



# Low socioeconomic level and enterobius vermicularis: A interventional study to children and their mothers in home

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## Abstract

To determine the effects of care and monitoring provided at home to children in whom *Enterobius vermicularis* is detected and their mothers on the presence of observing the parasite and the knowledge and practices of the children and their mothers on the issue. This study used a pre-test-post-test quasi-experimental design. In the study, 20 students and their mothers were determined as the experimental group, while 18 students and their mothers were determined as the control group. Home visits were made to the families of the children in the experimental group for 6 months. At these home visits, health education on the parasite was provided to the mothers and the children. There were highly significant differences between the experiment and control groups in terms of *E. vermicularis* presence, knowledge and hygiene practice scores ( $p < .001$ ).

## KEYWORDS

*Enterobius vermicularis*, health education, home care, nurse

## 1 | INTRODUCTION

*Enterobius vermicularis* is among the most prevalently observed parasites in primary school children in the world and in Turkey (Berger, 2017; Yazgan et al., 2015). The prevalence of *E. vermicularis* in school-age children was reported as 1.7%–28.7% in some countries (Bhattacharya et al., 2017; De Alegria et al., 2017) and 10.4%–16.1% in Turkey (Aytar et al., 2015; Yazgan et al., 2015).

Most studies on the topic in Turkey have emphasized that the prevalence of intestinal parasites is high, this is still significant as a public health problem, and it is important to provide holistic care covering simultaneous repair of the environment, raising awareness in the society especially on personal hygiene and health education (Çelik et al., 2014; Yazgan et al., 2015). However, there is a limited number of studies on the effectiveness of health education in controlling parasitic diseases (Kaplan et al., 2002; Karadeniz, 1995). A study conducted in Egypt stated that health education led to changes

in the knowledge and habits of mothers in controlling *E. vermicularis* (Mobarak et al., 2011). In Korea, information was provided by brochures to the families of preschool children with *E. vermicularis*, and it was seen that the parasite rate substantially decreased 6 months after the first follow-up (Kang et al., 2012). Consequently, while no study in Turkey or the region in general was encountered to examine the effectiveness in health education in controlling *E. vermicularis* which is seen frequently in school-age children, it is noteworthy that studies conducted in different countries took on children and their mothers separately. However, it is recommended to take on family members together in medical treatment and care in controlling *E. vermicularis* which has a high rate of recurrence and is known as a household infection (CDC, 2019). This is why this study aimed to take on children in whom *E. vermicularis* was detected and their mothers together by providing care in the environment they lived in and take part in monitoring due to the recurrence risk of the disease. Additionally, during the planning and implementation of this study in

Turkey, in the literature review carried out by the researcher, while several studies were found to examine health education and monitoring by nurses regarding various health problems, studies on such a scale on parasitic diseases could not be encountered.

The purpose of this study was to determine the effects of home care and monitoring provided to children with the parasite *E. vermicularis* and their mothers on the presence of *E. vermicularis* and the knowledge and hygiene practices of the children and mothers on this issue.

## 1.1 | Research Hypotheses

**H1<sub>1</sub>:** Home care and monitoring on the issue of *E. vermicularis* affect the presence of *E. vermicularis*.

**H1<sub>2</sub>:** Home care and monitoring on the issue of *E. vermicularis* affect the knowledge levels and hygiene practices of mothers.

**H1<sub>3</sub>:** Home care and monitoring on the issue of *E. vermicularis* affect the knowledge levels and hygiene practices of children.

## 2 | MATERIAL AND METHOD

### 2.1 | Search methods

The pre-test-post-test quasi-experimental design was used to determine the effects of home care and monitoring on the presence of *E. vermicularis*.

### 2.2 | Participants

The study was carried out at two different primary schools located in the city centre of X. In determining these schools, the socioeconomic level assessment of the Turkish Statistical Institute on the level of neighbourhoods and roads for the province of X was taken as a criterion. By using the socioeconomic level assessment on the level of neighbourhoods and roads for X, a total of six schools with low socioeconomic status were determined (TSI, 2015). Instead of including all children living in areas with low socioeconomic levels under the risk of *E. vermicularis*, as the study was a dissertation study, considering limitations such as cost, time and personnel, it was decided to select a sample (Tezcan, 2017). In selection of the sample, it was decided to select two out of the six schools by simple random sampling.

