Health belief model approach in reducing worm infections in elementary school in North Aceh, Indonesia

Rizka Sofia*, Yuziani2, Wheny Utariningsih3

ABSTRACT

Introduction: The prevalence of worm infections in Indonesia is still relatively high, about 2.5% - 62%, depending on geographical conditions, education, economics, environmental sanitation and community hygiene. Elementary school students have an increased risk of worm infections due to personal hygiene and environmental factors which cause high levels of worm infections in students. Implementing the health belief model (HBM) will be a model for identifying public understanding regarding preventive and promotive efforts to reduce the risk of worm infections. This study aims to determine the application of the HBM for reducing worm infections in elementary school students in Lapang sub-district in North Aceh.

Method: This type of research is a purposive sampling with a cross sectional design. A number of 120 respondents are from elementary school in Lapang sub-district, HBM was measured by using a questionnaire. Worm infection was determined from the results of fecal examination using the direct slide method.

Results: The results found that 45.8% students experienced worm infections, majority's perception of susceptibility to worm infections (67.3%), perception of seriousness (65.5%), and perception of benefits (65.5%) were in low category but perception of barriers was in high category (58.2%). HBM Assessment Analysis on perceived vulnerability shows a p-value of 0.020, perceived seriousness shows 0.034, perceived obstacles show 0.021, and perceived benefits shows 0.022. The four HBM concept assessments have a value of p<0.05.

Conclusion: The results concluded that the Ho meaning was accepted which there was a relationship between HBM and the reduction of worm infections.

Keywords: ringworm, elementary school students, knowledge, attitude.

INTRODUCTION

Wormed is an intestinal worm infection, often caused by roundworms (Ascaris lumbricoides), whipworms (Trichuris trichiura), and hookworms (Necator americanus and Ancylostoma duodenale). Wormed is a health problem that often found in the world. Based on data from the World Health Organization (WHO), over one billion people are infected with Ascaris lumbricoides, 795 million people are infected with the Trichiuris trichiura worm and 740 million with the Hooworm worm. The infection is widespread in the tropics and sub tropics, with large numbers in sub-Saharan Africa, America, China and East Asia.1

The prevalence of worm infections in Indonesia is still relatively high, about 2.5% - 62%, depending on geographical conditions, education, economics, environmental sanitation and community hygiene (Ministry of Health, 2017). The results of a survey by the Ministry of Health Indonesia, several provinces in Indonesia showed that the percentage of worms in general was 40-60%. Meanwhile, the number of incidents increases to 30 - 90% if the prevalence is calculated in elementary students (Rosyidah and Prasetyo, 2020). The age range that often experiences worms is 6-12 years old or at elementary school level because they interact more often with the soil.2

Worm infections affect intake, digestion, absorption and metabolism of food. Cumulatively, worm infections can cause losses in nutritional needs due to lack of calories and protein, as well as blood loss. Worm infections have the potential for losses due to the loss of carbohydrates, protein and blood. Apart from hampering physical development, intelligence and work productivity, it can reduce the body's resistance so that it is susceptible to other diseases.2

Wormed in students can cause a decrease in the level of cognitive function due to reduced iron status, decreased macro-nutrient status, inhibiting children's physical growth, development, activity and intelligence. This happens because the worms will absorb the substances that children need during their growth period. Children who frequently experience worms over a long period of time will have an impact on the decline in the quality of human resources.3 Worms are more common in rural areas. This high prevalence in Indonesia is because the country has a tropical climate which is an environment for the development of endemic diseases including worms, and Indonesia has various risk factors for the occurrence of worms such as lack
of clean living behavior in protecting the environment, lack of knowledge, and low socio-economic and level of knowledge of a person. According to the theory developed by Stretcher & Rosenstock, it is stated that a person's belief in the threat of a disease, perception of the benefits, and barriers related to health behavior will predict the possibility of the individual adopting that health behavior or not. Behavior is one of the important factors in increasing the level of health. Whether the health environment of individuals, families and communities is healthy or unhealthy really depends on human behavior itself. Health behavior during a pandemic is closely related to a person's response in facing a pandemic. Each person has a belief assessment of their own level of vulnerability and severity so that they make efforts to prevent disease. Assessment of healthy actions for disease prevention can be done using the HBM which includes perceived susceptibility, perceived severity, perceived barriers, perceived benefits and cues to action (cue to action). This HBM can be adapted to explore various long-term and short-term health behaviors. The use of the health belief model method in reducing the number of worm infections has never been done. Therefore, with the implementation of the Health Belief Model, it is hoped that it can influence the healthy living behavior of elementary school students so that worm infections can be reduced.

**METHOD**

This research is a cross-sectional study with a design on a population of families with elementary school students in Lapang sub-district. Data was obtained by taking fecal samples and examined using the direct slide method in the parasitology laboratory. Nutritional status data was obtained by measuring body weight. Parental knowledge data was obtained from questionnaires. Health Belief Model is calculated using the HBM questionnaire.

