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Effect of Education and Regular Examination on the Prevalence of Head Louse Infestations in Adana

Adana'da Eğitim ve Düzenli Muayenenin Baş Biti Enfestasyonlarının Prevalansına Olan Etkisi

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ABSTRACT

Objective: The current study provides training to parents and teachers about pediculosis in schools in three villages in Adana to measure their knowledge level by conducting surveys and to determine the prevalence of pediculosis in these foci.
Methods: Pre- and post-questionnaires including 30 questions about pediculosis were handed to parents and teachers. The answers were analyzed with the Pearson correlation analysis. Overall, 418 school pupils s were examined for lice. The results of the head louse control were analyzed by the chi-square test and t-test.
Results: We observed that the level of awareness increased in parents and teachers. Additionally, the gender of both teachers and parents was determined as the most important factor in increasing this awareness. Because of interventions for the control of head and lice, the prevalence of pediculosis decreased from 15.22% to 1.71%.
Conclusion: It is very important that parents and teachers are aware of the health problems related to pediculosis, while regular combing of school children may be essential for the control of this common infestation.
Keywords: Head lice, pediculosis, education, combing, prevalence

ÖZ

Amaç: Çalışmamızın amacı, Adana ilinde üç köyde bulunan okullarda pediküloz konusunda ailelere ve öğretmenlerin bilgi düzeylerini eğitimler vererek, ve anketler yardımıyla ölçmek, ve bu odaklarda pediküloz prevalansını belirlemektir.
Yöntemler: Ebeveynlere ve öğretmenlere pediküloz ile ilgili 30 sorudan oluşan ön ve son anket uygulanmıştır. Anketlere verdikleri cevaplar Pearson korelasyon analizi ile analiz edilmiştir. Üç okulda yapılan dört saç biti kontrolünde, ortalama 418 öğrenci taranmıştır. Kontroller sonucunda elde edilen bulgular ki-kare testi ve t-testi ile analiz edilmiştir.
Bulgular: Ebeveynler ve öğretmenlerin pedikülozis hakkındaki farkındalık düzeyinin arttığı belirlenmiştir. Ayrıca hem öğretmenlerin hem de velilerin cinsiyet durumu bu farkındalığın artmasında en önemli faktör olarak tespit edilmiştir. Düzenli kontroller sonrasında pediküloz prevalansının %15,22'den %1,71'e düştüğü görülmüştür.
Sonuç: Velilerin ve öğretmenlerin, öğrencilerin karşılaştıkları pediküloz gibi sağlık sorunlarının farkında olmaları çok önemlidir. Ayrıca çalışmanın sonuçları, bu yaygın istilanın kontrolü için okul çocuklarının düzenli taranmasının gerekli olabileceğini göstermiştir.
Anahtar Kelimeler: Saç biti, pedikülozis, eğitim, saç taraması, prevalans

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Türkiye PARAZİTOLOJİ Dergisi

INTRODUCTION

The head louse is an ectoparasitic insect responsible for infestations of humans (pediculosis) worldwide. Head lice, have three life stages as egg, nymph and adult, and are mostly transmitted to humans in spring and winter months. In other publications the prevalence of head louse infestations are higher in autumn months (1). There is no relationship between pediculosis and socio-economic status, but may cause a socially unpleasant condition accompanied by social stigma and pruritus There are many publications showing that there is a relationship between pediculosis and socio-economic status (2). In pediculosis, the most common symptom is the intense itching in the head area, while secondary infections such as impetigo and furnculosis and lymphadenopathy may occur as a result of bacterial contamination of the abrasions as a result of scratching (3). Head lice control is carried out by mechanical (physical), herbal and chemical (synthetic and semi synthetic) methods, as in other ectoparasitic arthropods. Chemicals such as malathion, carbaryl, permethrin, phenothrin are generally used in the treatment of pediculosis (4).

Pediculosis that causes psychological frustration for parents and children, has been known since antiquity. Moreover, preventive and therapeutic practices, such as head shaving and the "no-nit" policy of excluding infected children from school, can also induce social stress that affected their wellbeing. Though the stigma exists that pediculosis is related to being poor and dirty, this was shown to be not correct and children from all socio-economic levels can be infested with head lice (5-7).

