was performed using the Wilcoxon test. There is a significant difference between the level of knowledge before and after health education through the exercise's method on TB prevention and cough etiquette in high school/equivalent dormitory students in Indonesia with low and moderate effectiveness. SI PETRUK's exercises proved to be effective based on this research.

Keywords: Exercise, Tuberculosis Prevention, Cough Etiquette, Level of Knowledge

1. Introduction

Tuberculosis, or what is often called, TB is a contagious infectious disease caused by *Mycobacterium tuberculosis* [1]. This microorganism most often attacks the lungs and is transmitted through droplets from the throat and lungs of people with positive Acid-fast bacilli [2]. This disease can cause dangerous and life-threatening complications if not treated immediately or treatment is not completed [3]. Pulmonary TB is still a major health problem in various countries in the world. The prevalence of TB incidence is estimated at 10 million in 2018. Indonesia occupies the 3rd position with the most TB cases in the world². In 2015, various countries agreed on the Sustainable Development Goals, in which there are essential points of a global action plan. As one of the countries agreed to it, Indonesia must achieve the target within the next 15 years (from 2016 to 2030) [4]. As an effort to realize the number three target of the Sustainable Development Goals (SDGs), which reads, "By 2030, end the epidemic of AIDS, tuberculosis, malaria, and other tropical diseases" [5], Indonesia must reduce the incidence of TB by 90% by 2035 [6]. To end the epidemic, various approaches can be used, one of which is risk factors. The risk factors for a person contracting TB can be grouped into the host (host), agent (cause), and environment (environment) factors. Host factors can be in the form of

immunity, smoking habits, and knowledge that influence behavior regarding the prevention of TB transmission. Public understanding and awareness about how to prevent TB and correct cough etiquette are needed to contain the incidence of TB.

In addition to host factors, there are agent factors which can be in the form of the concentration of *Mycobacterium tuberculosis* bacteria in the air and environmental factors, which can be in the form of environmental conditions that support the proliferation and spread of these bacteria. Some populations in environments that have a high risk of contracting TB include slum areas in urban areas, ports, industries, densely populated areas such as Islamic boarding schools, prisons, barracks, and dormitories [7]. This is because one room is occupied by several students, demographic conditions with a humid climate, and student hygiene and sanitation conditions. From a preliminary study conducted on December 30, 2016, 62 students lived in the Manokwari dormitory. Male and female students live in one dormitory with 3x3 rooms filled by 4-5 students. The study found that hygiene and sanitation behavior was still low because some of them still used shared eating utensils, the room was still humid, and they never dried the mattress TB incidence [8]. One factor that plays an important role is the host factor, namely knowledge about preventing TB transmission and related behaviours. In addition, the prevention of TB is also related to cough etiquette [9]. Cough is one of the main symptoms of pulmonary TB. By coughing, the mycobacterium from the lungs can be released as airborne particles into the environment. To prevent this, people need to know how is the proper way to cough. Therefore, health education regarding the prevention of TB disease transmission and proper cough etiquette must be done [10].

When viewed from previous studies, it was found that studies on the level of knowledge of TB in dormitories with health promotion interventions had been carried out. However, until now, there has been no research conducted in several cities in Indonesia simultaneously. In addition, research using intervention methods in audiovisual media demonstrations is considered the most effective and has never been done. Therefore, to reduce the incidence of TB in Indonesia, health education regarding the prevention of TB disease transmission by demonstration method with audiovisual media is deemed necessary for high school/equivalent dormitory students in Indonesia. So that researchers have an idea to provide counselling with audiovisual demonstration methods in the form of exercise. The exercise used in this study is Exercises SI PETRUK (Education for Tuberculosis Prevention and Cough Etiquette), an innovative idea by researchers based on developing and modifying existing exercises.

2. Material and Methods

Research Design

This study uses a quasi-experimental research design with a one-group pretest-posttest design. Before being given the intervention, the study group was asked to fill out a self-data questionnaire and a pretest questionnaire through the google form media. After that, the study group performed the SI PETRUK Exercises movement as an intervention with the help of audiovisual media in the form of songs and videos of the SI PETRUK Exercises movement. Furthermore, the study group will be given a posttest with the same questionnaire.

Method of Collecting Data

The questionnaire used is a knowledge questionnaire about tuberculosis prevention and a knowledge questionnaire about cough etiquette, each of which consists of 10 questions with four answer choices. The questionnaire has been tested for validity and reliability before being used as a research instrument.

