ARTIGO ORIGINAL

HEAD LICE INFESTATION IN CHILDREN IN DAY-CARE CENTERS AND SCHOOLS OF MANAUS, AMAZON, BRAZIL

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ABSTRACT

Head lice infestation is a public health problem, which, though more prevalent in children, may occur in all age groups. From July 2009 to February 2010 a total of 976 children aged 0-12 years who attended four schools and three day-care centers in Manaus, Amazonas State, Brazil, were screened for the presence of head lice. The prevalence rate was 18.5%, with black ($X^2_{0.05\ (1)}$ = 4.655) female children ($X^2_{0.05(1)}$ = 151.324) with dark hair ($X^2_{0.05(1)}$ = 9.942) showing the highest prevalence rates. The type ($X^2_{0.05\ (2)}$ = 6.660) and length of hair ($X^2_{0.05\ (2)}$ = 58.042) also significantly influenced the prevalence of this ectoparasitosis. The age group most affected was the 10-12 year-old ($X^2_{0.05\ (3)}$ = 59.891). Questionnaire answers revealed that intense itching of the head was the most frequently observed symptom by the parents/guardians of affected children and that manual scavenging and pesticides are the main methods of controlling lice. Parents/guardians suggest the indicated educational institutions as the main sources of infestations. The results indicate the need to implement an integrated program to control this ectoparasitosis in the majority of the institutions surveyed.

KEYWORDS: Head lice. Prevalence. Children. Manaus. Amazon.

INTRODUCTION

Pediculosis is a public health problem, which despite being more prevalent in children, is observed in all age groups and many populations (Borges et al.,

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2007; Hodjati et al,. 2008; Jahnke et al., 2009; Sim et al., 2011). Several factors are associated with head lice infestation: socioeconomic aspects, cultural habits, increased human population and insecticide resistance (Monheit & Norris, 1986). Transmission occurs by physical contact between people and via fomites: combs, brushes and caps (Toloza et al., 2009). In Brazil, most studies on the subject address the epidemiology of this ectoparasitosis, and are restricted and clustered to a few regions, such as the states of Minas Gerais, São Paulo and Rio de Janeiro (Linardi et al., 1989, Linardi et al., 1998, Borges & Mendes, 2002, Bastos et al, 2004; Borges et al., 2007). The country has continental dimensions and ethnic, cultural and socioeconomic differences between the populations of its various regions. Regional studies on this ectoparasitosis may provide better insights into the degree of importance and the epidemiological aspects associated with head lice infestation in the respective regions. The objectives of this study were to assess the prevalence of pediculosis in children attending day-care centers and schools in Manaus, State of Amazonas, Brazil, in the Amazon region. In addition, the influence of risk factors for head lice infestation, such as age, sex, race and hair characteristics, was studied in these children in relation to the prevalence of head lice.

MATERIAL AND METHODS

Study design

This was a prevalence survey performed in children from seven educational institutions in the urban region of Manaus, State of Amazonas. The study was conducted from July 2009 to February 2010.

Sampling procedures

The institutions were sorted *a priori* using the phone directory of the city. Contact was established to inform the intention to study pediculosis prevalence in each institution. The participating institutions were two public and one private day-care centers, and four public schools. Three other private institutions were consulted and refused to participate in the study. The minimum number of children to be examined was determined through the formula: $n = (z .P.Q)/d^2$; where z is the critical value of the normal distribution associated to 95% of confidence; p and q were respectively proportions of positive and negative children, and d was the sample error admitted (3%) (Rodrigues, 1986).

Data collection

Diagnosis of pediculosis was performed by the inspection of children's heads and the collection of hair samples. Children who presented viable nits and/or

nymphs and/or adults were considered positive. A form to characterize the sampled children and their hair was filled in with the following data: age; sex; race; and hair length, type, and color (Borges & Mendes, 2002). Hair length was obtained from visual observation and confirmed by stereoscopic microscope analysis. Hair was considered short when it measured up to 3 cm, medium from 3 to 10 cm, and long when longer than 10 cm. Hair was also characterized according to type, as: straight, wavy and curly; and regarding color: light (blond and red-haired) and dark (black and brown). The children were categorized as blacks and non-blacks, which included dark brunets, brunets and whites (Borges & Mendes, 2002). All the procedures were performed by three previously trained members of the research group.

A questionnaire, with seven multiple choice questions addressing the epidemiology, mode of transmission, symptoms and control of head lice, was applied to parents and/or guardians of all examined children.

Ethical issues

All parents or guardians of children participating in the research signed a free, informed consent form and the study was approved by the Ethics in Research Committee of the Federal University of Amazonas (CAAE: 0099.0.115.000-09).

Statistical analysis

The proportions of each institution were compared. Because only one of the four private institutions accepted to participate on the survey, comparisons among prevalence encountered in children from public and private institutions were done solely between those from day-care centers. The chi-square test (X^2) was used in comparisons between two or more groups. Where the analysis indicated significant differences between several groups, these were submitted to angular transformation ($p' = \text{arcsine } \sqrt{p'}$) and subsequently compared by the Tukey test. In addition, prevalence ratios were calculated and the respective confidence intervals were also determined. A significance level of 5% was adopted in all analyses performed (Zar, 1999).

