
OCCURRENCE AND AWARENESS OF HEAD LICE AMONG ELDERLY RESIDENTS IN LONG-TERM CARE FACILITIES IN UBERLÂNDIA, MG, BRAZIL

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ABSTRACT

The purpose of this investigation was to determine the occurrence of head lice in long-term care facilities (LTCFs) in Uberlândia, MG, Brazil, analyze associations with sex, ethnicity, age and hair characteristics, and verify awareness among elderly adults. Head inspections were performed and infestation was characterized on individual forms. A questionnaire on the biology, epidemiology and control of head lice was applied. Overall occurrence was 1.4%, being highest in elderly women with medium-length curly hair. Questionnaire responses indicated that the majority had no general knowledge on head lice. More than 40% reported infestation at some point in their lives and most knew how to control it. Overall occurrence was considered low and is related to measures adopted by the LTCFs, which controlled infestation by minimizing the influence of factors normally associated with its occurrence. The study was pioneer in analyzing associations between head lice and the degree of autonomy of elderly adults.

KEY WORDS: Head lice; infestation; elderly adults; Uberlândia, MG.

INTRODUCTION

Hematophagous lice are mammalian exclusive ectoparasites with high specificity regarding their hosts (Freitas et al., 1984). Humans are the hosts of members of the Pediculidae and Pthiridae families (Triplehorn & Jonnson, 2011).

Infestation by *Pediculus humanus* (Mumcuoglu, 2012) is called scalp or head lice. It is characterized by severe itching, irritation at the affected site, secondary infections and anemia when associated with an inadequate diet. Transmission occurs directly, through contact between people, and indirectly,

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through fomites like combs, brushes and caps (Linardi et al., 1988; Linardi & Barbosa, 2016).

Several factors may interfere with the prevalence of head lice, including hair characteristics, age and the socioeconomic status of the population (Madureira, 1991; Borges & Mendes, 2002; Poudel & Barker, 2004; Borges-Moroni et al., 2011). Living in a communal environment is another factor commonly associated with this parasitosis (Amazonas et al., 2015; Nunes et al., 2015). Although the highest occurrence rates are verified among school-age children, there is no minimum or maximum age limit for the occurrence of infestations, which ranges from three-month-old children to the elderly (Sinniah et al, 1981; Catalá et al, 2004). However the parasitism of *P. humanus* in adults is rare, unlike its occurrence in children and young people, as observed worldwide (Araújo et al., 2000; Heukelbach et al., 2005; Borges et al., 2007; Nunes et al., 2015).

The most commonly used treatments consist of natural and/or chemical control. The former mainly involves the use of procedures like nit picking, combing with a fine comb and scraping the scalp. Chemical control involves the use of insecticides, and is one of the most widely used methods to control head lice (Nunes et al., 2015; Marinho et al., 2018).

Given that head lice infestation has posed an important public health problem over time, current epidemiological studies aimed at increasing knowledge on the topic are fundamental, especially regarding the implementation of parasite control policies (Borges-Moroni et al., 2011; Marinho et al., 2018).

Head lice are among the parasites neglected by public health authorities and may also be neglected by the affected population itself (Heukelbach & Feldmeier, 2004; Marinho et al., 2018). Moreover, recent studies have shown that several population groups have high rates of occurrence (Linardi et al, 1989; Borges & Mendes, 2002; Poudel & Barker, 2004; Borges-Moroni et al., 2011).

This study addressed the epidemiological aspects of head lice infestation among elderly residents of long-term care facilities in Uberlandia, Minas Gerais, Brazil. The purpose was to determine the occurrence of head lice in these individuals, and analyze possible associations of the parasitosis with sex, ethnicity, age and hair characteristics. The study also sought to verify the level of knowledge among elderly adults regarding aspects of the biology, epidemiology and control of this ectoparasitosis.

MATERIAL AND METHODS

The study was conducted in seven long-term care facilities (LTCFs) for elderly adults, two were philanthropic and five were private, located in six different neighborhoods of the city of Uberlandia, Minas Gerais, Brazil. All

the elderly adults interviewed and examined lived in the facilities permanently. Sample collections were performed from August 2017 to January 2018.

