

Comparison of Two Combs in the Detection of Head Lice in School Children

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SUMMARY: The diagnostic efficacies of two metal pin lice combs having different spacing between their teeth were compared in two cohorts of school children, aged between 7 and 15 years, from different villages of Manisa, Turkey. Head lice infestation was evaluated with comb A (0.18 mm of distance between the teeth) in 95 children in Cavusoglu village, and with comb B (0.15 mm of distance between the teeth) in 146 children in Yesilköy village, compared to visual inspection. Five of 95 (5.3%) children in Cavusoglu village and 5 of 146 (3.4%) children in Yesilköy village were found to harbor live head lice with combing, while none was detected during the visual inspection. The difference between the infestation rates of two cohorts was statistically insignificant ($p>0.05$). With visual screening, 15 and 16 children with louse eggs were identified in Cavusoglu and Yesilköy villages, respectively. With combing in these villages, 5 and 8 children, respectively, with louse eggs were identified and 3 and 5 children, respectively, were detected only with combing, not with visual screening. In conclusion, combing is more effective than visual inspection in head lice detection, but there were no significant difference between the two combs either in lice detection or in usage.

Key Words: *Pediculus capitis*, diagnosis, combing, Manisa

Okul Çağı Çocuklarında Saç Bitinin Saptanmasında İki Tarağın Karşılaştırılması

ÖZET: Manisa'nın farklı iki köyündeki ilköğretim okullarında okuyan yaşları 7 ile 15 arasındaki iki öğrenci grubunda, metal diş aralıkları birbirinden farklı iki bit tarağının tanimsal etkinlikleri gözle muayene yöntemiyle karşılaştırılarak değerlendirildi. Bunun için Çavuşoğlu köyündeki 95 çocukta Tarak A (diş aralığı 0.18 mm), Yeşilköy'deki 146 çocukta ise Tarak B ile (diş aralığı 0.15 mm) saç biti (*Pediculus capitis*) varlığı araştırıldı. Çavuşoğlu köyündeki 95 çocuğun 5'inde (% 5,3) ve Yeşilköy'deki 146 çocuğun 5'inde (%3.4) tarama ile canlı saç bitine rastlanırken gözle muayene ile ise hiç saç bitine rastlanmadı. İki kohort arasındaki saç biti infestasyon oranları arasındaki fark istatistiksel olarak anlamlı bulunmadı ($p>0.05$). Gözle muayene sırasında, Çavuşoğlu ve Yeşilköy okullarındaki sırasıyla 15 ve 16 çocukta bit yumurtasına rastlandı, ancak hiçbirinde canlı saç bitine rastlanmadı. Tarama ile ise sırasıyla 5 ve 8 çocukta bit yumurtası görüldü ve bunların sırasıyla 3 ve 5 tanesi sadece tarama sırasında görülüp gözle muayenede görülmedi. Yapılan değerlendirmede, saç bitinin tanısında taramanın gözle muayeneye kıyasla daha etkili olduğu ve karşılaştırılan iki tarağın tanimsal etkinlik ya da kullanım kolaylığı açısından birbirlerinden farklı olmadıkları gösterildi

Anahtar Sözcükler: *Pediculus capitis*, tanı, tarama, Manisa

INTRODUCTION

The human head louse (*Pediculus capitis* De Geer) is an ectoparasitic insect, responsible for prevalent infestations of humans (pediculosis) globally. Pediculosis is not strictly related

to the socioeconomic status, but may cause a socially undesirable condition accompanied by social stigma and pruritus. A noteworthy increase in the number of infested children worldwide accompanied by the documentation of the growing resistance to pediculocidal agents such as pyrethroids and malathion, have reemerged the interest on this common human insect parasite over the last two decades (2, 6, 11).

There are many methods for head lice detection. Direct visual examination by hand or a fine-toothed plastic detection comb is preferred, and the diagnosis is mainly based on the presence

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of nits (8). Combing dry hair with a special comb is reported to be four times more effective than and twice as fast as examination by hand in the diagnosis of head louse infestation in mass screening studies, such as in schools (2, 7). Actually, the discrimination of cases with live lice and nits only is essential as the former indicates an active, while the latter indicates a past or non-active infestation (8). Direct visual examination commonly underestimates active louse infestations. On the other hand, it reveals higher percentage of children with nits only as the examiner spends more time on hair than with a comb, indicating a higher chance of diagnosing false-positive infestations by hand (8).

In the present study, we aimed to compare the efficacies of two metal pin combs with different distances between their teeth in the diagnosis of head louse infestation.

