

# PREVALENCE OF *PEDICULUS CAPITIS* INFESTATION AMONG SCHOOL CHILDREN OF CHINESE REFUGEES RESIDING IN MOUNTAINOUS AREAS OF NORTHERN THAILAND

Chia-Kwung Fan, Chien-Wei Liao,<sup>1</sup> Ming-Shuan Wu,<sup>2</sup> Neng-Yeou Hu,<sup>3</sup> and Kua-Eyre Su<sup>4</sup>

Department of Parasitology, College of Medicine, and <sup>2</sup>Department of Internal Medicine, Wan-Fang Hospital, Taipei Medical University; <sup>1</sup>Institute of Parasitology, College of Medicine, National Yang-Ming University; <sup>3</sup>Clinical Laboratory, Chu-Tung Hospital, Department of Health, Hsin-Chu; <sup>4</sup>Department of Parasitology, College of Medicine, National Taiwan University, Taipei, Taiwan.

An epidemiologic survey of *Pediculus capitis* infestation among Akka aboriginal and Han children of Chinese refugees living in mountainous areas at elevations of 1,100 to 1,400 m in Chiang-Rai Province of northern Thailand was conducted during January 2003. Of the 303 children examined, 43 (14.2%) had *P. capitis* infestation. The overall infestation rate for *P. capitis* in Akka children (29.3%, 12/41) was significantly higher than that in Han children (11.8%, 31/262;  $\chi^2 = 8.161$ ,  $p = 0.002$ ). The prevalence in Akka (52.2%, 12/23) and Han girls (19.7%, 31/157) was higher than that in Akka (0%) and Han boys (0%), respectively ( $p < 0.001$ ), and the prevalence was higher in Akka girls than in Han girls ( $\chi^2 = 10.978$ ,  $p = 0.001$ ). The high prevalence of *P. capitis* infestation among these girls was possibly due to poor environmental hygiene and unavailability of sufficient water.

**Key Words:** *Pediculus capitis*, school children, refugees, Chiang-Rai Province, Thailand  
(Kaohsiung J Med Sci 2004;20:183-7)

*Pediculus capitis* (head louse) is a cosmopolitan parasite that is especially prevalent in temperate and cold regions wherever personal or general hygiene is low [1]. Lice will chiefly infest the human scalp, and female lice will deposit their eggs on the hair, where they become firmly attached. The eggs or nits are quite small, glistening white, and may be seen with the naked eye. About 10 days after deposition, they hatch into nymphs, which are quite similar structurally to the adults, and they mature in about 2 weeks. Both larvae and adults feed on blood obtained by their piercing mouth-

parts. Reportedly, 6-12 million individuals are infested with head lice yearly in the USA, 72% of whom are children who usually acquire the infestation from schoolmates [2].

*Luis* and *Wawi* refugee villages are located in mountainous areas at elevations of 1,100 to 1,400 m in Chiang-Rai Province, northern Thailand. Chinese refugees live in these villages, and include several different aboriginal populations and Han peoples who migrated from southern China between 1949 and 1952. The Akka population living in *Luis* village is the largest of the aboriginal populations, while most Han people live in *Wawi* village. Aboriginal and Han people differ in their traditional culture. Medical services are provided by Taipei Medical University, Taiwan, and, to improve the health status of school children, a survey of and treatment for *P. capitis* infestation among Han and Akka school children was conducted during January 2003.

Received: November 3, 2003

Accepted: January 16, 2004

Address correspondence and reprint requests to: Dr. Chia-Kwung Fan, Department of Parasitology, College of Medicine, Taipei Medical University, 250 Wu-Hsin Street, Taipei 110, Taiwan.  
E-mail: tedfan@tmu.edu.tw

## MATERIALS AND METHODS

*Luis* and *Wawi* villages are located near the borders of Laos and Myanmar in the mountainous areas of Chiang-Rai Province, northern Thailand (Figure), an area of approximately 10,000 km<sup>2</sup>. These villages have approximately 20,000 Han and 4,000 aboriginal inhabitants. The study areas are located at about latitude 20°N and longitude 100°E, with mean daily temperatures of 10°C to 35°C, and relative humidity varying between 25% and 50%.

This study included Akka school children from *Luis* village and Han school children from *Wawi* village. The hair of each child was examined visually (gross examination), paying special attention to the back of the head, which is a preferred nesting area for lice. After the examination, each infested child was given two packages of pediculicides, permethrin 1% (Nix Cream; Wellcome Co, Burlington, NC, USA), to kill the lice by washing their hair once a week within a 2-week treatment period as instructed by our physician. Statistical significance was tested using the Chi-squared test.