145 individuals aged 60 to 105 years of age were examined. Clinical examinations were performed following authorization by the coordinators of each LTCF and the relatives/caregivers of the elderly adults, who signed terms of free, informed consent.

Clinical examinations followed the protocol described by Borges-Moroni et al. (2011) consisting of examining the head of each elderly adult for three minutes with the naked eye, paying greater attention to regions around the neck, behind and around the ears and the central region of the head. The examinations were performed by people previously trained according to procedures described by Borges and Mendes (2002).

Individuals with viable and/or non-viable nits and/or adult nymphs and/or lice were considered infested. After removal, the viability of the nits and identification of adult specimens were confirmed by examination under a stereoscopic microscope and analyzed with the aid of an entomological key (Triplehorn & Jonnson, 2011).

A form was filled out with information concerning each individual examined: name (coded), sex, ethnicity (Black: black and *mulatto*, and non-Black: *pardo* and white), age and hair characteristics (length, type and color). The classification of hair characteristics was based on visual evidence. Hair length was classified as follows: short, up to 3 cm; medium, from 3 to 10 cm; and long, over 10 cm. The type of hair was classified as: straight, wavy or curly. Hair color was classified as: fair (blond, red) or dark (black and brown). Information on sex, ethnicity and age was also noted in the individual records. Age groups were established according to the World Health Organization (WHO, 1986).

The level of autonomy of the elderly adults was inferred according to their ability to care for themselves. Those who needed assistance in activities of daily living (ADLs), such as bathing, dressing and eating, were considered dependent, while those who could perform ADLs without assistance were considered independent.

The questionnaire was answered by the elderly adults themselves or by interview when they were unable to do so independently. The questionnaire consisted of multiple-choice questions, with the purpose of obtaining information about the individuals, their relatives or caregivers, and their knowledge on aspects of parasite biology and epidemiology and controlling head lice after infestation.

The results of the study were sent to the LTCFs in the form of reports. Subsequently, talks were held on aspects of the biology, epidemiology and control of lice infestation in the participating institutions.

Comparisons were made between the occurrence of head lice in individuals from different LTCFs, sex, ethnicity, age group and hair

characteristics (length, type and color). For comparisons between two groups, the Student t test was performed. In comparisons between three or more groups, analysis of variance (ANOVA) was performed. When significant differences were observed between more than two proportions, the data were submitted to Tukey's multiple comparisons test (Zar, 1999). A significance level of 5% was adopted for all tests.

The project was approved on March 29, 2017, by the Research Ethics Committee of the Federal University of Uberlandia, under protocol no. 1.990.239.

RESULTS

All individuals participating in the study lived in the LTCFs and most of them (73.8%) received visits from family members three or more times a week. Seventy percent of them had completed at least nine years of education, while 10% reported being illiterate. Most of them shared the same room with at least one person, and more than a third of them were dependent on assistance with their ADLs. For the majority, hair washing was performed daily, while for the remainder, hair washing was performed between one and four times a week (Table 1).

The overall occurrence of head lice was 1.4% in 145 elderly adults examined in seven institutions. The two elderly adults who presented infestation lived in the same LTCF (Table 2). There was a higher occurrence in elderly non-Black women, and the age group most affected was 60 to 75 years old (Table 3). The highest occurrence was observed in elderly adults with medium length, curly hair. The LTCF where the elderly women resided was privately run. Both positive elderly women were dependent on assistance to perform their ADLs (Table 3).

Table 1. Responses to the questionnaire applied to caregivers/elderly adults in long-term care facilities in Uberlandia, Minas Gerais, Brazil.