In the first phase of the study, parasite screening was conducted to determine the presence of *E. vermicularis* in students at schools. For this purpose, it is planned to hold a parents' meeting by meeting with school principals. In the parent meetings, the researcher who were trained on the study showed the mothers of the students how

### Impacts

- *Enterobius vermicularis* is among the most prevalently observed parasites in primary school children.
- In this study, *Enterobius vermicularis* decreased significantly as a result of health education and follow-up.
- In interventions, it may be suggested to use materials such as animation and cartoons that will attract the attention of children.

the tapes would be used on what part of the body. A form that described how to do this procedure at home visually and in writing was given, and it was stated that the form included contact information through which they could reach to the researcher. The mothers were asked to bring the descriptive information form and the three pieces Paraset adhesives (pinworm screening tapes with information on the student's name-surname, classroom and date of specimen collection) to their teacher the next day. Paraset adhesives and forms collected from a total of 663 students that were given to the teachers.

The collected specimens were examined by the researcher in the laboratory of the X State Hospital and the laboratory of the Department of Biology at X University. At School A, 20 positive cases were determined from 366 students. At School B, there were 18 positive cases from 297 students. The results were shared with their families, school administrations and teachers.

As a result of screening, *E. vermicularis* was detected in a total of 38 students including 20 out of 366 students at Primary School A and 18 out of 297 students at Primary School B. In the study, the experiment and control groups were determined randomly, and the 20 students at School A and their mothers constituted the experiment group, while the 18 students at School B and their mothers constituted the control group. The mothers and the children in the experiment and control groups were similar in terms of their socio-demographic characteristics ( $p > .05$ ).

As there was no other completely corresponding study on this topic, it was decided to calculate the power of the study at the end, and the intervention was started. In the power analysis, the effect size was calculated as 0.6. Considering the effect size of 0.6 and significance level of 0.05, the power of the study with a total of 38 children was found as 95.4%.

### 2.3 | Instruments

#### 2.3.1 | Descriptive information form

The form was prepared by the researcher by reviewing the information in the literature (Baker, 2013; CDC, 2019; Kannan, 2016). The form consisted questions on sociodemographic data, knowledge of mothers on parasitic diseases and symptoms related to pinworms.

### 2.3.2 | *Enterobius vermicularis* scanning tape

In the study, the presence of *E. vermicularis* in the students was collected using the form of Paraset adhesives (Pinworm scanning tapes with student name-surname, branch and days on which samples will be taken) distributed to the mothers. The collected bands were examined by the researcher in the hospital laboratory.

### 2.3.3 | Form of assessment of the knowledge of mothers on Pinworms

The questionnaire form used by Mobarak et al., 2011 which is not only similar to those in other studies but also the most comprehensive one in terms of content which provides ease of assessment was taken as a basis (Mobarak et al., 2011). The form that was translated into Turkish contained 9 titles as the pinworm's definition, life cycle, ways of transmission, causes, dermatological symptoms, general symptoms, complications, diagnosis and treatment. For each subject, the correct answers of the mothers were assessed as 2 points, partly correct ones were assessed as 1 point, and wrong ones were assessed as 0 points. According to the total scores obtained from the questionnaire form, those who received 50% or lower scores were considered as weak, those in the range of 50%–75% were considered as medium, and those higher than 75% were considered as good in terms of their knowledge.

### 2.3.4 | Form of assessment of the hygiene practices of mothers regarding Pinworms

This form contained a total of 15 statements including eight statements on the general hygiene practices of the mothers and 7 on their hygiene practices in protection from and prevention of pinworms. Each correct practice was scored as 1 point, while erroneous practices were scored as 0 points. Based on the total scores in the questionnaire form, those with scores of 75% or lower were considered as erroneous, while those higher than 75% were considered to take part in the correct practices (Mobarak et al., 2011).