Research Population

The population of this research is high school/equivalent dormitory students in Indonesia with

an affordable population, namely high school/equivalent dormitory students in each city/district in Indonesia where the center of the institution is located. This multicenter research was conducted in 2021 by involving eight institutional centers in ten schools spread throughout Indonesia. The number of respondents in this study was 453 people.

Research Subject

Determination of the sample in this study was done by purposive sampling method with inclusion and exclusion criteria. Respondents included in this study included boarding school students in grades 10-12 high school who had signed an informed consent form and could participate fully from the beginning to the end of the study. Respondents who had received education about TB prevention and cough etiquette did not understand Indonesian, were deaf, blind, illiterate, physically disabled, and respondents who were not cooperative in the study were the criteria for respondents who were excluded.

Data Analysis

The data management process in this study includes coding, data entry, verification, and computer output. The data were processed using the SPSS 16 for Windows program. Data analysis was done by univariate analysis and bivariate analysis. Univariate analysis was conducted to describe the characteristics of the research subjects and presented in the form of a frequency distribution table. Bivariate analysis in this study begins with the normality test, which was carried out with the Kolmogorov-Smirnov test. Furthermore, statistical tests were carried out using an alternative test for not normally distributed data, namely the Wilcoxon test.

3. Result

Description of Subjects Characteristics

This study's subjects' characteristics consist of educational institutions, gender, age, education, and majors. The online intervention data were obtained from 275 respondents across six educational institutions in Indonesia. Most of the study included female participants (66.2%) aged 16 years old (39.6%) grade 12 (44.4%) majoring in science (72.7%). Online intervention data were obtained from 275 respondents spread across six educational institutions in Indonesia. Information on the characteristics of respondents consists of educational institutions, gender, age, education, and specialization. The distribution of respondents in Table 1 shows that more female respondents (66.2%) aged 16 years (39.6%) are in class XII (44.4%) with a specialization in science (72.7%).

Table 1. Distribution of Subjects Characteristics from Online Intervention

Characteristics of subjects	N (%)
Educational institutions:	
Pesantren Al-Hamidiyah	75 (27.3)
SMAN 5 Parepare	68 (24.7)
SMAN IC Kendari	56 (20.4)
SMAN 3 Sumatera Barat	45 (16.4)
SMAN Bali Mandara	18 (6.5)
SMK Bali Mandara	13 (4.7)
Gender:	
Male	93 (33.8)
Female	182 (66.2)
Age in years:	
14	10 (3.6)
15	71 (25.8)
16	109 (39.6)
17	79 (28.7)
18	6 (2.2)
Grade:	
10 th grade high school	59 (21.5)
11 th grade high school	94 (34.2)
12 th grade high school	122 (44.4)
Major:	
Science	200 (72.7)
Social science	44 (16.0)

A total of 209 respondents (45.9% boys and 54.1% girls) across four educational institutions in Indonesia participated in the offline intervention. Table 2 shows that the majority of subjects are 16 years old (47.8%) in grade 11 (52.6%) science major (85.2%). Offline intervention result data obtained as many as 209 respondents spread across four educational institutions in Indonesia. Based on table 2, it was found that the distribution was higher among female respondents (54.1%) aged 16 years (47.8%) in class XI SMA/equivalent (52.6%) with specialization in science (85.2%).

Table 2. Distribution of Subjects Characteristics from Offline Intervention

Characteristics of Subjects	N (%)
Educational institutions:	
SMAI Andalusia	66 (31.6)
SMA IT Raudhatul Ulum Indralaya	63 (30.1)
Pondok Pesantren Sultan Hasanuddin Gowa	56 (26.8)
SMA IT ICBS Payakumbuh	24 (11.5)
Gender:	
Male	96 (45.9)
Female	113 (54.1)
Age in years:	
14	10 (4.8)
15	60 (28.7)
16	100 (47.8)
17	39 (18.7)
Grade :	
10 th grade high school	56 (26.8)
11 th grade high school	110 (52.6)
12 th grade high school	43 (20.6)
Major:	
Science	178 (85.2)
Social science	31 (14.8)

Table 3. Pretest and Posttest TB Prevention (Offline)

	TB (Offline)	Prevention
	Pretest N (%)	Posttest N (%)
Mean (SD)	68.3 (1.55)	77.9 (1.32)
Min Score	20	40
Max Score	100	100
Mean Difference	9.6	
N Gain Score	0.30	
Wilcoxon (p-value)	0.000	
Negative Ranks	32 (15.32%)	
Positive Ranks	126 (60.28%)	
Ties	51 (24.40%)	

Wilcoxon test found a difference between the pretest and posttest scores with a negative rank of 15.32%, a positive rank of 60.28%, and ties of 24.40%. The posttest means knowledge about TB prevention with offline intervention increased 9.6 points from the pretest mean. The N gain score of 0.30 indicates moderate effectiveness.