Questions	No. of responses: % No. of older adults: ()
Frequency of infestations	
Not infested at the time of study.	100% (145)
Had suffered infestation during their lifetime.	40.7% (59)
Never had an infestation.	17.2% (25)
Did not respond	42.1% (61)
Measures taken by the elderly adults	
Treated it themselves	8.3% (12)
Went to a doctor	1.4% (2)
Told family	26.9% (39)
Did not know what to do	63.4% (92)
Hair products used	
Shampoo and conditioner	91.7% (133)
Shampoo, conditioner and hair dye	8.3% (12)
Control methods*	
Nit-picking, use of fine comb, scalp scraping	6.2% (9)
Use of insecticides.	20.7% (30)
Chemical and Natural	19.3% (28)
Did not use any	53.8% (78)
Symptoms described by elderly adults	
Head itching and restlessness	35.9% (52)
Anemia	2.1% (3)
Did not respond	62.0% (90)
Frequency of hair washing	
One to four times per week	45.5% (66)
Every day	54.5% (79)
Education level of elderly adults	
Completed basic education (9 yrs)	41.4% (60)
Completed secondary education (12 yrs)	15.2% (22)
Completed university (16 or more yrs)	13.1% (19)
Illiterate	10.3% (15)
Did not respond	20.0% (29)
Possible places of transmission	
Day care centers, schools, playgrounds	26.2% (38)
Residences	7.6% (11)
Did not respond	66.2% (96)
Frequency of visits/relatives	
1 or 2 per week	17.2% (25)
3 or more per week	73.8% (107)
No visitors	9% (13)
Room sharing	
Sharing a room with 1 other person	37.3% (54)
Sharing a room with 2 other people	31% (45)
Sharing a room with 3 other people	20% (29)
Individual room	11.7% (17)

Table 2. Occurrence of head lice in elderly residents of long-term care facilities (LTCFs) in Uberlandia, Minas Gerais, Brazil.

Institution	Private or philanthropic	No. of elderly adults examined	No. infested (%)
LTCF 1	Private	23	0 (%) (A)
LTCF 2	Philanthropic	19	0 (%) (A)
LTCF 3	Philanthropic	36	0 (%) (A)
LTCF 4	Private	27	0 (%) (A)
LTCF 5	Private	21	0 (%) (A)
LTCF 6	Private	10	0 (%) (A)
LTCF 7	Private	9	2 (22.2%) (B)*

* Results with different letters are statistically different at the 0.05 significance level.

Because some examined individuals did not answer all the questions in the questionnaire, total responses varied in some of the factors studied. All individuals interviewed stated that they were not infested at the time of the survey. However, 40.7% said they had suffered infestation in the past and 63.4% said they did not know or did not respond regarding what actions they took once infested. The control methods that the interviewees mentioned were chemical control (20.7%), natural method (6.2%) and both methods simultaneously (19.3%) (Figure 1). The majority of elderly adults mentioned head itching and restlessness (35.9%) as the main symptoms associated with parasitosis and 2.1% reported anemia concurrent with infestation. They also indicated that possible places where head lice are transmitted include the home (7.6%), day care centers, schools and parks (26.2%); however, 65.5% of the elderly adults did not know or did not answer this question (Table 1).

Table 3. Occurrence of head lice in elderly adults in relation to sex, ethnicity, age group, hair characteristics, type of institution and degree of functionality in long-term care facilities in Uberlandia, Minas Gerais, Brazil.

	No. examined	No. infested (%)	Result of the analyses (F/T)	Probability of significance (p)
Sex				
Male	58	0 (A)	1.427	0.159
Female	87	2 (2.3) (A)		
Ethnicity				
Black non-Black	137	2 (1.4) (A)	1.929	0.056
Non-Black	8	0 (A)		
Age group				
60 to 75 yrs old	38	1 (2.6) (A)	0.357	0.700
76 to 90 yrs old	79	1 (1.3) (A)		
91 to 105 yrs old	28	0 (A)		
Hair characteristics				
Length:				
Short	131	1 (0.8) (A)**	28.058	0.000
Medium	11	1 (9.0) (B)		
Long	3	0 (C)		
Type:				
Straight	114	1 (0.9) (A)	4.058	0.019
Wavy	17	0 (A)		
Curly	14	1 (7.1) (B)		
Color:				
Fair	108	1 (0.9) (A)	0.157	0.855
Dark	9	0 (A)		
Dyed/toned	28	1 (3.6) (A)		
Type of institution				
Philanthropic	55	0 (A)	1.425	0.159
Private	90	2 (2.2) (A)		
Functionality				
Independent	90	0 (A)	1.427	0.159
Dependent	55	2 (3.6) (A)		