### 2.3.5 | Form of assessment of the knowledge of children on Pinworms

The questionnaire form used by Mobarak et al., 2011 which is not only similar to those in other studies but also the most comprehensive one in terms of content which provides ease of assessment was taken as a basis (Mobarak et al., 2011). The form that was translated into Turkish contained 9 titles as the pinworm's definition, life cycle, ways of transmission, causes, dermatological symptoms, general symptoms, complications, diagnosis and treatment. For each subject, the correct answers of the children were assessed as 2 points, partly correct ones were assessed as 1 point, and wrong ones were assessed as 0 points. According to the total scores obtained from the

questionnaire form, those who received 50% or lower scores were considered as weak, those in the range of 50%–75% were considered as medium, and those higher than 75% were considered as good in terms of their knowledge.

### 2.3.6 | Form of assessment of the personal hygiene practices of children regarding Pinworms

The form contained nine statements related to hygiene practices for protection from and prevention of pinworms. Each correct practice was scored as 1 point, while erroneous practices were scored as 0 points. Based on the total scores in the questionnaire form, those with scores of 75% or lower were considered as erroneous, while those higher than 75% were considered to take part in the correct practices (Mobarak et al., 2011).

### 2.3.7 | Training tools used in the study

#### *Adult education guide*

The education manual was developed by the researcher by reviewing the literature as the main education material for home visits with the purpose of increasing the effectiveness of the treatment of *E. vermicularis*, preventing recurring infections and informing the mothers (CDC, 2019; Kannan, 2016; WHO, 2002). Expert opinion was obtained for the education manual that was prepared, and the material was used after making the necessary adjustments. This material consists of 16 pages, and the text is supported by colourful visuals. The material was used during the 2nd and 4th house visits to the experimental group, and printed copies were given to each parent in case of re-reading.

#### *Children's education material*

With the purpose of increasing the effectiveness of the treatment of *E. vermicularis*, preventing repeated infections and informing children, the education material titled 'Story of Afacan and the Pinworm' was developed by the researcher to be used at home visits as the main education material. Imagery for the material whose script was prepared by the researcher was designed by graphical design experts. After obtaining expert opinion from education sciences and making the necessary adjustments, the education material was used (Figure 1). This material consists of colourful horizontally prepared 12 pages and in a size that children can read. The material was used during the 2nd and 3rd house visits to the experimental group and was given to each child in printed form in case of re-reading.

## 2.4 | Procedures in the experimental part of the research

Explanations on the interventions at home visits on the experiment and control groups in the study are given below, and the procedures are summarized on the flow diagram (Figure 2).

### 2.4.1 | Study group process

Regular home visits were made for 6 months to the families of the children in the experiment group. A total of six visits were made including 4 in the first month, 1 in the second month and 1 in the sixth month. The general plan to be followed during the visits was explained, and changes were made on the dates of the visits based on the requirements of the families. Each home visit takes 30–45 min on average. During these visits, training, monitoring and consultancy were provided in accordance with the planning (Figure 2). In addition, during the first home visit to the experimental group, an explanation letter prepared by the researcher was given to the mothers after the children and families applied to family physicians for pinworm medication. During this visit, the importance of drug use by all family members in drug treatment was explained.

### 2.4.2 | Control group

Three home visits were made to the families of the students in the control groups simultaneously with the experimental group. No intervention other than directing the families to medication treatment was made. An explanation letter prepared by the researcher was given to the mothers after the children and their families applied to their family physicians for pinworm medication. The mothers were reminded that they should take another dose of medication in consultation with their family doctor 3 weeks after the first dose of medication. After the last medication, Pareset adhesive with the names of the children was given to the families to take samples from the children. After the medication, samples were taken from the families and questionnaires were applied. After the examination, the results were reported to the families by phone. The same procedure was done after treatment and during follow-up periods.

### 2.5 | Evaluation of the Data

Descriptive information, distribution statistics for the categorical variables and the normal distribution test of Shapiro–Wilk analysis

were utilized. Mann–Whitney U test, chi-squared test and Wilcoxon t-test analysis were used. The level of significance was accepted as  $p < .05$ .