The questionnaire about the HBM consists of 24 statements that must be answered by respondents with answers in the answer categories of strongly agree to disagree strongly. All statements in this questionnaire include 6 components of the health belief model, namely perceived vulnerability, perceived seriousness, perceived benefits, perceived. Data were analyzed using SPSS, version 25.

**RESULT**

This research was carried out at the Lapang North Aceh District Elementary School. The population of this research is all elementary school students in Lapang District. The number of elementary schools in Lapang sub-district is 6 elementary schools: SD Negeri 1 Lapang, SD Negeri 2 Lapang, SD Negeri 3 Lapang, SD Negeri 4 Lapang, SD Negeri 5 Lapang, and SD Negeri 6 Lapang with a total of 921 students. The sampling method uses a purposive sampling technique with the following criteria: 1) Students who are in grade 2, 2) Students who are willing to have their feces taken, 3) parents of students who are willing to be respondents. The sample size was determined based on the Slovin formula, totaling 120 samples.

The research results are presented using 2 analytical tests, univariate analysis for description and bivariate analysis to determine the relationship between the two variables that have been determined.

**Table 1. Description of worm infections in elementary school students in Lapang District, North Aceh**

<table>
<thead>
<tr>
<th>Worm Infection</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>65</td>
<td>54.2</td>
</tr>
<tr>
<td>Positive</td>
<td>55</td>
<td>45.8</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 2. Description of the HBM with worm infections in elementary school students in Lapang District, North Aceh**

<table>
<thead>
<tr>
<th>Perceived Belief Model</th>
<th>Worm Infection</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived susceptibility</td>
<td>High</td>
<td>18</td>
<td>32.7</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>37</td>
<td>67.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>55</td>
<td>100.0</td>
</tr>
<tr>
<td>Perceived severity</td>
<td>High</td>
<td>19</td>
<td>34.5</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>36</td>
<td>65.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>55</td>
<td>100.0</td>
</tr>
<tr>
<td>Perceived barrier</td>
<td>High</td>
<td>32</td>
<td>58.2</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>23</td>
<td>41.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>55</td>
<td>100.0</td>
</tr>
<tr>
<td>Perceived benefit</td>
<td>High</td>
<td>19</td>
<td>34.5</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>36</td>
<td>65.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>55</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The characteristics of perceived benefits show that most respondents have a low perception at 65.5% (36) compared to a high perception at only 34.5% (55).

**Table 3** shows an analysis of HBM with worm infections in elementary school students in North Aceh. The analysis used the chi-square test to see the relationship between the Health Belief Model (HBM) and worm infections in elementary school students in North Aceh. The analysis results for the characteristics of perceived vulnerability show a p-value of 0.020 (p<0.05), which means Ho is accepted regarding a relationship between the characteristics of perceived vulnerability and worm infections using the HBM in elementary school students in North Aceh.

**DISCUSSION**

The results of the relationship between HBM and worm infections in elementary school students in North Aceh are described in **Table 1**. The results showed that the majority of respondents were negative at percentage 54.2% (65) compared to positive results at 45.8% (55).

Elementary school students often experience worm infections, accordance with research conducted by Liza on elementary school students in Medan that the results showed at 54% of elementary school students were positive for worms and 75% were infected with Ascaris lumbricoides.9

This worm can be transmitted through several routes, including entering infective eggs into the human mouth with contaminated food or drink, ingestion through dirty hands, for example, in children, or inhaling infective eggs with airborne dust.10

**Table 2** shows a description of HBM with worm infections in elementary school students in North Aceh District. From a total sample of 120 respondents, 55 respondents experienced worm infections. The HBM assessment of worm infections was carried out on positive respondents, for the characteristics of perceived susceptibility, it showed that the majority of respondents had a low perception at 67.3% (37) compared to a high perception of only 32.7% (18). The characteristics of seriousness show that the majority of respondents have a low perception of seriousness at 65.5% (36) compared to high at 34.5% (19). The characteristics of perceived barriers show that the majority of respondents have a high perception of 58.2% (32) compared to a low perception of only 41.8% (23). The characteristics of perceived benefits show that most respondents have a low perception at 65.5% (36) compared to a high perception at only 34.5% (55).

The Health Belief Model (HBM) assessment is a model that specifies how individuals cognitively demonstrate healthy behavior and efforts to achieve health or cure from an illness. There are 4 main concepts from this health belief model. In the first concept of perceived susceptibility, the research results show that the majority of respondents perceive susceptibility in the low category with a percentage of 55.8%, meaning that most respondents feel that their children are not susceptible to being infected with worms.
This perception of vulnerability assesses how someone perceives themselves as vulnerable or not to experiencing illness or contracting a disease. The higher the category value, the better because they will be more careful. In the second concept of perceived severity, the research results show that the majority of respondents have a perception of seriousness in the low category at 55%, which means that the majority of respondents feel that worm infections are not life-threatening so respondents do not have a strong urge to avoid worm infections. This perception of vulnerability assesses how a person perceives themselves regarding the seriousness of the threat of disease, especially worms. The higher the category value, the stronger the urge to act to avoid it. The third concept is Perceived Barriers, the results of the research show that the majority of respondents have perceived barriers in the high category at 55%, which means that the majority of respondents have barriers when making behavior changes, including the difficulty of changing long-standing habits such as defecating on the ground, not providing a latrine at home, not used to washing hands when doing activities and assuming that children generally don’t wear footwear when playing and that is normal. This perception of barriers looks at the potential for negative impacts from suggested/recommended health behavior which may act as an obstacle to taking action or changing behavior. The higher the category value, the stronger the obstacles to changing behavior. In the fourth concept of Perceived Benefits, the research results show that the majority of respondents have perceived barriers in the high category at 54.2%, meaning that most respondents do not feel any benefits from changing their behavior. If the recommended action or behavior change is seen as beneficial, the individual will tend to act or change his behavior. The higher the category value, the stronger the perceived benefits for behavior change.11,12

