

Effect of dry-on, suffocation-based treatment on the prevalence of pediculosis among schoolchildren in Calagtangan Village, Miag-ao, Iloilo

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Pediculosis is an ectoparasitic disease caused by the infestation of the head lice *Pediculus capitis*. It has a high prevalence rate in developing countries because it is mistakenly considered as a naturally occurring disease among schoolchildren with no public health programs geared towards eradicating it. This study determined the prevalence of pediculosis among schoolchildren of Calagtangan Village, Miag-ao, Iloilo, and the percent reduction in the prevalence after treatment using a dry-on, suffocation-based pediculocide (Cetaphil). A mass screening of the schoolchildren of the village was performed by house-to-house survey. Results showed an overall prevalence of pediculosis of 85%, and significantly twice as many females (66%) afflicted compared to males (33%). Results also showed a marked decrease in the prevalence of pediculosis after the first week (44%) and last week (0.03%) of Cetaphil treatment. The overall cure rate was 97.2%. No topical or

systemic adverse reactions to the treatment modality were reported by the parents and/or children. This shows that the dry-on, suffocation based-pediculocide is effective in reducing the high prevalence rate of pediculosis in the study area.

KEYWORDS

Entomology, Ectoparasite, Pediculosis, Prevalence, Pesticides

INTRODUCTION

Pediculosis is an ectoparasite infestation of humans by the head lice, *Pediculus capitis*, which inhabit the scalp and hair of humans and causes intense itching to the host (Menking and Taplin 1995, Frankowski and Weiner, 2002). *Pediculus capitis* is one of the blood sucking lice that infest humans. The other two species are *Pediculus humanus*, or the body louse, and *Phthirus pubis*, or the crab louse which inhabits the pubic hairs. *Pediculus capitis* and *Pediculus humanus* are more or less morphologically similar, *Pediculus capitis* however inhabits the hair and the scalp and lays its eggs on the hair shaft, while *Pediculus humanus* inhabits the body of the host and lays eggs on the clothing fiber. These two lice species are usually pale beige or greyish in color, with a soft but leathery integument and wingless. The adult lice have three pairs of stout and well-developed legs. A thumb-like spine can be seen on the inner side at the apex of the short and thick tibia, and a curved claw is present on the short tarsus. The clothing fiber, or the hair of the host, is gripped between this spine and claw. The mouthpart of the lice is tube-like and flexible, and armed in the inner surface by

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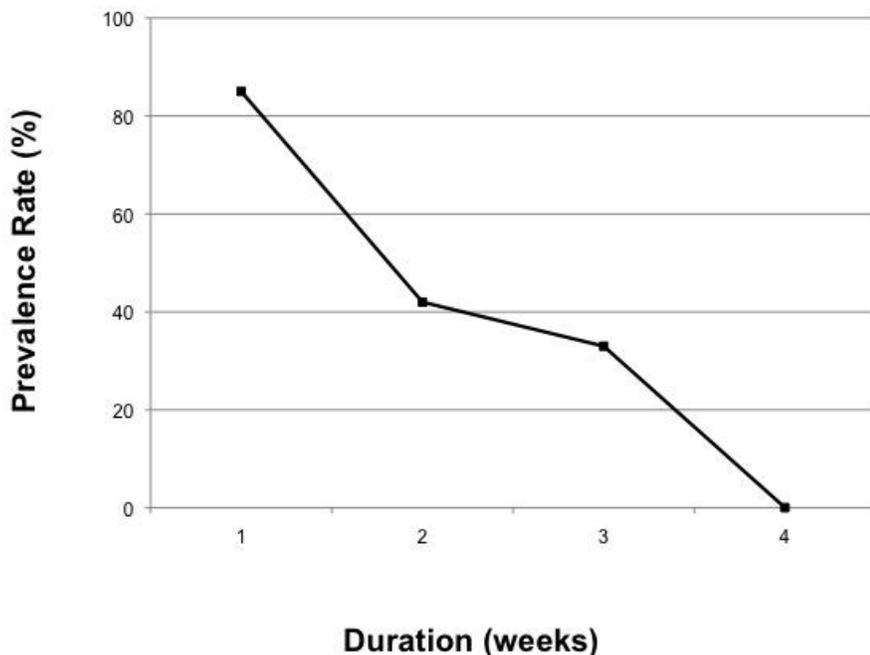