## 3 | RESULTS

There was a significant difference in terms of the prevalence of *E. vermicularis* in the post-test measurements between the experiment and control group children ( $p < .05$ ). In the follow-up measurements, this difference was highly significant ( $p < .001$ ) (Table 1).

When the *E. vermicularis* knowledge and hygiene score medians of the mothers and their children in the experimental and control groups were evaluated, it was determined that there was no statistically significant difference between the pre-test medians in both; however, there was a statistically significant difference between the post-test and follow-up scores. ( $p < .001$ ; Graph 1).

While the ratio of the mothers with a good level of knowledge in the experiment group was 0% before the education, it became 60% after the education and 75% at the follow-up. The ratio of the mothers with a good level of knowledge in the control group was 0% before and after the education and 5.6% at the follow-up. The

**TABLE 1** Distribution of the presence in *Enterobius vermicularis* before education, after education and at follow-up regarding on children

	Experiment (n = 20)		Control (n = 18)		$\chi^2$ p
	n	%	n	%	
Pre-test					
Positive	20	100.0	18	100.0	-
Negative	-	-	-	-	
Post-test					
Positive	2	10.0	5	27.8	$\chi^2 = 7.370$
Negative	18	90.0	13	72.2	$p = .007^*$
Follow					
Positive	1	5.0	12	66.7	$\chi^2 = 16.007$
Negative	19	95.0	6	33.3	$p = .000^*$

Bold values and \*:  $p < .001$ .



**FIGURE 1** A Part of the Educational Material titled The Story of 'Afacan and the Pinworm' [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

*Afacan came home running from school every day, ate the fruits without washing his hands. Afacan was always such a hasty child, he shared his belongings with his friends and ate without washing his hands.*