## RESULTS

In total, 303 children, including 41 Akka children (18 boys and 23 girls) and 262 Han children (105 boys and 157 girls) were examined. The mean age was similar for both genders and ranged from 8 to 14 years in both populations. Of the 303 children examined, 43 (14.2%; 43/303) had *P. capitis* infestation. The overall *P. capitis* infestation rate was 29.3% (12/41) for Akka children and 11.8% (31/262) for Han children. The prevalence was 52.2% (12/23) in Akka girls, 0% in Akka boys, 19.7% (31/157) in Han girls and 0% in Han boys (Table). Overall, the prevalence in Akka children was higher than that in Han children ( $\chi^2 = 8.161, p = 0.002$ ); the prevalence in Akka girls was also higher than that in Han girls ( $\chi^2 = 10.978, p = 0.001$ ).

## DISCUSSION

Head lice are transferred from one person to the next by direct contact or by contact with clothing, hats, or hair from "lousy" individuals. Not only do head lice infestations pose a hazard to the health of children because they suck blood and cause allergic scalp dermatoses [3], but they may also play a role as vectors of *Rickettsia prowazekii*, the etiological agent of louse-borne epidemic typhus [4]. In the present study, the overall

prevalence of *P. capitis* infestation in Akka aboriginal children in northern Thailand was not low (29.3%). In Poland, head lice infestation was found in 3.2% of 27,800 primary school children [5]. In Turkey, it was reported that 4.1% of 4,365 school children were infested with head lice [6]. In Australia, of 456 children examined, 33.7% had evidence of head lice infestation [7]. Infestation was found in 3.7% of 6,882 school children in Nigeria [8], and the prevalence was extremely high in Argentinian children (81.5%) [9]. In Asia, 37.2% of 912 primary school children in Korea were infested [10], and in Taiwan, 12.8% of 2,725 aboriginal children had evidence of head lice infestation [1].

It is noteworthy that the prevalence of *P. capitis* infestation in Akka girls was extremely high (52.2%). To our knowledge, Akka girls wash their hair infrequently (once per month) due to insufficient water in the remote mountainous areas, which may be an important factor contributing to the high prevalence. None of the Akka and Han boys examined were infested by head lice, possibly because almost all had their hair cut short, providing little area for the lice to live on. Many reports indicate that head lice are more prevalent in girls than boys [1,7,11]. In Korea, the prevalence rate in girls is reported to be 19 times higher than that in boys [12]. Not surprisingly, since northern Thailand is situated in the tropics, temperature and humidity are high throughout the year, making infestation with head lice very probable. Although the infested children were treated weekly with permethrin during a 2-week period, which reportedly has cure rates of 98% and 96% on days 7 and 14 post-treatment, respectively [13], these children might reacquire the infestation due to poor knowledge and environmental hygiene.

Although public health education may be a feasible measure in the prevention of *P. capitis*, intensive chemotherapy for infested Chinese children resident in mountainous areas of northern Thailand is more important due to their parents' poor economic conditions. Providing more medical services is necessary in the future.

## ACKNOWLEDGMENTS

The authors are grateful to the Military Ministry, Ministry of Foreign Affairs, and Ministry of Hygiene of Thailand. The authors also wish to thank the Ministry of Foreign Affairs, Department of Health, Chinese Association for Relief and Ensuing Services, and Taipei Medical University, Taiwan, for their support of this investigation. Dr. Chamberlain helped with the revision of this paper.