In each educational institution, talks were held on head lice biology and prevention methods; furthermore, the coordinating body of each institution was given a report of the results of the clinical exams.

RESULTS

Preliminary data collected in the private day-care center and in a public school were used to calculate the necessary minimum sample size that indicated n=456. During the study, 104 children attending a private day-care center, 452 attending two public day-care centers and 420 attending four public schools were examined.

A prevalence rate of 18.5% was encountered in the 976 children examined (Table 1). The analysis indicated significant differences between the prevalence rates obtained in the institutions ($X^2_{0.05\ (6)}$ = 12.492). The lowest prevalence rate was obtained in the private day-care center and the highest in one of the two public day-care centers included in the study (Tables 1, 2). Prevalence ratios indicated that age group, hair length and type of institution (public or private institution) were the factors that most influenced the prevalence of pediculosis in children (Table 2).

Table 1. Prevalence of pediculosis (head lice infestation) in children attending urban public and private day-care centers and public schools in the city of Manaus, AM, Brazil.

Institutions	No. of children examined	No. of children infested	Prevalence rate (%) (95% confidence interval)
Public day-care centers			
I	248	76	30.6 (24.9 - 36.3) A[a]
III	204	28	13.7 (9.0 - 18.4) C
Private day-care center			
II	104	4	3.8 (0.2 – 7.4) D
Public schools			
IV	102	10	9.8 (6.9 – 12.7) C
V	115	26	22.6 (18.7 – 26.5) A, B
VI	102	16	15.6 (12.0 – 19.2) C
VII	101	21	20.7 (16.7 – 24.7) B
Total	976	181	18.5 (17.3 – 19.7)

a: Values with different letters show statistical differences at 5% significance level.

Black children presented greater prevalence ($X^2_{0.05\ (1)}$ = 4. 655) and the age group most affected was 10 to 12-year-old ($X^2_{0.05\ (3)}$ = 59.891; Table 2). Predominance was observed for prevalence rates among girls ($X^2_{0.05(1)}$ = 151.324) and children with medium length and long hair ($X^2_{0.05\ (2)}$ = 58.042; Table 2). The study also revealed greater prevalence among children with curly and wavy hair ($X^2_{0.05(2)}$ = 6.660; Table 2).

A total of 69 parents or guardians responded to the questionnaires. Most parents (72.5%) claimed to have verified the occurrence of head lice infestation in children they were responsible for. Educational institutions have been suggested as source of the origin of infestations (53.6%).

The parents of 48.0% of the children reported that they had presented infestation once and the remainder had presented parasitosis twice or more. The main symptom observed was intense itching at the site of infestation (75.4%). Parents/guardians also stated that the procedures adopted for controlling infestations were the use of a fine comb (55.1%), manual scavenging (50.7%), and application of insecticides (31.9%).

Table 2. Prevalence of pediculosis (head lice infestation) according to sex, race, age and different hair characteristics of children attending urban public and private day-care centers and public schools in the city of Manaus, AM, Brazil.

	Children examined	No. of children infested (%)	Prevalence ratio (95% confidence interval)
Sex			
Male	479	28 (5.8) A[a]	-
Female	497	137(27.5) B	1.63 (1.15 - 3.09)
Race			
Black	68	15 (22.1) A[a]	-
Non-black	908	144 (15.9) B	1.39 (1.09 - 2.11)
Age (years)			
0____3	219	22 (10.0) A[a]	-
4____6	327	69(21.1) B	2.11 (1.55 - 2.87)
7____9	241	36(14.9) C	1.49 (0.977 - 2.17)
10____12	189	54 (28.5) D	2.85 (1.80 - 4.49)
Color			
Dark	888	149 (16.7) A[a]	-
Light	88	9 (10.2) B	1.63 (1.15 - 3.09)
Type			
Straight	511	73 (14.2) A	-
Wavy	383	73 (19.1) B	1.34 (1.03 - 1.86)
Curly	81	16 (19.7) B	1.38 (1.17 - 2.25)
Length			
Short	521	43 (8.2) A[a]	-
Medium	196	46 (23.4) B	2.85 (1.94 - 4.17)
Long	259	73 (28.1) B	3.42 (2.9 - 4.89)
Day-care centers			
Private	104	4(3,8) A	-
Public	452	104(23,0) B	5.98 (2.25 - 15.86)

a: For each factor analyzed, values with different letters show statistical differences at a 5% significance level.