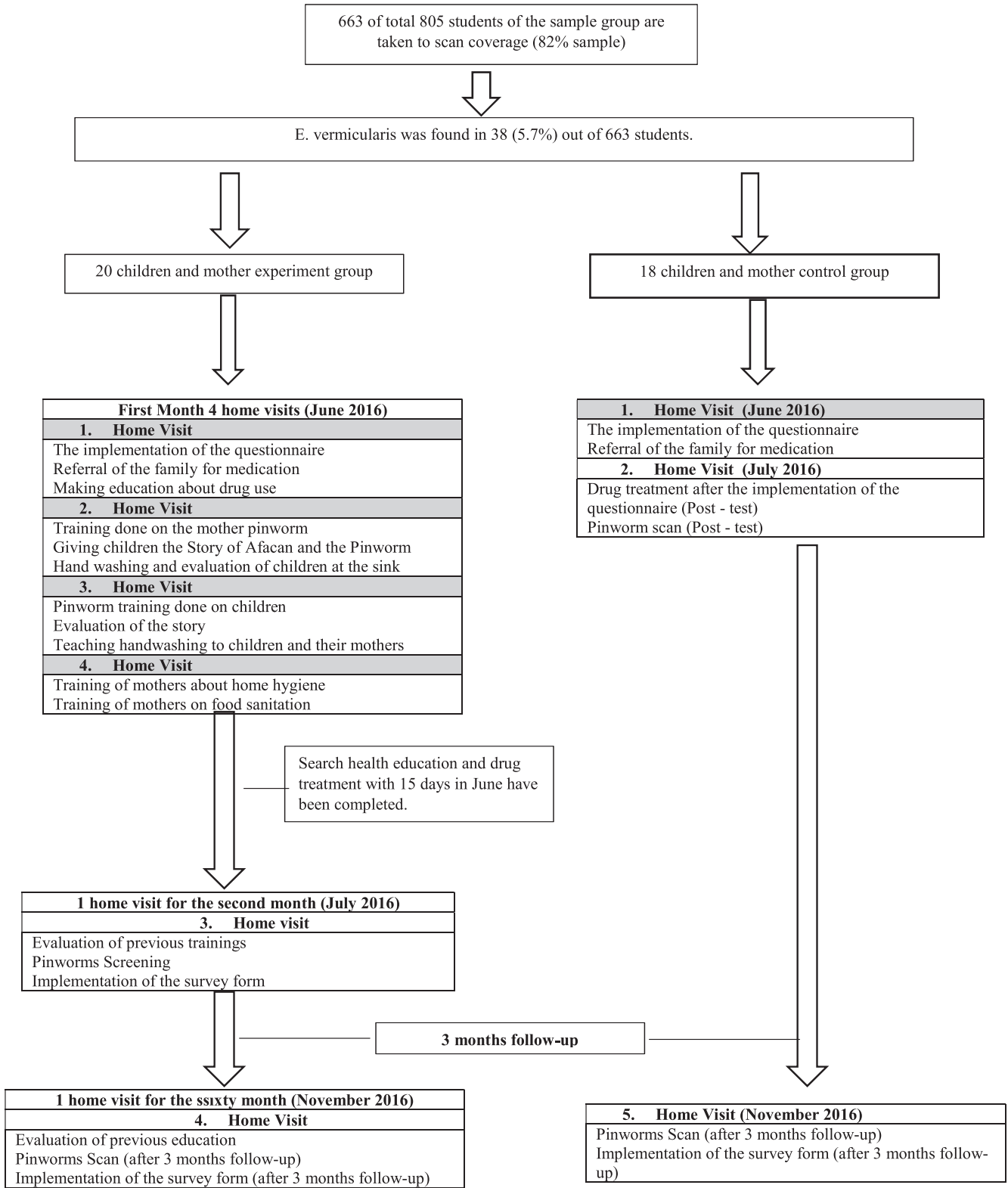
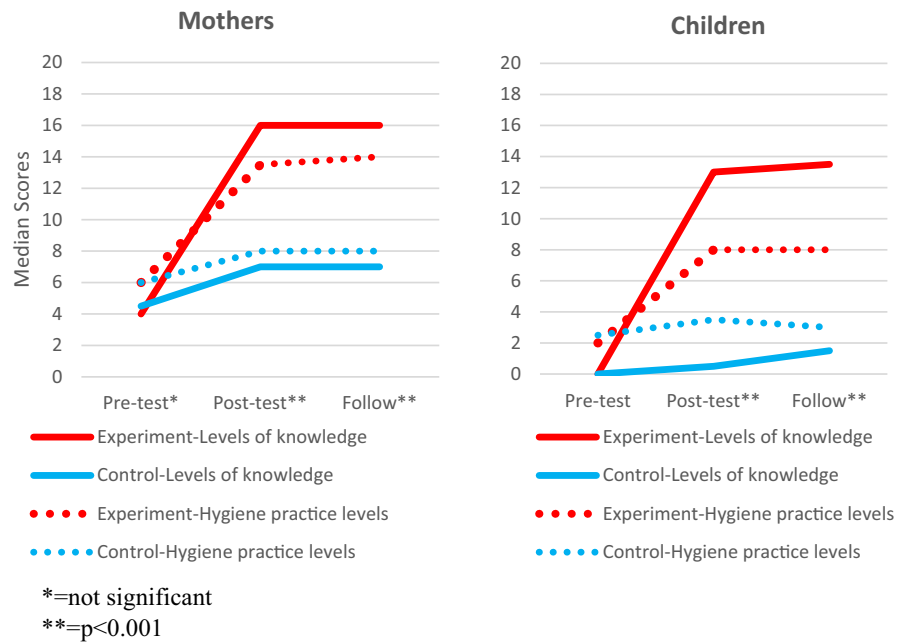


Figure 1. Flow Chart of Processes to Experiment and Control Groups

FIGURE 2 Flow chart of processes to experiment and control groups

**GRAPH 1** Distribution of differences between groups according to the knowledge and hygiene practice scores of mothers and children on *Enterobius vermicularis* in the pre-, post- and follow-up periods [Colour figure can be viewed at wileyonlinelibrary.com]