Figure 1. Prevalence of pediculosis among schoolchildren in Calagtangan Village during a 4-week treatment period. Mass screening of the schoolchildren was done for the presence of *Pediculus capitis* adults, nymphs, eggs, and nits.

minute teeth. During feeding, these teeth grip the skin of the host and needle-like stylets are thrust into the skin, the saliva is injected into the wound, then the blood is sucked into the mouth (Service 2000).

Head lice infestation is a persistent and growing problem (Frankowski 2004). It is a common chronic disease affecting children of school age with varying prevalence rates in both developed (0-28% in Victoria, Australia (Counahan et al. 2004), 8.9% in Ghent, Belgium (Willems et al. 2005)) and developing countries (0.8% in Afyon, Turkey (Ciftci et al. 2006), 3.8% in Kerman, Iran (Kamiabi and Nakhaei 2005), 3.8%-13.9% in Bogota, Columbia (Rios et al. 2008), 13.3% in Al-Mahweet, Yemen (Al-Maktari et al. 2008), 16.59% in India (Khokhar 2002), 58.9% in Alexandria, Egypt (El Sahn et al. 2000), 81.5% in Argentina (Chouela et al. 1997)). Close contact between children during play and sharing of personal things such as clothing, head caps, and combs greatly increase the transmission of adult head lice from one person to another and thereby increasing the prevalence of disease. Although there are no studies establishing that head lice can transmit disease (Meinking 1996, Hansen 2004), its presence in a child may pose several health risks and social stigma (Heukelbach and Feldmeier 2004, Momcuoglu et al. 2006). The head lice feed by injecting small amounts of saliva and taking tiny amounts of blood from the scalp every few hours. Heavy infestations and frequent feeding of the lice may lead to iron deficiency and subsequent anemia (Speare et al. 2005). Also, the saliva injected by the parasite may create an itchy irritation, which may result in frequent scratching of the scalp. Wounds that arise from frequent scratching may cause secondary bacterial infection especially when left undiagnosed (Frankowski and Weiner 2002). With no apparent or serious symptoms, pediculosis is frequently overlooked as a public health problem among schoolchildren in very poor communities (Heukelbach and Feldmeier 2004). Because of this, the disease has never been given priority. Hence, there are no projects or programs

implemented against it in poor resource communities like those in the Philippines. These, along with lack of hygienic practices and proper screening and treatment practices, contribute to the high prevalence rate of pediculosis (Gratz 1997).

Treatment for pediculosis relies on conventional household cleaning practices and the use of some neurotoxic pediculocides (Jones and English 2003), which have been found to produce resistance in some strains of head lice (Downs et al. 2002, Yoon 2003, Meinking 2004). These household practices may not be effective in decreasing the prevalence of pediculosis due to the problem of reinfection. Also, they are too cumbersome to perform. Pediculocide chemicals, such as permethrin and malathion, were also found to induce resistance and allergic reactions among children (Meinking 2004). It has been a challenge then for public health officials to choose wisely which pediculocide is the most effective and least toxic to the children (Hensel 2000, Burkhart 2004, Burkhart and Burkhart 2006). A novel and safe treatment was however earlier reported by Pearlman (2004, 2005a), which uses a dry-on, suffocation-based pediculocide. He later revealed it was the non-toxic, over-the-counter, mild facial cleanser,

Cetaphil (Pearlman 2005b). This present study is further validation of the use of Cetaphil as a pediculocide based on Pearlman's (2004) first report.

In this study we sought to determine the prevalence of pediculosis among schoolchildren, ages 4-12 years old, in Calagtangan Village, Miag-ao, Iloilo, Philippines and assess the effectivity of a non-toxic, dry-on, suffocation-based pediculocide (Cetaphil).