Table 4. Pretest and Posttest TB Prevention (Online)

	TB Prevention (Online)	
	Pretest N (%)	Posttest N (%)
Mean (SD)	68 (1.54)	76.3 (1.41)
Min Score	10	30
Max Score	100	100
Mean Difference	8.3	
N Gain Score	0.26	
Wilcoxon (p-value)	0.000	
Negative Ranks	50 (18.18%)	
Positive Ranks	156 (56.72%)	
Ties	69 (26%)	

The posttest means of knowledge about TB prevention with online intervention increased by 8.3 points from the pretest mean. The N gain score of 0.26 indicates low effectiveness. Wilcoxon test found a difference between the pretest and posttest scores with a negative rank of 18.18%, a positive rank of 56.72%, and ties of 26%.

Table 5. Pretest and Posttest Cough Etiquette (Offline)

	Cough (Offline)	Etiquette
	Pretest N (%)	Posttest N (%)
Mean (SD)	71.2 (1.53)	79.6 (1.44)
Min Score	30	20
Max Score	100	100
Mean Difference	8.4	
N Gain Score	0.29	
Wilcoxon (p-value)	0.000	
Negative Ranks	46 (22.02%)	
Positive Ranks	118 (56.45%)	
Ties	45 (21.53%)	

The posttest means of knowledge about cough etiquette with offline intervention increased by 8.4 points from the average pretest score. The N gain score of 0.29 indicates low effectiveness. Wilcoxon test found a difference between the pretest and posttest scores with a negative rank of 22.02%, a positive rank of 56.45%, and ties of 24.53%.

Table 6. Pretest and Posttest Cough Etiquette (Online)

	Cough (Online)	Etiquette
	Pretest N (%)	Posttest N (%)
Mean (SD)	73.2 (1.54)	81.8 (1.41)
Min Score	0	30
Max Score	100	100
Mean Difference	8.6	
N Gain Score	0.32	
Wilcoxon (p- value)	0.000	
Negative Ranks	51 (18.54%)	
Positive Ranks	157 (58%)	
Ties	67 (24.36%)	

The online intervention's posttest means of knowledge about cough etiquette increased 8.6 points from the average pretest score. The N gain score of 0.32 indicates moderate effectiveness. Wilcoxon test found a difference between the pretest and posttest scores with a negative rank of 18.54%, a positive rank of 58%, and ties of 24.36%.

Table 7. Knowledge Level of TB Prevention (Offline)

		TB Prevention (Offline)	
		Pretest N (%)	Posttest N (%)
Lack of Knowledge		14 (6.7%)	2 (1%)
Enough Knowledge		117 (56%)	63 (30.1%)
Good Knowledge		78 (37.3%)	144 (68.9%)

The knowledge of good category regarding TB prevention at the pretest was 37.3% to 68.9% or an increase of 31.6% after being given offline intervention. Knowledge is sufficient in the pretest by 56% to 30.1% in the posttest. Lack of knowledge in the pretest of 6.7% changed to 1% after the offline SI PETRUK exercise intervention.

Table 8. Knowledge Level of TB Prevention (Online)

		TB Prevention (Online)	
		Pretest N (%)	Posttest N (%)
Lack of Knowledge		19 (7%)	4 (1.5%)
Enough Knowledge		161 (58.5%)	116 (42.1%)
Good Knowledge		95 (34.5%)	155 (56.4%)

The knowledge of good TB prevention at the pretest was 34.5% to 56.4% or increased by 21.9% after an online intervention. Knowledge is sufficient in the pretest by 58.5% to 42.1% in the posttest. Lack of knowledge on the pretest by 7% changed to 1.5% after the online SI PETRUK exercise intervention.