**TABLE 2** Distribution of the scores of the mothers before education, after education and at follow-up regarding their knowledge and hygiene practice levels on *Enterobius vermicularis*

	Experiment (n = 20)		Control (n = 18)		$\chi^2$ p
	n	%	n	%	
<b>Levels of knowledge on <i>E. vermicularis</i></b>					
<b>Pre-test</b>					
Low-level information on	15	75.0	13	72.2	$\chi^2 = 0.000$
Mid-level information on	5	25.0	5	27.8	$p = 1.000$
There is a good level of knowledge	0	0.00	0	0.00	
<b>Post-test</b>					
Low-level information on	0	0.0	13	72.2	$\chi^2 = 26.658$
Mid-level information on	8	40.0	5	27.8	$p = .000^*$
There is a good level of knowledge	12	60.0	0	0.0	
<b>Follow</b>					
Low-level information on	0	0.0	12	66.7	$\chi^2 = 24.212$
Mid-level information on	5	25.0	5	27.8	$p = .000^*$
There is a good level of knowledge	15	75.0	1	5.6	
<b>Hygiene practice levels regarding <i>E. vermicularis</i></b>					
<b>Pre-test</b>					
Incorrect practices	17	85.0	16	88.9	$\chi^2 = 0.000$
Correct practices	3	15.0	2	11.1	$p = 1.000$
<b>Post-test</b>					
Incorrect practices	2	10.0	14	77.8	$\chi^2 = 17.853$
Correct practices	18	90.0	4	22.2	$p = .000^*$
<b>Follow</b>					
Incorrect practices	0	0.0	13	72.2	$\chi^2 = 21.956$
Correct practices	20	100.0	5	27.8	$p = .000^*$

Bold values and \*:  $p < .001$ .

	Experiment (n = 20)		Control (n = 18)		$\chi^2$ p
	n	%	n	%	
<i>Levels of knowledge on E. vermicularis</i>					
Pre-test					
Low-level information on	20	100.0	18	100.0	-
Mid-level information on	0	0.0	0	0.0	
There is a good level of knowledge	0	0.0	0	0.0	
Post-test					
Low-level information on	1	5.0	13	72.2	$\chi^2 = 23.468$ $p = .000^*$
Mid-level information on	14	70.0	5	27.8	
There is a good level of knowledge	5	25.0	0	0.0	
Follow					
Low-level information on	1	5.0	16	88.9	$\chi^2 = 33.484$ $p = .000^*$
Mid-level information on	12	60.0	2	11.1	
There is a good level of knowledge	7	35.0	0	0.0	
<i>Hygiene practice levels regarding E. vermicularis</i>					
Pre -test					
Incorrect practices	20	100.0	17	94.4	$\chi^2 = 0.003$ $p = .957$
Correct practices	0	0.0	1	5.6	
Post-test					
Incorrect practices	5	25.0	15	83.3	$\chi^2 = 12.931$ $p = .000^*$
Correct practices	15	75.0	3	16.7	
Follow					
Incorrect practices	6	30.0	17	94.4	$\chi^2 = 16.468$ $p = .000^*$
Correct practices	14	70.0	1	5.6	

Bold values and \*:  $p < .001$ .

difference between the experiment and control group mothers in terms of their mean knowledge levels in the post-test and follow-up periods was highly significant ( $p < .001$ ; Table 2).

While the ratio of the mothers in the experiment group with correct practices was 15% before the education, it became 90% after the education and 100% at the follow-up. The ratio of the mothers in the control group with correct practices was 11.1% before the education, 22.2% in the post-test and 27.8% at the follow-up. The difference between the experiment and control group mothers in terms of their mean hygiene practice levels in the post-test and follow-up periods was highly significant ( $p < .001$ ; Table 2).

While the ratio of the children with a good level of knowledge in the experiment group was 0% before the education, it became 25% after the education and 35% at the follow-up. The ratio of the

**TABLE 3** Distribution of the scores of the children before education, after education and at follow-up regarding their knowledge and hygiene practice levels on *Enterobius vermicularis*

children with a medium level of knowledge in the experiment group was 0% before the education, 70% after the education and 60% at the follow-up. The ratio of the children with a good level of knowledge in the control group was 0% in all three measurements, while the ratio of those with a medium level of knowledge was 0% before the education, 27.8% after the education and 11.1% at the follow-up. The difference between the experiment and control group children in terms of their mean knowledge levels in the post-test and follow-up periods was highly significant ( $p < .001$ ; Table 3).