Head lice affect approximately 6-12 million people in the United States each year. They are widely seen all over the World (1). There is no relationship between pediculosis and socio-economic status, but lice may cause a socially unpleasant condition accompanied by stigma and pruritus (2). Prevalence of pediculosis was determined to be between 0.3% and 34.1% in previous studies carried out with 578,938 people treated for head in Turkey between 1982 and 2012 years (8). Several risk factors related to the prevalence of pediculosis included the educational status of parents, children's gender and their age (9). The pediculosis prevalence detected in Turkey was found to be higher than in Europe (0.48% to 22.4%), while lower than the many countries in America (3.6% to 61.4%) (10).

It is known that, primary-school students are intermingled in classes and have high contact rates, transmission of *P. h. capitis* occurs frequently. Thus it has been reported in various studies conducted in schools that pediculosis is more common in childhood (11,12). Therefore, it is very important that both teachers and parents are role models in the hygiene education of children and regular head lice controls are very important (13,14).

In this study we aimed to lower the prevalence of pediculosis with raising awareness of parents and teachers about pediculosis and conducting regular head lice controls in three schools in Karaisalı district, Adana, Turkey.

METHODS

Ethics Committee Approval

The study was approved by the Ethical Committee of Çukurova University Medical School (letter dated: 05.07.2019 and numbered: 2019-90).

Selection of Schools and Participants

The study was conducted in three schools in the rural area of Karaisalı district, 50 km away from Adana, where pediculosis cases are quite high according to the reports of the local representative of the Ministry of Education in 2018-2019 education period (Figure 1).

Informing and Surveying

The first questionnaire with 30 questions about pediculosis was handed to 363 parents and 34 teachers. Respondents were asked to answer the questions as "True", "False" and "I don't know". In a 2-hour courses, teachers and parents were divided into groups and presentations were made by a physician, an education specialist and parasitologists, in which information about the transmission, diagnosis, treatment and social negative effects of pediculosis was given. After the educational session(s), children were examined visually, after having treated those infested a second questionnaire was handed to the teachers and parents in order to determine the effect of education and treatment on the prevalence of pediculosis.

Examination of the Hair for Head Lice

Overall 440, 429, 417 and 407 pupils were examined for head lice in the four schools. Each pupil was examined four times with a louse comb and visually using the fingers. All researchers were experienced doctors and/or parasitologists familiar with the detection methods of head lice and various life stages. The pupils were examined by visual screening, in which the examiner parted the hair using his/her fingers while observing for signs of live lice and/or louse eggs for three minutes (Figure 2). The presence of louse eggs and active lice stages was recorded separately. No distinction was made between the nits and live eggs during the screening. Plastic louse combs ("PDC", KSL Consulting, Denmark) with a distance between the teeth of 0.15 mm were used (Figure 3). Each part of the scalp was combed three times. At the end of combing removal, the suspected organisms were examined visually to confirm the diagnosis. The children found to be positive for head louse were referred to local GP for treatment.

Statistical Analysis

All statistical analyses were made using the SPSS program. The attitudes and thoughts of teachers and parents about pediculosis after the informative seminars were analyzed with the t-test, in which the answers they gave to the two questionnaires were taken as reference. In addition, Pearson correlation analysis was performed to determine the relationship between the answers given by the respondents to the questions and their educational status, age, etc. Also, the chi-square test was used for the comparison of groups for yes/no variables such as presence/absence of infestation.

RESULTS

Surveying

The correct answers given by the participants to the questions in the first and last questionnaire were compared. It was observed that the level of awareness about pediculosis raised by 9.80% in parents and 9.70% in teachers (Figure 4). T-test results show that awareness of the subject changed significantly between before and after the study ($p<0.001$) (Table 1).

Table 1. Comparison of the change in knowledge level of parents and teachers (t-test results)

	Status	N	Mean	Standard deviation	t	p
Parents	**Before education**	363	10.84	4.630	-12.256	0.000*
	After education	363	13.78	3.830		
Teachers	**Before education**	34	12.09	5.265	-5.429	0.000*
	After education	34	15.00	3.181		