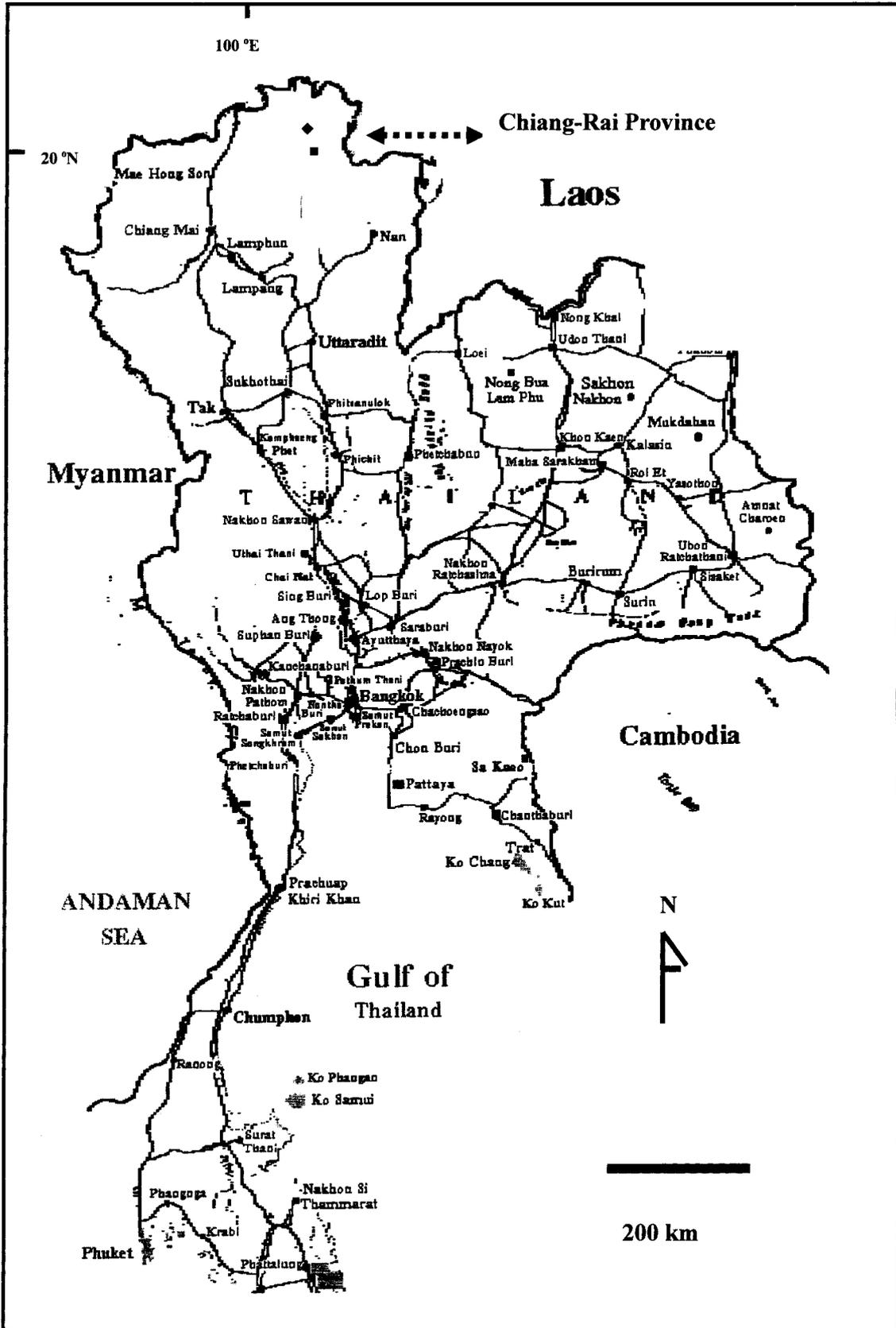


Figure. Map of Chiang-Rai Province, northern Thailand, showing selected study areas. ◆ = Akka aboriginal village; ■ = Han village.

**Table.** Prevalence of *Pediculus capitis* infestation among Akka and Han school children in mountainous areas of Chiang-Rai Province, northern Thailand

	No. examined	No. positive	Positive rate (%)
<b>Akka children</b>			
Boys	18	0	0.0
Girls	23	12	52.2*
Total	41	12	29.3 <sup>†</sup>
<b>Han children</b>			
Boys	105	0	0.0
Girls	157	31	19.7*
Total	262	31	11.8 <sup>†</sup>

\* $p < 0.001$ ; <sup>†</sup> $p < 0.01$ .