While the ratio of the children in the experiment group with correct practices was 0% before the education, it became 75% after the education and 70% at the follow-up. In the control group, the ratio of the children with correct practices was 5.6% before the education, 16.7% after the education and 5.6% again

at the follow-up. The difference between the experiment and control group children in terms of their mean hygiene practice levels in the post-test and follow-up periods was highly significant ( $p < .001$ ; Table 3).

## 4 | DISCUSSION

*Enterobius vermicularis*: it is among the first parasites seen in primary school children in the world and in our country. (Berger, 2017). It is an important public health problem because factors such as socioeconomic status, personal hygiene habits, improvement of the environment and infrastructure in the spread of this parasite are important and preventable (Kannan, 2016; CDC, 2019). For this reason, primary healthcare workers should give importance to the awareness of the society and the provision of health education services under the control of *E. vermicularis*.

This study aimed to reduce the prevalence of *E. vermicularis* and increase the knowledge and hygiene practice levels of mothers and children regarding the issue by providing home care and monitoring for children carrying the parasite *E. vermicularis* and their mothers. Karadeniz investigated similarly, positive results were obtained in the study, and at the end of the 6th month of intervention, the rates of parasitosis were 4% in the participatory education group, 20% in the conference group and 28% in the control group, while the difference among the groups was significant (Karadeniz, 1995). A study in Egypt reported that the prevalence of the parasite decreased as a result of the health education provided to mothers (Mobarak et al., 2011). In Korea, information was provided by brochures to the families of preschool children, and it was observed that the incidence of the parasite decreased substantially 6 months after the first monitoring (Kang et al., 2012). In Cameroon, in controlling parasitic diseases in school-age children, a health education programme was organized at school by using visual cards, and at the end of the education, the rate of parasitic diseases in the intervention group dropped from 50.9% to 26.9% (CDC, 2019). It may be seen that mothers and children were taken on separately in studies in Turkey and other countries on the effectiveness of health education in controlling *E. vermicularis*. For this reason, in this study, the mothers and children were given nursing care simultaneously with therapy, and to be able to assess the recurrence status of the parasite, 3 months of monitoring was carried out on the families. At the end of the study, in the control group that only received medical treatment, five children in the post-test and 12 children in the follow-up 3 months later were infected with the parasite, while these numbers were 2 and 1, respectively, for the children in the experiment group that received home care in addition to medical treatment, which was a significant finding of our study.

Nevertheless, the global approach emphasizes the importance of holistic care and health education in fighting against intestinal parasites (Alum et al., 2010). Medical treatment is not sufficient in curing intestinal parasites, and in prevention of recurring infections, it is recommended to inform families, especially mothers, on the issue and have behavioural changes in terms of hygiene (Polseela & Vitta, 2015).

The health education given in this study was positively effective not only on the knowledge levels but also on the hygiene practices of the mothers. In the study, it was seen that the knowledge and hygiene practice levels of the control group increased from the pre-test to the post-test, though slightly. Although no education was provided to the control group, this increase may have been related to the possibility of the mothers to receive information from sources such as physicians, pharmacists, TV and Internet regarding the disease at the treatment phase by diagnosis of the disease. This shows that even diagnosing children leads families to look for information on the disease.