The basic concept in HBM is healthy behavior influenced by each individual’s beliefs or threat perception and behavior evaluation. Threat perception explains two main beliefs, perceived susceptibility to illness or health problems and anticipated severity of the consequences of illnesses. The behavioral evaluation also consists of two benefits beliefs and ability beliefs (efficacy) as well as the existence of sacrifices and obstacles (in healthy behavior).11 According to Conner & Norman, the construct of perceived susceptibility (perceived risk) also influences the emergence of healthy behavior. When someone knows they are at risk of contracting a disease, they believe they are indeed at risk.13 Therefore, they will try to do things that can reduce the potential risk. The higher a person's perceived risk, the higher his or her tendency to behave healthily to reduce the risk. Unfortunately, this also works the other way around. When someone feels they are not at risk of disease, they are also less likely to behave unhealthily. However, this statement is not an absolute law. Sometimes beliefs about disease risk do not affect healthy or unhealthy behavior. The anticipated severity construct is an individual’s belief about the seriousness of an illness. Perceptions about how serious a disease can be obtained from the knowledge or medical information and can come from a person's beliefs about the impact that may arise in their life due to the disease. Then the perceived benefit construct means that an individual behaves healthily because he believes that something he does will provide benefits, especially in reducing the potential for contracting a disease. Healthy behavior carried out by individuals because of beliefs about the benefits of a new activity, usually prevents disease onset.14,15,16

In this study, a bivariate analysis test was carried out which aimed to determine the relationship between implementing the health belief model and reducing worm infections and increasing the nutritional status of elementary school students.

Table 3 shows an analysis of HBM with worm infections in elementary school students in North Aceh District. The analysis used the chi-square test to see the relationship between the Health Belief Model (HBM) and worm infections in elementary school (SD) students in North Aceh. The results of the analysis for the characteristics of perceived vulnerability show a p-value of 0.020 (p<0.05), which means Ho is accepted regarding a relationship between the characteristics of perceived vulnerability and worm infections using the HBM model in elementary school students in North Aceh.

The results of the analysis of seriousness characteristics show a p-value of 0.034 (p<0.05), which means Ho is accepted regarding a relationship between the characteristics of perceived seriousness and worm infections using the HBM in elementary school students in North Aceh. The results of the analysis of perceived benefits show a p-value of 0.022 (p<0.05), which means Ho is accepted regarding a relationship between the characteristics of perceived benefits and worm infections using the HBM in elementary school students in North Aceh.

Analysis of the assessment of the relationship between the HBM and worm infections in elementary school students using 4 concepts to specify how individuals cognitively demonstrate healthy behavior and efforts to become healthy or cure from an illness have a meaningful relationship. This research is in accordance with research conducted by Suryani et al. which used the HBM in handling the Covid-19 pandemic in Jakarta. According to Angela’s research, the use of basic concepts from the HBM theory can reduce the number of Covid-19 in Jakarta, this condition impacts the healthcare behavior determined by an individual's personal beliefs or perceptions regarding a disease and the strategies available to reduce the occurrence of the disease.11

Changes in attitudes are greatly influenced by the educational media used. In the 5.0 era, the use of digital media is very important to provide the public with the importance of maintaining health. In this study, the relationship between HBM and worm infections showed significant value, so educational media is needed to reduce the risk of worm infections that can occur. In Ilham’s research regarding the effectiveness of conveying Covid-19 information and knowledge at Universitas
Malikussaleh, it showed that 80.8% of respondents had received information related to Covid-19 education, and 87.5% showed that knowledge related to Covid-19 was categorized as good, this was due to the effectiveness of its use and delivery of information carried out by the Unimal Covid 19 Task Force.\textsuperscript{17,18}

**CONCLUSION**

The results of this study showed that the pearson chi square p-value was (p<0.05), which means regarding a relationship between HBM in reducing worm infections in elementary school students in Lapang District, North Aceh.

**FUNDING**

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**ETHICAL CONSIDERATION**

This research has passed the ethical review No.1039/KEPK/FKUMSU/2023.

**CONFLICT OF INTEREST**

All author declares there is no conflict of interest regarding publication of current study.

**AUTHOR CONTRIBUTION**

All authors had contributed in manuscript writing and agreed for the final version for publication.

**REFERENCES**