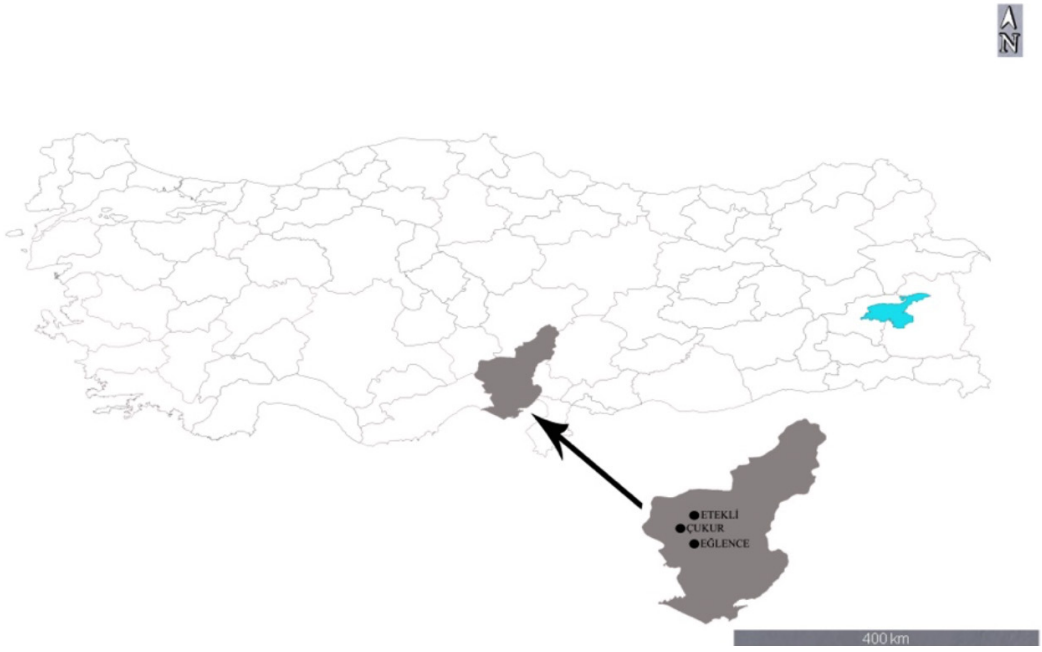

Figure 1. Study areas

In particular, the correct answers given by the high school and university graduate parents after the course were found to be 16.15 and 15.5 on average, respectively. In addition, it was determined that the number of correct answers given by the male parents to the questionnaire after the course was higher than that of the females. It was determined that female teachers gave more correct answers to the pre- and post-course questionnaires than male teachers.

According to the results of Pearson correlation analysis, it was determined that there was a significant correlation ($p<0.05$) between the correct answers given to the first questionnaire and the education level of the students' parents and a significant correlation ($p<0.01$) between the gender. In the last questionnaire, it was determined that the correct answers showed a significant correlation ($p<0.01$) regarding the educational status and a significant correlation ($p<0.01$) regarding the province in which they were living (Table 2). When the same analysis was repeated for the teachers, the province, and the educational status was not taken into account. It was determined that there was a significant correlation between the correct answers given by the teachers to the first and last questionnaires and their gender status (Table 3).

Pediculosis' Prevalence

The highest in the first combing to detect head lice was in the school in the Etekli neighborhood with 98.02%. During the first combing, 22.3% of the female pupils were found to be positive for pediculosis. Tables 4 and 5 show the pediculosis prevalence by

Figure 2. Head combing of students for detection pediculosis

Figure 3. Plastic comb for head lice detection

gender and villages, respectively. According to chi-square analysis, there was a significant difference between the infestation rate of the gender and the villages except for 3th and 4th combing results ($p<0.01$). In Çukur district the prevalence was 24.82%. In the second combing, the prevalence of pediculosis decreased in both female and male 0.5% and 6.45%, respectively. The prevalence value increased in the third combing from 0.49 to 2.45 in male students, while no additional infested individuals were found in in Etekli village during the third examination. The lowest prevalence was observed in the last combing. Only 7 out of 407 students in three village schools were positive for pediculosis.

DISCUSSION

Pediculosis sometimes causing epidemics, is seen as a public health problem especially in rural areas. The knowledge about pediculosis of the pupils, parents and teachers in the schools and the timely diagnosis and early intervention play an important role in solving the problems caused by this infestation.

Head lice infestation causes not only clinical symptoms but also psychological stress because children and parents believe that head lice infestation is a result of being dirty. In the ages when children are forming their personality development and self-confidence, encountering the problem of pediculosis creates psychological stress for them due to the environmental pressure. Children can overcome these negative situations only with the right approach of parents and teachers (7). The role of parents and teachers in communicating with the children and supporting the child's personality development is indisputable (15).