MATERIALS AND METHODS

The study was conducted in Barangay (Village) Calagtangan, one of the 119 barangays in the municipality of Miag-ao, Iloilo, Philippines. It is seven kilometers away from the town proper, has no primary and secondary schools, pharmacy, or health station within its area and is considered to be one of the poorest communities in the said municipality. It has a daycare center which caters to 8-15 students, ages 1-5 years old for pre-school. Majority of its land area is used for farming and most of its income is obtained from crops and animal products. It has a total of 84 houses and an average of five household members.

A mass screening was conducted through house-to-house survey among schoolchildren, ages 4-12 years old, of Brgy. Calagtangan Miag-ao, Iloilo. The screening process included: a) history of pediculosis, b) past treatment, c) occurrence of itch, d) red marks, and e) presence of eggs, nits, nymphs and adult lice. Children showing the presence of eggs, nymphs, and adults, as confirmed by the wet combing method (Vander Stichele et al. 2002), were considered to be positive for pediculosis and enrolled in the study. Informed consent was signed by the parents before the children entered the study, with the Calagtangan Village Council approving the protocol. The panel of advisers from the

The children with current pediculosis were enrolled in the treatment course. The treatment procedure was performed by the researchers and pre-trained mothers in the barangay health center. The materials needed in the treatment, such as “detangler combs”, “nit-removal combs”, blow dryers, and shower caps, were provided by the researchers.

The Pearlman (2004) treatment protocol was used in this study with direct visual inspection for diagnosis and wet combing for removing the lice (Vander Stichele et al. 2002, Pilger et al. 2008, Jahnke 2009). A weekly application of Cetaphil was employed, up to a maximum of three applications, until cure was achieved. Lotion was thoroughly applied on the subject’s hair and scalp with excess lotion combed out, first with a plastic, wide-spaced detangler comb, and then by a plastic, closely-spaced nit-removal comb. Active infestation was indicated by the presence of adult lice on the lotion that was combed out. The hair was then blowdried and covered with a shower cap. The lotion was allowed to stay for 8 hours or more, after which the hair was shampooed with the child’s regular shampoo. The shower caps were collected by the researchers and examined for the presence of nymphs and adults. The number of active infestations each week was noted to determine the prevalence of pediculosis and the effectiveness of the treatment.

To ensure that there will be no reinfection and cross infection among family members, each member of the family, who was more than 12 years old, was given a pediculocide shampoo (Licealiz) to be used three times a week. The mothers were also instructed on several household cleaning steps during the study. These steps were: (1) to clean all of the subject’s combs and brushes at home by soaking them for 10 minutes in isopropyl alcohol, (2) to change the subject’s clothes with fresh clothes, and (3) to heat the subject’s pillowcase, sheets, blankets, comforter, and bedspreads by exposing them to direct sunlight before putting them back on the bed.

The children were defined as cured when they did not show any presence of eggs, nymphs, or adult lice in the wet combing, after 3 weeks of treatment.

Descriptive statistics were used to analyze the data on the prevalence of pediculosis and the presence of eggs, nits, nymph, and adult lice. The relationship between prevalence and sex was analyzed using the Chi-square test. All statistical analyses were carried out using SPSS software, version 17.0.

RESULTS

A total of 46 children, ages 4-12 years old, were screened for the presence of pediculosis, with 39 children (85%) showing active lice infestation (Figure 1). Among these, 27 (58.7%) were females and 19 (41.35) were males, with the infestation significantly higher among