## REFERENCES

1. Fan PC, Chung WC, Fan CK, et al. Prevalence and treatment of *Pediculus capitis* infestation among aboriginal school children in northern Taiwan. *Kaohsiung J Med Sci* 1999;15:209-17.
2. Markell EK, John DT, Krotoski WA. *Markell and Voge's Medical Parasitology*. Pennsylvania: WB Saunders, 1999.
3. Driscoll DM, Tronic B. Images in clinical medicine. Pediculosis capitis. *N Engl J Med* 1996;335:790.
4. Robinson D, Leo N, Prociw P, Barker SC. Potential role of head lice, *Pediculus humanus capitis*, as vectors of *Rickettsia prowazekii*. *Parasitol Res* 2003;90:209-11.
5. Wegner Z, Racewicz M, Stanczak J. Occurrence of pediculosis capitis in a population of children from Gdansk, Sopot, Gdynia and the vicinities. *Appl Parasitol* 1994;35:219-25.
6. Ilhan F, Budak S, Guruz AY. The prevalence of *Pediculus humanus capitis* among the students of a secondary and three elementary schools in Karsiyaka-Izmir, Turkey. *J Egypt Soc Parasitol* 1997;27:157-61.
7. Speare R, Buettner PG. Head lice in pupils of a primary school in Australia and implications for control. *Int J Dermatol* 1999;38:285-90.
8. Ebomoyi EW. Pediculosis capitis among urban school children in Ilorin, Nigeria. *J Nat Med Assoc* 1994;86:861-4.
9. Chouela E, Abeldano A, Cirigliano M, et al. Head louse infestations: epidemiologic survey and treatment evaluation in Argentinian schoolchildren. *Int J Dermatol* 1997;36:819-25.
10. Huh S, Pai KS, Lee SJ, et al. Prevalence of head louse infestation in primary school children in Kangwon-do, Korea. *Korean J Parasitol* 1993;31:67-9.
11. Fan PC, Chung WC, Fan CK. Studies of *Pediculus capitis* infestation among school children in Taiwan and offshore islands with a special emphasis on evaluation of pediculosis control program in the past years. *Chin J Parasitol* 1999;12:71-87.
12. Hong HK, Kim CM, Lee JS, et al. Infestation rate of head lice in primary school children in Inchon, Korea. *Korean J Parasitol* 1995;33:243-4.
13. DiNapoli JB, Austin RD, Englander SJ, et al. Eradication of head lice with a single treatment. *Am J Public Health* 1988;78:978-80.

# 泰國北部山地地區中國難民兒童頭蝨感染盛行率

范家堃<sup>1</sup> 廖建維<sup>2</sup> 吳明順<sup>3</sup> 胡能有<sup>4</sup> 蘇霏霏<sup>5</sup>

<sup>1</sup> 台北醫學大學醫學院寄生蟲學科 <sup>2</sup> 陽明大學寄生蟲學研究所

<sup>3</sup> 台北醫學大學萬芳醫院內科 <sup>4</sup> 行政院衛生署立竹東醫院檢驗科

<sup>5</sup> 台大醫學院寄生蟲學科

於二零零三年一月間，對居住於泰國北部清萊省高山地區海拔 1,100 至 1,400 公尺高的中國難民，包括阿卡族與漢族學童進行頭蝨感染流行病學調查與治療。整體而言，303 位受檢學童中，43 位被檢出受頭蝨感染 (14.2% , 43/303)。其中阿卡族學童頭蝨感染率為 29.3% (12/41)，明顯較漢族學童頭蝨感染率 11.8% (31/262) 高 ( $\chi^2 = 8.161$  ,  $p = 0.002$ )。阿卡族 (52.2% , 12/23) 或漢族女學童 (19.7% , 31/157) 的頭蝨感染率皆明顯較己族的男學童 (阿卡族：0.0% , 0/18 ; 漢族：0.0% , 0/105) 高 ( $p < 0.001$ )，而阿卡族女學童頭蝨感染率 (52.2% , 12/23) 又較漢族女學童 (19.7% , 31/157) 的頭蝨感染率高 ( $\chi^2 = 10.978$  ,  $p = 0.001$ )。環境衛生貧乏與水源缺少推測是當地兒童，尤其是女童頭蝨感染率高的原因。

**關鍵詞：**頭蝨；兒童；難民；清萊省；泰國

(高雄醫誌 2004;20:183-7)

收文日期：92 年 11 月 3 日

接受刊載：93 年 1 月 16 日

抽印本索取處：范家堃助理教授

台北市吳興街 250 號

台北醫學大學醫學院寄生蟲學科

northern Thailand, Pediculus capitis infestation, Chiang-Rai Province, Taipei Medical University, head lice, infestation, MOUNTAINOUSAREAS, Chinese refugees, National Yang-Ming University, Pediculus capitis, aboriginal children, prevalence rate, primary school, National Taiwan University, head lice infestation, Akka, Department of Health, Stanczak J. Occurrence, Kaohsiung J Med Sci, Chinese Association for Relief and Ensuing Services, Ministry of Hygiene of Thailand, Pediculus capitis, aboriginal village, Thailand Figure, Kaohsiung J Med Sci 1999;15, Parasitology, College of Medicine, Ministry of Foreign Affairs, Tronic B. Images, Markell and Voge's Medical Parasitology, Kua-Eyre Su4 Department of Parasitology, College of Medicine

Prevalence of Pediculus capitis infestation among school children of Chinese refugees residing in mountainous areas of northern Thailand