Table 9. Knowledge Level of Cough Etiquette (Offline)

		Cough Etiquette (Offline)	
		Pretest	Posttest
		N (%)	N (%)
Lack of Knowledge		14 (6.7%)	4 (2%)
Enough Knowledge		97 (46.4%)	72 (34.4%)
Good Knowledge		98 (46.9%)	133 (63.6%)

The knowledge of good category regarding cough etiquette at the pretest was 46.9% to 63.6% or an increase of 16.7% after being given an offline intervention. Knowledge is sufficient in the pretest by 46.4% to 34.4% in the posttest. Lack of knowledge on the pretest by 6.7% changed to 2% after the offline SI PETRUK exercise intervention.

Table 10. Knowledge Level of Cough Etiquette (Online)

		Cough Etiquette (Online)	
		Pretest	Posttest
		N (%)	N (%)
Lack of Knowledge		17 (6.2%)	5 (1.8%)
Enough Knowledge		127 (46.2%)	83 (32%)
Good Knowledge		131 (47.6%)	187 (68%)

The knowledge of good category cough etiquette at the pretest was 47.6% to 68% or an increase of 20.4% after an online intervention. Knowledge is sufficient at the pretest by 46.2% to 32% at the posttest. Lack of knowledge on the pretest by 6.2% changed to 1.8% after the online SI PETRUK exercise intervention.

4. Discussion

In the normality test, all data obtained results <0.05 , so it can be determined that the data is not normally distributed, so it does not meet the requirements of the T-dependent test and is replaced by an alternative test, namely Wilcoxon.

Knowledge Level of Prevention of Pulmonary Tuberculosis of High School/Equivalent Dormitory Students in Indonesia

There are differences in online and offline intervention research on the knowledge of pulmonary tuberculosis prevention. The online intervention showed that 56.72% of respondents experienced an increase in knowledge of pulmonary tuberculosis prevention, while the offline intervention showed more effective results with an increase in knowledge of 60.28%. Good knowledge obtained after the online intervention was 56.4%, while 68.9% after the offline intervention. The results of the Wilcoxon test on both online and offline interventions showed that $p\text{-value} = 0.000 < 0.05$ which indicated that there was a significant difference in SI PETRUK exercise on the level of knowledge of pulmonary tuberculosis prevention. Research conducted in an elementary school showed an effect of using kinesthetic, audio media in exercises and balanced nutrition message songs on knowledge of balanced [11]. The absorption rate of information from reading can be absorbed by 20%, from

something heard 30%, from something seen 40%, from something spoken 50%, from something done 60%, and the largest absorption of information is obtained from what is seen, heard, spoken and done at the same time, which is 90% [12]. Knowledge is one factor that influences a person's actions, so it can be concluded that good knowledge affects good actions and behavior [13].

Knowledge Level of Cough Etiquette for High School/Equivalent Dormitory Students in Indonesia

Based on the description of the results of the intervention research conducted offline and online, it shows that there are 56.45% and 57.09% of respondents respectively experienced an increase in cough etiquette knowledge. When viewed from the definite increase in knowledge of cough etiquette after the intervention, it was found that the knowledge category for both offline and online interventions was 63.6% and 68%, respectively. These results show that the online intervention increased cough etiquette knowledge more than the offline intervention. The results of the Wilcoxon test on offline and online interventions showed that $p\text{-value} = 0.000$ ($\alpha < 0.05$), which indicated that there was a significant difference in the SI PETRUK exercise intervention on the level of knowledge of cough etiquette. The results of this study are different from the research conducted in 2020, which showed that there was no significant difference in CTPS knowledge after the CTPS exercise intervention [14]. A significant difference when exercises intervention is carried out on an individual's knowledge is related to the Cone of Experience theory proposed by Edgar Dale. In this research, the exercise method used is learning that allows an individual to participate in direct activities so that the ability to remember the learning given is 90% compared to the writing, viewing, or listening methods [15]. The current pandemic and increasingly sophisticated technological advances require people to be able to adapt. They are included in the intervention process, which can now be done offline and online.

Various ways of intervention can be developed further to get the best results. The author hopes that further research can further examine the effectiveness of interventions with audio-visual methods with online and offline demonstrations.

5. Conclusion

There is a significant difference between the level of knowledge before and after health education through the exercise's method on TB prevention and cough etiquette in high school/equivalent dormitory students in Indonesia with low and moderate effectiveness.

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