It is seen in the literature that studies on health education are focused on mothers (Mobarak et al., 2011; Kang et al., 2012). This situation may be related to the role that mothers take on in provision and maintenance of the hygiene habits of children in the primary school age. However, in achievement of behavioural change in the child who gets away from family and gains a new environment, it is important to focus on the mother and the child together. It reported that, after education given on hand washing and parasitic diseases, the rates of the students to wash their hands with appropriate hand washing techniques and their knowledge on the transmission/prevention ways of parasites increased (Polseela & Vitta, 2015). Likewise, in this study, it was aimed to provide the children with the correct hand washing skills in fighting against the parasite *E. vermicularis*, and the children were provided with hand washing skills by repeated practices in the regular visits. Kim and Yu provided an education of 40 min with visual material and explained the students how pinworms are transmitted from an infected child to another by examples. Right after this intervention and in the 3-month follow-up, while the parasite prevalence decreased, the knowledge levels of the children increased positively, and the difference between the intervention and control groups was significant. Additionally, they also reported that they obtained findings contrary to the expectation that the children would forget the knowledge they acquired at the end of 3 months and make mistakes in their practices, and the children could also have affected their families (Kim & Yu, 2014). In this study, *E. vermicularis* was explained to the children by using the book named 'Afacan ve Kil Kurdunun Hikayesi'. At the end of the education, the difference between the experiment and control groups in terms of the post-test and follow-up scores of the children on their knowledge and hygiene practices was highly significant ( $p < .001$ ; Graph 1). Moreover, the prevalence of *E. vermicularis* decreased to 10% after the education and 5% at the follow-up in the experiment group. Although it decreased to 27.8% in the post-test in the control group, it increased up to 66.7% at the follow-up as a result of the recurrence of the parasite in some children. Home visit is defined as a flexible education approach that reinforces learning by visits that are made at certain intervals, allows showing by doing, immediate implementation after observation and feedback, improves private, free discussions that are not possible in a group setting and considers the patient within a frame and not as an abstract being (Potter & Wills, 2013). In this study, the regular home visits to the families improved the knowledge and hygiene behaviours of the children and the mothers and created a setting that allowed families to express



themselves. In the study, more than half of the families (11 families) stated that, before the study, they applied medication treatments on only their children for multiple times, they did not receive any information other than conventional information on the issue, and therefore, the visits were positive, while five families expressed the sadness of their children caused by receiving medication by themselves. It was stated that, when these children take medication treatment by themselves, they think that the pinworm disease is only related to them, and they feel anger, but within our study, medication of the entire family reduced their feelings of guilt and anger. As this situation is a hygiene-related disease, considering the risk of children to be stigmatized not only in the family but also at school, it may be seen that treatment and care covering the entire family are important.

#### 4.1 | Limitations

As this study was conducted with children from two schools and their mothers, it has a limitation of sampling. Status of the mothers in the control group to receive information on the parasite from sources such as healthcare professionals, the Internet and TV was a situation that could not be controlled by the researcher, therefore, another limitation of the study.

### 5 | CONCLUSION

In the study, with the home care practices covering health education and monitoring simultaneously with treatment given to the children in whom *E. vermicularis* was detected and their mothers, it was determined that the prevalence of this parasite significantly decreased. Obtaining these results especially in crowded families with low educational levels reveals the significance of care and monitoring provided at home in terms of public health.

Children living in impoverished and crowded families with low levels of education in mothers are under risk of several diseases and not only *E. vermicularis*. Furthermore, the home care practices provided in fighting against this disease could be considered among practices that will prevent the development of many other diseases.

In the light of these results, it may be recommended to.

- Conduct efforts covering school administrators, teachers and cleaning personnel considering that this parasite is seen especially in primary school children, and its contagiousness originated from school in addition to the family,
- Carry out awareness and responsibility work by using mass communication tools effectively on the topic of hygiene practices that are common in fighting against not only *E. vermicularis* but also many other parasitic diseases,
- Develop materials such as animations and cartoons that will attract children's attention considering that *E. vermicularis* affects

school-age and playing-age children and measure their effectiveness by scientific studies.

#### CONFLICT OF INTEREST

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

#### ETHICAL APPROVAL

Before starting the study, approval from the Ethics Board of X University (2016.01.05-E-300), written permission from the X Provincial Directorate of National Education (19.01.2016-E.644359) and written and verbal consent from the participants (from mothers of children) were obtained. After the study was completed, education was provided to the control group on the issue. The study conforms to the Declaration of Helsinki.

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