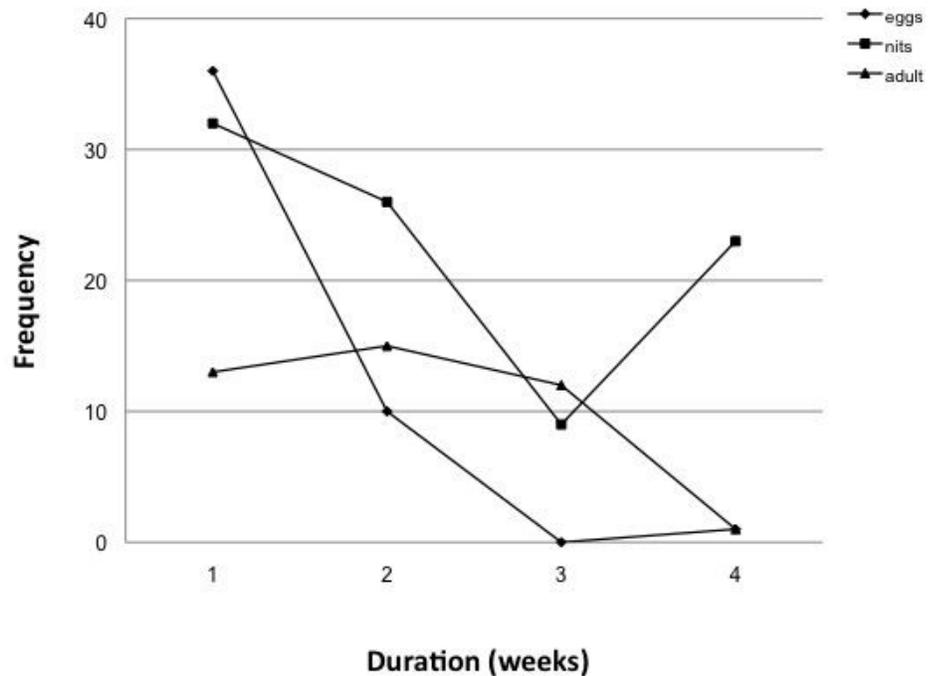


Figure 2. Gradual reduction of the number of *Pediculus capitis* adults, nymphs, eggs, and nits during a 4-week treatment period.

females (n=26; 66.7%) than males (n=13; 33.3%) (P=0.010) (Table 1). Based on our survey, most of these children (78.3%) also have histories of head lice infestation and have undergone conventional household treatment (82.6%).

The frequency of occurrence of eggs, nits, nymph and adults was also determined before, during, and after the three-week treatment period. Generally, the frequency of occurrence of each showed a decreasing pattern (Figure 2). There is a marked decrease in the frequency of occurrence of the lice eggs a week after the first treatment (week 2). There is a continued decrease on the second week and a slight increase on the last week of treatment. The prevalence of the eggs decreased by 97.2% after three weeks of treatment. The occurrence of the nits also decreased after the first and second week of treatment, but slightly increased after the third week. The frequency of occurrence of adult lice slightly increased after the first week of treatment, but gradually decreased after the second and third treatment. The frequency of occurrence of adult lice decreased by 92.3% at the end of the three-week treatment course.

Consequently, the prevalence of pediculosis decreased every week of treatment (Figure 1). There was a marked decrease in the prevalence of pediculosis after the first week (from 85% to 42%) and after the last week (from 33% to 0.03%) of treatment. After the three-week treatment course, only one child exhibited an active lice infestation. The overall reduction rate in the prevalence of pediculosis after treatment with the dry-on, suffocation-based pediculocide was 97.2%.

DISCUSSION

Pediculosis indicates the presence of lice eggs, nymph, and adults. This is the first report of pediculosis prevalence in a village in

Table 1. Ratios of male and female schoolchildren with and without pediculosis.

Prevalence			
Sex	(-)	(+)	Total
Female	1	26	27
Male	6	13	19
Total	7	39	46

Iloilo among school-age children and we report an 85% prevalence rate (Figure 1), a relatively high number compared to other third world communities (Ciftci et al. 2006, Kamiabi and Nakhaei 2005, Rios et al. 2008, Al-Maktari et al. 2008, Khokhar 2002, El Sahn et al. 2000). Also, infestation among females is significantly higher compared to males, most probably due to the fact that the female students have longer hair and borrowing of hair utensils is more common among them. Most of the children screened were found to have lice eggs and nits (Figure 2), with 78.3% reported to have past and recurring infestation. This shows the extent of the public health problem in such resource-poor communities (Willems 2005). Treatment has been sporadic and no physician or public health worker has tried to institute mass treatment regimens in this particular village. Although lice infestation has not been found to transmit any disease, there is still a danger of acquiring secondary bacterial infection from wounds caused by frequent scratching and anemia in malnourished children, with social stigma exacerbating it (Heukelbach and Feldmeier 2004, Momcuolglu et al. 2006).