** Results with different letters are statistically different at the 0.05 significance level.

DISCUSSION

The overall occurrence of head lice verified in this study is considered low compared with that reported for other population groups, such as children and adolescents (Borges & Mendes, 2002; Nunes et al., 2015; Mendes et al., 2017), and compared with results obtained by other studies conducted on elderly adults in Manaus, AM (Borges-Moroni et al., 2011) and in Uberlandia, more than a decade prior to this study (Borges et al., 2007). Living in a communal environment is one of the main factors associated with the occurrence of this parasitosis (Borges et al., 2007; Willens et al, 2005; Linardi & Barbosa, 2016). The fact that a significant portion of the elderly adults demonstrated minimal awareness regarding aspects of the biology and epidemiology of this parasite, and being dependent on assistance to perform ADLs, are other factors that contribute to the occurrence of parasitosis in this population. Thus, it seems reasonable to assume that the low occurrence of head lice verified in this group is related to measures and/or care practices adopted by the LTCFs, which kept head lice under control and, consequently, minimized the influence of the factors mentioned above.

Features like sex, ethnicity, age and hair characteristics have been shown to be important in several studies on head lice epidemiology. The degree of importance of one or more of these factors varies according to the population studied (Borges & Mendes, 2002; Mendes et al., 2017). In this study, only hair length and type proved significantly relevant. It is noteworthy that although the number of institutions and individuals sampled was satisfactory, for each factor studied, a large variation was noted in the number of individuals according to each of the characteristics analyzed. Given this finding, it is possible that samples with a larger number of individuals, who present certain of the characteristics studied in specific factors analyzed here, would increase precision regarding the relevance of the respective factors in the epidemiology of head lice in this population. Again, the measures and/or care practices adopted by the LTCFs, which resulted in the control of the parasitosis, also reduced the influence of the above factors in the occurrence of head lice in the elderly adults studied.

The symptoms reported by the elderly adults associated with head lice are in agreement with those described in the literature concerning this parasitosis (Nejati et al., 2018). The natural and chemical control methods that were remembered are also recognized as commonly used by individuals with infestation. It is worth highlighting that the majority of the elderly adults said they did not have head lice, had not used any form of control for head lice throughout their lives, or did not answer these questions. Considering the age group of the population studied here and the literature on head lice, it seems reasonable to assume that this group is part of a generation who suffered high

rates of infestation, especially in childhood. Therefore, the limited information provided in the questionnaires regarding these points should be considered.

In reference to the literature, this is the first study to evaluate the association between head lice and the degree of dependence in elderly adults. Although not statistically significant in this study, the degree of dependence in the individuals, that is, their ability to take care of themselves could be relevant in the occurrence of head lice and other morbidities in the elderly.

