BRIEF COMMUNICATION

PREVALENCE AND TREATMENT OF *PEDICULUS HUMANUS CAPITIS* WITH 1% PERMETHRIN AND 0.4% D-PHENOTHRIN IN TURKEY*

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Summary: Pediculosis humanus capitis (head lice) is an important public health problem among school children. In our study, 20,612 schoolchildren (10,367 boys, 10,245 girls) were examined for *Pediculus humanus capitis* in 36 elementary schools between December 1996 and February 1998 in Ankara, Turkey. The prevalence of pediculosis capitis infestation was found to be 3.4% (701 / 20, 612). Of these, 382 students were treated with application of 1% permethrin cream rinse, and 184 students with 0.4% d-phenothrin shampoo. On day 14 of the controlled trial, the success rates were 93.7 % in the 1% permethrin cream rinse group and 75.5 % in the 0.4% d-phenothrin shampoo group. The 1% permethrin cream rinse was also significantly more active in pediculicidal efficacy when compared to the 0.4% d-phenothrin shampoo ($p<0.001$). As a result, these findings demonstrate that pediculosis capitis still remains a widespread health problem.

Key words: *Pediculus humanus capitis; Prevalence; Treatment; Permethrin; D-phenothrin*

Introduction

Pediculus humanus capitis (head lice) affects millions of children worldwide, especially between 5 and 14 years of age (6). Since head lice are transmitted primarily by personal contact and by such objects as combs and hats, infestation may also be widespread in adults living in over-crowded conditions or where there are inadequate facilities for personal hygiene or clean clothing (17). Many factors contribute to increased incidence: poor hygiene and socio-economic situations lack of medical training, and resistance to treatment preparations in the parasite (2). Recently, many pediculicidal preparations are put onto control of head lice infestation. However, development of insecticide resistance such as dichlorodiphenyltrichloro ethane and *sym*-hexachlorocyclohexane makes difficult the control of lice infestation because of extensive use of two more recently developed insecticides, namely malathion and carbaryl (4,17). The current recommended treatment for lice infestation is topical application of one per cent permethrin, 0.5% malathion, and 1% lindane (9). A single ten-minute application of 1% permethrin cream rinse was well tolerated, highly effective, and therapeutically superior to a single four-minute application of 1% lindane shampoo (20). Our study was aimed to detect prevalence of head lice infestation and to compare the efficacy of 1% permethrin cream rinse (Zalvor®) and the 0.4% d-phenothrin shampoo (Antibit®).

Materials and Methods

The study group was consisted of 20,612 schoolchildren from 36 elementary schools in Ankara, Turkey. Hygienic conditions, cultural and socio-economic status of the region are relatively equal to or better than most of the other parts of Turkey. Five hundred and sixty eight schoolchildren aged between 6 and 11 years were entered in this single blind, randomized, parallel-group comparative study. Informed consent was obtained from each patient and their parent/guardian as appropriate before enrollment. The study was planned and then carried out by physicians. In Ankara, elementary schools were selected randomly, and all children were examined in the selected elementary school. Neither children nor their parents were aware of the day the examination would be performed. Randomization was classified by school. For the application of the 1% permethrin cream rinse (Zalvor®), children were instructed to wet their hair thoroughly with warm water and apply adequate cream rinse to create a rich lather covering the whole of the scalp. After 10 minutes, the hair was rins-

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ed with warm water. Children treated with the 0.4% d-phenothrin shampoo (Antibit®) were instructed to apply the entire contents of the bottle, to allow the hair to dry naturally and the procedure repeated one more time. After 2 days, the hair was washed with the same shampoo, applying the same procedure above. More schoolchildren (382) were treated with 1% permethrin cream rinse (Zalvor®) than 0.4% d-phenothrin shampoo (184) (Antibit®). Eligible children had to be *P. h. capitis*-infested, have live lice and / or more than 5 creamy white or white nits closer than 1.5 cm to the scalp (6). In addition, children were excluded if they had any scalp infection.

Statistical analysis. Chi-square test was used to compare the differences between treatments using SPSS for Windows v. 9.01 for population proportions. Differences of $p<0.001$ were considered significant.