The drug armamentarium against pediculosis is varied (Meinking et al. 2000) and confusing for the ordinary consumer, especially with the emergence of resistance, neurotoxicity and overexposure to pesticides (Burkhart 2004, Lebowohl 2007). Selection of these commercially available chemical-based pediculocides, which contain permethrin, pyrethrin, lindane and malathion, becomes crucial especially if infected children are treated by non-physicians (Burkhart and Burkhart 2006, Hansen 2004) in poor, far-flung villages like those in the Philippines. Most of the community members have no knowledge of the commercially available pyrethrin based-pediculocide (Licealiz) and our survey showed that four out of five (82.6%) of the infested individuals relied on traditional methods for treating head lice infestation. These methods include nit removal using a fine-tooth nit comb, manual removal of eggs, nits, and adult by their parents or relatives, and the use of household materials such as vinegars, mayonnaise, jellies, or even kerosene. These methods are not totally effective in eradicating pediculosis (Hansel 2000). There are no studies establishing the action of these methods on the head lice, but the community perceived these methods to aid in nit removal. Nits are empty egg shells and their presence indicates that the eggs have already hatched into lice nymphs. Nit removal has been found to have no effect on curing pediculosis, hence these traditional methods are more likely to promote reinfestation and transmission of head lice (Jones and English 2003, Momcuolglu et

al. 2006). Because of reports of lice resistance, allergic reactions, irritations, and toxicity for these chemical-based pediculocide (Meinking 2004, Lebowohl et al. 2007), we tried to validate a new method described by Pearlman (2004) among the infected children. This method uses a dry-on, suffocation-based pediculocide, Cetaphil, a mild cleanser that is readily available in the market. This cleanser is water-soluble and is composed of stearyl alcohol, propylene glycol, sodium lauryl sulfate, cetyl alcohol, water, methyl 4-hydroxybenzoate, propyl *p*-hydroxybenzoate, and butyl *p*-hydroxybenzoate. The United States Food and Drug Administration labels these ingredients as safe (Pearlman 2004, 2005b). In this method, the cleanser is applied to the head of the individual until it is evenly distributed all over the head and the hair. Excess lotion is combed out and the hair is blow-dried. Blow-drying creates a film that covers the louse, plugging its spiracles, causing death by suffocation. Pearlman (2004) reported a 96% cure

rate and 94% remission rate. In our study, the prevalence of pediculosis dropped by 58% after the first application of Cetaphil and continued to decrease until the third week of application (Figure 1). This parallels the decrease in the occurrence of eggs and adults every week of treatment (Figure 2). Many parents reported the presence of dead adult lice in the hair cap of their children after every treatment. Participants were also screened after the third week of treatment and the results showed only one child with adult lice, while the rest showed only nits. Parents also noted the itching, red marks, and scratching decreased after treatment. The overall cure rate of this method in this study is 97.2%, which is essentially the same as Pearlman's (2004) reported cure rate (96%). Also, no untoward allergic reactions, or toxicity, were reported, with minimal household cleaning measures for the parents.

This is the first report that documents the high prevalence of pediculosis that was eradicated by a novel non-toxic, over-the-counter cleansing solution in one of the villages of a rural town in the Philippines. This highlights the extent of the public health problem that pediculosis poses in such far-flung rural areas and the need to come up with a community-based program for control and eradication. Even if this case study is limited by its lack of control, randomization, and blinding, we have shown that the use of the dry-on, suffocation-based pediculocide, Cetaphil, is dramatically effective in reducing the high prevalence rate of pediculosis in Barangay Calagtangan. To further establish the effectiveness of this method, it would be best to compare it with one that utilizes another commonly used pediculocide; and follow-up tests should be done to determine reinfestation.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

CONTRIBUTIONS OF INDIVIDUAL AUTHORS

AMSB, KTSA, JCC, CEUG, EJTN, KHSR, MACC did all the field work with assistance and supervision from PIP.

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