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REFERENCES

1. Amazonas P, DE Souza R, Mendes J, Moroni F, Borges-Moroni R. Pediculose em Crianças e Jovens Atendidos em Orfanatos e Ambulatório Público de Manaus, AM, Brasil. *Rev Patol Trop* 44: 207-214, 2015.
2. Araújo LF, Ferreira N, Guidon N, Freire NMS, Reinhard KJ, Dittmar, K. Ten Thousand Years of Head Lice Infection A. *Parasitol Today* 16: 269, 2000.
3. Borges R, Mendes J. Epidemiological aspects of head lice in children attending day care centers, urban and rural schools in Uberlândia, Central Brazil. *Mem Inst Oswaldo Cruz* 97: 89-192, 2002.
4. Borges R, Junqueira J, Rodrigues RM, Mendes J. Prevalence and monthly distribution of head lice using two diagnostic procedures in several age groups in Uberlândia, State of Minas Gerais, Southeastern Brazil. *Rev Soc Bras Med Trop* 40: 1-3, 2007.
5. Borges-Moroni R, Mendes J, Justiniano SCB, Bindá AGL. Head Lice infestation in children in day-care centers and schools of Manaus, Amazon, Brazil. *Rev Patol Trop* 40: 263-270, 2011.
6. Catalá S, Carrizo L, Córdoba M, Khairallah R, Moschella F, Bocca JN, Calvo AN, Torres J, Tutino R. Prevalence and parasitism intensity by *Pediculus humanus capitis* in six to eleven-year-old schoolchildren. *Rev Soc Bras Med Trop* 37: 499-501, 2004.
7. Freitas MG, Costa HMA, Costa JO, Lide P. *Entomologia e Acarologia Médica e Veterinária*. Belo Horizonte, Ed. Precisa, 1984.
8. Heukelbach J, Feldmeier H. Ectoparasites – the underestimated realm. *The Lancet* 363: 889-891, 2004.
9. Heukelbach J, Wilcke T, Winter B, Feldmeier, H. Epidemiology and morbidity of scabies and pediculosis capitis in resource-poor communities in Brazil. *British J Dermatol* 153: 150-156, 2005.
10. Linardi PM, Botelho JR, Maria M. Crendices e falsos conceitos que dificultam ações profiláticas contra o piolho e a pediculose “capitis”. *J Pediatr* 64: 248-255, 1988.
11. Linardi PM, Maria M, Botelho JR, Cunha HC, Ferreira JB. Pediculose capitis: prevalência em escolares da rede municipal pública de Belo Horizonte, Minas Gerais, Brasil. *Mem Inst Oswaldo Cruz* 84: 327-331, 1989.
12. Linardi PM, Barbosa VB. Anoplura. In: Neves DP, Melo AL, Linardi PM, Vitor RWA. *Parasitologia Humana*. São Paulo, Ed. Atheneu, 2016.

13. Madureira PR. Pediculosis and Ethnic Groups. *Internat J Dermatol* 30: 524, 1991.
14. Marinho MM, Milan BA, Borges-Moroni R, Mendes J, Moroni FT. Epidemiological aspects of head lice in children attended to at a public hospital in Uberlandia, Minas Gerais state, Brazil. *Rev Patol Trop* 47: 1-11, 2018.
15. Mendes GG, Borges-Moroni R, Moroni FT, Mendes J. Head lice among children attending school in Uberlandia, Minas Gerais State, Brazil. *Rev Patol Trop* 46: 200-208, 2017.
16. Mumcuoglu KY. Is the Head Louse, *Pediculus humanus capitis* Vector of Human Diseases? *J Trop Dis* 1: 1, 2012.
17. Nejati J, Keyhani A, Tavakoli AK, Mahmoudvand H, Saghafipour A, Khoraminasab M, Tavakoli RO, Mousavi SM. Prevalence and Risk Factors of Pediculosis in Primary School Children in South West of Iran. *Iran J Public Health* 47: 1923-1929, 2018.
18. Nunes SCB, Moroni RB, Mendes J, Justiniano SCB, Moroni FT. Head lice in hair samples from youths, adults and the elderly in Manaus, Amazonas State, Brazil. *Rev Inst Med Trop S Paulo* 57: 239-244, 2015.
19. Poudel SKS, Barker SC. Infestation of people with lice in Kathmandu and Pokhara, Nepal. *Med Vet Entomol* 18: 212-213, 2004.
20. Sinniah B, Sinniah D, Rajeswari B. Epidemiology of *Pediculus humanus capitis* infestation in Malaysian schoolchildren. *Am J Trop Med Hyg* 30: 734-738, 1981.
21. Triplehorn CA, Johnson NF. *Estudo dos insetos*. São Paulo, Cengage Learning, 2011.
22. Zar JH. *Biostatistical analysis*. New Jersey: Prentice Hall; 1999.
23. Willems S, Lapeere H, Haedens N, Pasteels I, Nayaert JM, De Maesenee J. The importance socio-economic status and individual characteristics on the prevalence of head lice in schoolchildren. *Eur J Dermatol* 15: 387-92, 2005.
24. World Health Organization (WHO). *Young People's Health a Challenge for Society. Report of a WHO Study Group on Young People and Health for All*. Technical Report Series 731. Geneva: WHO. 1986. 117p.