Results

A total of 701 schoolchildren (3.4 %) out of 20,612 were found to be infested with *P. h. capitis* eggs and / or adults. Fifty-one (0.49 %) out of 10,367 boys and 650 (6.34 %) out of 10,245 girls were infested with this parasite. There was not significant difference between the two study groups in sex distribution ($p>0.05$) ($p=0.813$, $\chi^2=26.604$) (data not shown). Nineteen children in the 1% permethrin cream rinse (Zalvor®) group and thirty children in the 0.4% d-phenothrin shampoo (Antibit®) group were reported as having applied the shampoo incorrectly and had viable eggs and/or living lice (=nymphs and adults) identified at follow-up visit. Children did not follow the description of the pediculicidal agents were not included in the final analysis. At follow-up 2 weeks later, 24 (6.28 %) children in the 1% permethrin cream rinse (Zalvor®) and 45 children (24.45 %) in the 0.4% d-phenothrin shampoo (Antibit®) group had evidence of viable eggs and/or adults (Table I). Three hundred and fifty-eight children (93.7 %) treated with the 1% permethrin cream rinse (Zalvor®) and one hundred thirty-nine (75.5 %) children treated with the 0.4% d-phenothrin shampoo (Antibit®) had no evidence of viable eggs and/or adults. There was statistically significant difference in the results between the two treatment regimens ($p<0.01$). Re-inspection of the children's scalps was conducted after another 2 weeks and no live lice or viable eggs were present.

Tab. 1: Distribution of cases treated with the 1% permethrin cream rinse and the 0.4% d-phenothrin shampoo.

	treated (n)*		nontreated
	cured (n)	noncured (n)	(n)
Permethrin Total (n:382)	358 (93.7 %)	24 (6.38 %)	19
D-phenothrin Total (n:184)	139 (75.5 %)	45 (24.5 %)	30

*Chi-square = 95.285 ($\chi^2 = 95.285$) $p<0.001$.

Conclusions

The prevalence of head lice is various from one country to another. Head lice infestation seems to remain a public health problem in Turkey, the condition being common in children. Sometimes, eradication efforts are supported, but with not much lasting effect. A major basis for this is that use of not consciously treatment preparations may be in Turkey for effective deal with this infestation. Infestation with head lice is a common problem among school children, probably because lice are transmitted from one child to another in kindergartens. In this setting, children have much contact with each other. Parents can accept head lice as a fact of life, even if an unlikable one, and children with the situation are not defamed (8). The prevalence of pediculosis capitis were investigated among school-aged children various cities of Turkey and were found to have between 1.3 % and 3.6 % (12,13,15,16). An outbreak of pediculosis at primary schools was recorded in the Czech Republic in 1992. Almost 20 % of children in some schools were infested (14). In Maale Adumin, a town near Jerusalem, Israel a total of 1,516 children were examined: living lice and eggs were found on 12.1 % of the children; or another 22.8 % of the children only nits were found (11). Elementary schools in Gdansk, Sopot, Gdynia and neighboring areas were studied during 1990-1992 (22). A survey of head lice treatment was carried out in four schools in the Bordeaux area, France. It was found that 48.7 % of children had head lice infestation. The prevalence of lice was higher in girls (60 %) than in boys (40 %) (7). When an outbreak of pediculosis capitis occurred in elementary school children in Barrow County, Georgia, fifty-three (3 %) of 1,783 children were infested (18). A total of 2,519 primary school children in northern Jordan were examined for head lice. Three hundred thirty eight (13.4 %) were infested with nits, immature or adult head lice. The infestation for girls was higher than that of boys (1). In Australia, 456 school children were examined, and 33.7 % of them found had evidence of infestation with head lice, and 21.0 % children with active infestation (19). Effective pediculicides and ovicides are pyrethrins and synthetic pyrethroids whose development and use has recently been comprehensively reviewed by Taplin and Meinking, and evaluated permethrin as an ideally positioned between the heat- and light-labile natural pyrethrins, and had not the cutaneous toxicity (21). Synthetic pyrethroids, developed from natural pyrethrins, have a huge insecticide activity, and these compounds, permethrin have been extensively evaluated in the treatment of head lice infestation. At present, 1% permethrin is available in USA and UK (5). In this our study, the difference between the results of the two treatment regimens was statistically significant ($p<0.01$). These findings indicate that, when applied in the treatment of head lice infestation, the 1% permethrin cream rinse was more effective than the 0.4% d-phenothrin shampoo. The 0.4% d-phenothrin shampoo is less ovicidal and therefore less effective in eradicating head

lice and eggs (with a cure rate of 75 %). Unlikely, Sexton and Miller have found that phenothrin liquid shampoo is effective and well tolerated in the eradication of head lice infestation (17). In the other study, d-phenothrin (sumithrine) was found to be more effective than lindane in the treatment of *P. h. capitis* (3). The results of this study clearly demonstrate that the application of the 1% permethrin cream rinse (Zalvor®) is highly effective in the eradication of head lice infestation. Parents, physicians, and school health officials confront a major problem to decide in the best of choice for the therapy, and many advertising demands by manufacturers of pediculicides make the assessment of efficacy very difficult (10). Many efforts should be made for the patient's education about hygiene, and identifying and treating the disease as far as the louse head lice is known to transmit several rickettsial and viral infections. In case of any child has head lice problem, parents should be recommended to tell the school authorities or playgroup leaders so that all close contacts among the others children can be checked.

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