In the present study, it was aimed to increase the awareness levels of parents and teachers regarding pediculosis. The present results show that awareness of pediculosis varies according to both education and gender status in parents, and only gender status in teachers (Table 1). In a study that analyzed parents' communication with children and their contribution to education, it was shown determined that educational status and gender caused significant differences. In terms of educational level, it has been determined that there is a significant difference in the sub-dimensions of "communicating", volunteering "and" learning at home in favor of high school and university graduates (16). The education of teachers and parents on pediculosis is of paramount importance (17,18).

Between 1982 and 2012, 63 pediculosis prevalence studies were conducted in Turkey (8). The prevalence of pediculosis was 0.3-34.1% in elementary schools examined. The infestation rate was twice more in girls that in boys ($p<0.05$), which is in agreement with our findings. Those studies also have shown that the prevalence increased with worsening economic status ($p<0.05$) and the prevalence was high as 44.1% among children with illiterate mothers.

In our study, the overall observed prevalence of head lice was 15.22% during the first combing and decreased to 1.71% during the fourth combing. The prevalence could be lowered by education and regular combing for lice. We believe that also in Turkey that the prevalence of pediculosis has decreased due to social distancing during Coronavirus disease-2019 pandemic. In a study conducted in Argentine it was shown that the prevalence dropped from 69.6% to 43.9% (19).

CONCLUSION

In conclusion, head lice are common in school-age children. Head lice can be seen in all socio-economic situations, and families' awareness of the issue affects its prevalence. Timely diagnosis and early intervention with regular controls is important for

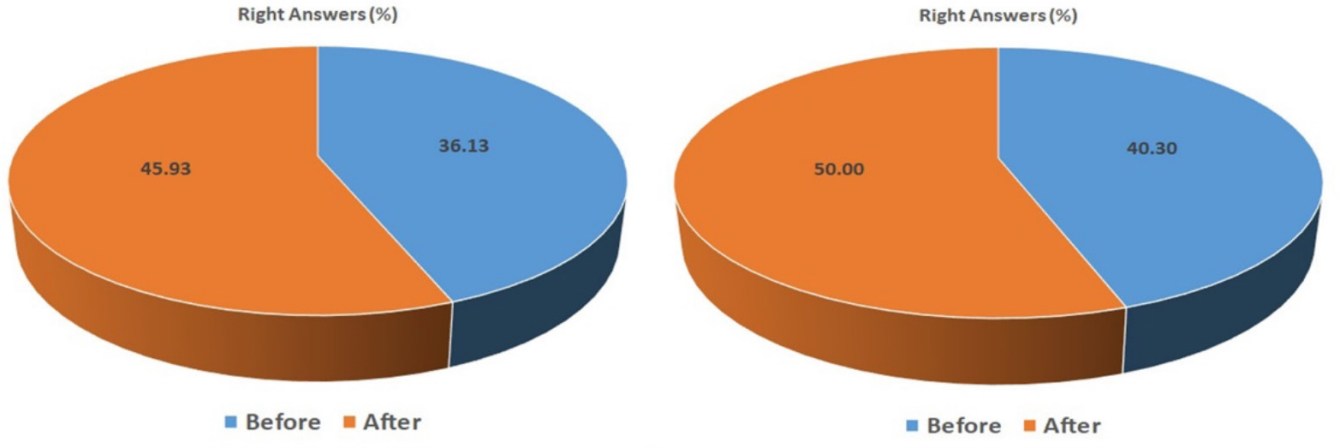

Figure 4. The level of development of awareness about pediculosis in parents and teachers

Table 2. Pearson correlation results of the correct answers given by the parents to the pre- and post-questionnaires