DISCUSSION

The prevalence rates obtained are relatively low, when compared to prevalence rates determined in other parts of Brazil and the world for this population group (Kwaku-kpikpi, 1982; Linardi et al., 1998; Borges & Mendes, 2002; Govere et al., 2003; Toloza et al., 2009, Bosely & El-Alfy, 2011). Several factors influence the occurrence of this ectoparasitosis; variations in the degree of influence of these factors in each region could explain the differences in prevalence reported. The adoption of different criteria for determining positive individuals could also partially explain the difference in the prevalence rate obtained in this study, in comparison to rates obtained in other regions of Brazil (Linardi et al., 1998; Pilger et al. 2008).

The criterion adopted here was the same adopted by Borges & Mendes (2002), and presents high sensibility (Borges et al., 2007).

Pediculosis prevalence rates were higher in children aged 10 to 12 years, corroborating the work of Hodjati et al. (2008). In contrast, Speare & Buettener (1999) and Rios et al. (2008) reported a higher prevalence in children 3 to 6 years of age, and indicated an association between these rates and behavioral changes in different age groups. The higher prevalence among girls is partially due to the predominance of medium to long hair among females (Toloza et al., 2009). The significant differences between the prevalence rates obtained for children with different hair types have also been reported in other studies (Borges & Mendes, 2002).

Population groups with different socioeconomic levels have shown significant differences in the prevalence of pediculosis (Linardi et al., 1995). Considering that in Brazil the decision made by families as to placing their children in public day-care centers and schools is generally associated with their socioeconomic circumstances, it is possible to affirm that the lowest rate obtained in the present study in the private day-care center is linked with the higher socioeconomic status of its social group. The superimposition of social factors that are favorable to infestation by this ectoparasite increases the susceptibility of certain groups, such as black children (Sinniah et al., 1981). The differences among prevalence rates in public institutions observed in the present study also indicate that other factors may be influencing prevalence of pediculosis in children of theses institutions in Manaus. Prevalences encountered at public and private day-care centers were statistically different, and the respective ratio of prevalence was the highest encountered among compared factors (Table 2). Nevertheless, it is worth noting that only one of four private institutions initially consulted authorized the inclusion of its students in the research, and this restricted sample would limit inferences on the influence of this factor in the present study. On the other hand, this fact reinforces the argument that it is necessary to use other diagnostic techniques and obtain information on this parasitosis in population groups that are difficult to sample using procedures such as these used here (Linardi et al., 1989; Borges et al., 2007).

The choice made by most parents or guardians concerning natural control methods partially corroborates data from other studies (Borges et al., 2007; Cazorla et al., 2007); however, indication that the use of insecticides is among the control measures most commonly adopted is of some concern, since the use of these insecticides without prior medical consultation is notorious. The questionnaire responses indicated that a considerable proportion of the students with a negative diagnosis reported having had pediculosis in the past. This is another indicator that this parasitosis is very common in this population group. The suggestion of the majority of parents/guardians that infestations could occur in the school environment is supported by other studies (Borges et al.,

2007; Cunha et al., 2008). Considering that, during the period of the survey, the majority of the institutions surveyed had no control measures for pediculosis in place, the declaration cited above and studies that corroborate these facts become even more important.

This study indicates that head lice should be the target of control measures in children in Manaus. Campaigns involving the participation of families, educational institutions and coordinated/planned by the institutions responsible for public health in this city are recommended.

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RESUMO

Pediculose do couro cabeludo em crianças de creches e escolas de Manaus, Amazonas, Brasil

A pediculose do couro cabeludo é um problema de saúde pública que, embora seja mais prevalente em crianças, pode ocorrer em todas as faixas etárias. De julho 2009 a fevereiro 2010, 976 crianças de 0 a 12 anos de idade, frequentadoras de três creches e quatro escolas em Manaus, Amazonas, Brasil, foram examinadas para que se investigasse a ocorrência de pediculose da cabeça. A taxa de prevalência verificada foi de 18,5%, sendo as crianças negras ($X^2_{0.05\,(1)} = 4{,}655$), do sexo feminino ($X^2_{0.05(1)} = 151{,}324$) e de cabelos escuros ($X^2_{0.05(1)} = 9{,}942$) as que apresentaram as maiores taxas. O tipo ($X^2_{0.05\,(2)} = 6{,}660$) e o comprimento dos cabelos ($X^2_{0.05\,(2)} = 58{,}042$) também influenciaram significativamente a taxa de prevalência desta ectoparasitose. A faixa etária mais acometida foi a de 10 a 12 anos ($X^2_{0.05\,(3)} = 59{,}891$). As respostas aos questionários mostraram que a coceira intensa na cabeça foi o sintoma mais observado pelos pais/responsáveis nas crianças acometidas. A catação manual e o uso de inseticidas foram os principais métodos adotados para o controle da pediculose. Os pais/responsáveis sugeriram como possíveis fontes da infestação as instituições educacionais. Os resultados indicam a necessidade de implantação de um programa integrado de controle que inclua a participação dos pais e/ou responsáveis, estudantes, professores e demais funcionários das instituições educacionais municipais e estaduais.

DESCRITORES: Pediculose. Crianças. Creches. Escolas. Manaus. Amazonas.

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