MATERIALS AND METHODS

Setting and Participants: This study was conducted in two village schools of Manisa province. As both schools were for small communities (their villages, only), it was possible to screen all children in one day with high attendance rate. A total of 241 children aged between 7-15 years were recruited in the study; among them, 95 were from Çavuşoğlu village and 146 from Yeşilköy village. The study was approved by the ethical committee of Celal Bayar University Medical School, and the required permission to conduct such studies in schools was received from both school authorities and the local representative of the Ministry of Education. Verbal assent was obtained from all children prior to examination.

Combing for head lice detection: All investigators taking part in the study were experienced dermatologists and/or parasitologists familiar with the detection methods of head lice and various life stages of the insect. All children were examined with two diagnostic methods. Firstly, they were examined with visual screening, in which the examiner parted the hair using fingers and thumbs over the whole head, while he examined the signs of live lice or louse eggs for 3 minutes. The presence of louse eggs and active lice was recorded separately. No distinction was made between the nits and live eggs during screening.

After visual screening, a different team of examiners, blinded to prior results, evaluated all children with combing. Two different combs were used in the study; comb A used for the children in Çavuşoğlu village had a distance of 0.18 mm between its teeth, while comb B used in Yeşilköy village had a distance of 0.15 mm between its teeth. Both combs were metal pin comb with an angled nylon grip. The stainless steel pins are 31 mm long. Both combs are provided by KSL Consulting, Denmark (Figure 1). Combing required a systematic approach to whole head, starting on one side and continued until the scalp was completely combed, which lasted for a maximum of 3 minutes or until a head louse was found, whichever hap-

pened earlier. The combing technique involved inserting the comb into dry hair until the tips of the teeth contacted the skin followed by drawing the comb smoothly until the end of the tress. Each part of the scalp was combed three times. After removal, the suspected organisms were examined on the comb to confirm the diagnosis. The children found to be positive for head louse were referred to local GP for treatment.



Figure 1. The combs used in the study (Comb A is dark blue, Comb B is green)

Statistical Analysis: The chi-square test was used for the comparison of groups for yes/no variables such as presence/absence of infestation and for the comparison of the efficacies of the two combs. Detection of p value below 0.05 was regarded to indicate statistical significance.

RESULTS

The results of the comparison of two combs were summarized in Table 1. There were more head louse-positive children in Yeşilköy, but the difference was statistically insignificant ($p > 0.05$). Combing was found to be superior to visual screening for the detection of louse eggs, as well. Both combs were comparable in terms of their efficacies in detection and usage facilities.

The infestation of live lice and eggs were detected predominantly in girls (Table 2). However, one of the interesting findings of the study was that three of the five children in Çavuşoğlu village, but none in Yeşilköy village were boys with no obvious reason.

DISCUSSION

The field surveys of head louse infestation are predominantly conducted in schools, and the main objectives are always the examination of the highest number of children in shortest time both to obtain accurate data and to disrupt the education in the school minimally. Our team of six investigators managed to examine all 146 children in Yeşilköy and 95 children in Çavuşoğlu villages thoroughly, in less than one school day in each

Table 1. Comparison of the patient cohorts and combs

Village	Comb Type	Children examined (n)	Live lice - positive (%)	Live lice detected with combing (%)	Louse egg positive, Combing only / total (%)
Çavuşoğlu	A	95	5 (5.3)	5 (5.3)	3 / 5 (60)
Yeşilköy	B	146	5 (3.4)	5 (3.4)	5 / 8 (62.5)

Table 2. Characteristics of lice-positive children in the study

Village		Live lice			Louse eggs		
		Boys	Girls	Total	Boys	Girls	Total
Çavuşoğlu (n=95)	n (%)	3 (60)	2 (40)	5 (100)	4 (26.7)	11 (73.3)	15 (100)
	Mean age	15.0	15.0		11.5	9.2	
Yeşilköy (n=146)	n (%)	0 (0)	5 (100)	5 (100)	3 (18.8)	13 (81.2)	16 (100)
	Mean age	0	10.4		12.0	10.5	

school on different days, with less than 30 minutes of disruption to any class. This was more efficient in terms of limiting school disruption than by using a wet combing method (4).

The evaluation of a total of 241 pupils in Çavuşoğlu and Yeşilköy villages in Manisa City for the presence of head lice both with visual screening and combing revealed that 10 children (5 in each village) were positive for live lice and 31 (15 in Çavuşoğlu and 16 in Yeşilköy) were positive for louse eggs. Comparison of the two combs with different spaces between their teeth revealed no significant difference for efficacy or for facility in usage. Since two different populations were examined in the study, each with another comb, it was possible that there were actually bigger differences in the rate of infestation with living lice, but due to the poorer efficacy of one of the combs it looked out as if both combs were equally effective.