Pre-questionnaires						**Post-questionnaires**					
		Province	**Gender**	**Education**	**Correct answers**			**Province**	**Gender**	**Education**	**Correct answers**
Province	Corelation sig. (2-taied) N	1 - 363	0.099 0.059 363	0.041 0.440 363	0.092 0.080 363	**Province**	Corelation sig. (2-taied) N	1 - 363	0.099 0.059 363	0.041 0.440 363	0.110* 0.037 363
Gender	Corelation sig. (2-taied) N	0.099 0.059 363	1 - 363	0.064 0.223 363	0.188** 0.000 363	**Gender**	Corelation sig. (2-taied) N	0.099 0.059 363	1 - 363	0.064 0.223 363	0.029 0.583 363
Education	Corelation sig. (2-taied) N	0.041 0.440 363	0.064 0.223 363	1 - 363	0.127* 0.015 363	**Education**	Corelation sig. (2-taied) N	0.041 0.440 363	0.064 0.223 363	1 - 363	0.139** 0.008 363
Correct answers	Corelation sig. (2-taied) N	0.092 0.080 363	0.188** 0.000 363	0.127* 0.015 363	1 - 363	**Correct answers**	Corelation sig. (2-taied) N	0.110* 0.037 363	0.029 0.583 363	0.139** 0.008 363	1 - 363

** Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed)

Table 3. Pearson correlation results of the correct answers given by the teachers to the pre- and post-questionnaires

Pre-questionnaires						**Post-questionnaires**					
		Province	**Gender**	**Education**	**Correct answers**			**Province**	**Gender**	**Education**	**Correct answers**
Province	Corelation sig. (2-taied) N	1 - 34	0.440** 0.009 34	.[b] - 34	0.317 0.068 34	**Province**	Corelation sig. (2-taied) N	1 - 34	0.440** 0.009 34	.[b] - 34	0.303 0.081 34
Gender	Corelation sig. (2-taied) N	0.440** 0.009 34	1 - 34	.[b] - 34	0.334 0.053 34	**Gender**	Corelation sig. (2-taied) N	0.440** 0.009 34	1 - 34	.[b] - 34	0.320 0.065 34
Education	Corelation sig. (2-taied) N	.[b] - 34	.[b] - 34	.[b] - 34	.[b] - 34	**Education**	Corelation sig. (2-taied) N	.[b] - 34	.[b] - 34	.[b] - 34	.[b] - 34
Correct answers	Corelation sig. (2-taied) N	0.317 0.068 34	0.334 0.053 34	.[b] - 34	1 - 34	**Correct answers**	Corelation sig. (2-taied) N	0.303 0.081 34	0.320 0.065 34	.[b] - 34	1 - 34

**Correlation is significant at the 0.01 level (2-tailed), [b]Cannot be computed because at least one of the variables is constant

Table 4. The prevalence of pediculosis in terms of gender

Combing no	Male			Female			Total			X^2	df
	No	Infested	Prevalence (%)	No	Infested	Prevalence (%)	No	Infested	Prevalence (%)		
1.	203	14	6.89	237	53	22.3	440	67	15.22	20.262	1
2.	202	1	0.49	227	36	15.85	429	37	8.62	32.015	1
3.	204	5	2.45	213	7	3.28	417	12	2.87	0.260	1
4.	187	1	0.53	220	6	2.72	407	7	1.71	2.875	1

Table 5. The prevalence of pediculosis in terms of neighborhood

Combing no	Etekli			Çukur			Eğlence			Total			X^2	df
	No	Infested	Prevalence (%)	No	Infested	Prevalence (%)	No	Infested	Prevalence (%)	No	Infested	Prevalence (%)		
1.	99	6	6.06	141	35	24.82	200	26	13.00	440	67	15.22	17.270	2
2.	98	3	3.06	141	8	5.67	190	26	13.68	429	37	8.62	11.579	2
3.	87	0	0	121	6	4.95	209	6	2.87	417	12	2.87	4.453	2
4.	83	0	0	123	5	4.06	201	2	0.99	407	7	1.71	6.079	2

treatment. Regular head louse controls by teachers and parents who are knowledgebel about pediculosis will lower the number of infested children and the rate of transmission.

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*Ethics

Ethics Committee Approval: The study was approved by the Ethical Committee of Çukurova University Medical School (letter dated: 05.07.2019 and numbered: 2019-90).

Informed Consent: Informed consent was obtained.

Peer-review: Internally peer-reviewed.

***Authorship Contributions**

Concept: H.K., D.A., H.Ö., Design: H.K., D.A., H.Ö., Data Collection or Processing: H.K., F.B., G.E., S.K., Z.Ç., E.K., D.A.K., D.A., Analysis or Interpretation: H.K. Literature Search: H.K., H.Ö., F.B., Writing:. H.K., H.Ö., D.A., F.B.

Conflict of Interest: The authors have no conflict of interest to declare.

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