It has been suggested that the diagnosis of head louse infestation by wet combing using conditioner as a lubricant is the most effective method of identifying head louse infestation (4). To our knowledge, no trials have been published that demonstrates this assumption. However from a practical/logistic point of view, dry combing is the most commonly used method used for community surveys. Mumcuoglu et al (7) reported that dry combing is 4.2 times more effective than visual screening any combing, while Berger et al (3) reported no difference between wet combing and traditional visual screening method for the detection of head louse infestation. Wet or dry combing is more effective than visual screening. The results of the present study confirmed our previous finding (2) that the dry combing with a specially designed plastic head louse detection and removal comb was superior to the traditional method of visual inspection. All children with live lice were identified with combing, while none with visual screening in the present study (Table 1).

Other studies of head lice in Turkey have shown variable levels of infestation ranging from 3.4% to 15.8% (1, 5, 9, 10, 12).

However, in all cases visual inspection was the method used to identify cases, and contrary to our method in this study, the presence of an egg, whether dead or alive, was regarded as positive for head lice infestation. As we found a considerably increased level of infestation identified by detection combing compared with visual inspection, it is reasonable to conclude that if those investigators had used combing they may have found levels of infestation closer to ours.

According to our results in the study, we may conclude that combing of dry hair, using a specifically designed metal pin louse comb is a cheap, rapid, and effective method for accurately screening for head lice in schools and other communities. The space between the teeth of the combs (0.15 mm and 0.18 mm, respectively) has no advantage in identifying live lice, although both combs are significantly more effective than visual screening. In the light of our findings, we suggest the use of a lice comb instead of visual screening in the field surveys of head louse infestation to obtain more accurate data plus in the daily routines in families for detection of head lice.

REFERENCES

1. Akisu C, Delibas SB, Aksoy U, 2006. Albendazole: Single or combination therapy with permethrin against pediculosis capitis. *Pediatric Dermatol*, 23: 179–182.
2. Balcioğlu IC, Burgess IF, Limoncu ME, Sahin MT, Ozbek Y, Bilal C, Kurt O, Larsen KS, 2008. Plastic detection comb better than visual screening for diagnosis of head louse infestation. *Epidemiol Infect*, 136: 1425-1431.
3. Berger MY, Bueving HJ, Koning S, Schouten BWV, 2000. Wet combing no better than classical scalp inspection to detect head lice. *British Medical Journal*. (<http://bmj.bmjournals.com/cgi/eletters/321/7270/1187#11085>).
4. De Maeseneer J, Blokland I, Willems S, Vander Stichele R, Meersschaet F, 2000. Wet combing versus traditional scalp inspection to detect head lice in school children: observational study. *BMJ*, 321(7270): 1187-1188.

5. **Kokturk A, Baz K, Bugdayci R, Sasmaz T, Tursen U, Kaya TI, Ikizoglu G**, 2003. The prevalence of pediculosis capitis in school children in Mersin, Turkey. *Int J Dermatol*, 42: 694–698.
6. **Leung AKC, Fong JHS, Pinto-Rojas A**, 2005. Pediculosis capitis. *J Pediatric Health Care*, 19(6): 369-373.
7. **Mumcuoglu KY, Friger M, Ioffe-Uspensky I, Ben-Ishai F, Miller J**, 2001. Louse comb versus direct visual examination for the diagnosis of head louse infestations. *Pediatric Dermatol*, 18: 9–12.
8. **Mumcuoglu KY, Barker SC, Burgess IE, Combescot-Lang C, Dagleish RC, Larsen KS, Miller J, Roberts RJ, Taylan-Ozkan A**, 2007. International guidelines for effective control of head louse infestations. *J Drugs Dermatol*, 6(4): 409-414.
9. **Oğuzkaya Artan M, Baykan Z, Koc, AN**, 2006. The prevalence of *Pediculus capitis* in students of eight primary schools in the rural area of Kayseri province [in Turkish]. *Türkiye Parazitol Derg*, 30: 112–114.
10. **Özçelik S, Değerli S, Aslan A**, 2006. Investigation of the prevalence of *Pediculus* in Alahaci village primary school students in Sivas province [in Turkish]. *Türkiye Parazitol Derg*, 30: 184–186.
11. **Takano-Lee M, Yoon KS, Edman JD, Mullens BA, Clark JM**, 2003. *In vivo* and *in vitro* rearing of *Pediculus humanus capitis* (Anoplura: Pediculidae). *J Med Entomol*, 40(5): 628 - 635.
12. **Tanyuksel M, Araz RE, Albay A, Aycicek H**, 2003; Prevalence and treatment of *Pediculus humanus capitis* with 1% permethrin and 0.4% d-phenothrin in Turkey. *Acta Medica (Hradec Kralove)*, 46: 73–75.