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Relationship between head lice infestation and hair grooming practices in primary school children in Port Harcourt

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Abstract *Background:* Hair grooming practices and hair characteristics are some of the host related risk factors for head lice infestation. Certain hair grooming practices and characteristics have been reported to affect head lice infestation.
Objective: To determine the relationship between head lice infestation and hair grooming practices in Primary school children in Port Harcourt.
Methods: A cross-sectional study was conducted, using a stratified multi-staged sampling technique. A total of 1350 pupils from thirteen primary schools located in three School Districts were recruited. Data was collected using a proforma completed by parents / guardians. The heads of the pupils were inspected for head lice and nits with the aid of a battery operated Robi lice comb, magnifying glass and a torch as light source.
Results: Ten (0.7%) of the 1350 pupils had head lice infestation, all of whom were females. Seven (2.5%) of the 276 pupils with long hair (hair length greater than 5cm) had a significantly higher prevalence of head lice infestation, compared to 3 (0.3%) of the 1074 pupils with short hair ($p < 0.001$). Head lice infestation significantly increased with a reducing frequency of hair wash from 3 (0.3%) in those that washed daily to 1 (1.5%) in those that washed monthly ($p = 0.034$) but was not significantly associated with the use of chemicals to straighten hair. Head lice infestation significantly increased with reducing social class from 0 (0%) in social class I to 3 (9.1%) in social class V ($p < 0.001$).
Conclusion: A higher prevalence of head lice infestation is significantly associated with longer hair and reduced frequency of hair wash.

Key words: Head lice, Hair grooming, School children.

Introduction

The head louse, Pediculus capitis is transmitted mainly through physical contact and affects mainly school-aged children.[1,2] Besides race, age group, sex and socioeconomical conditions, hair characteristics (such as length and texture) is a host related risk factor for head lice infestation.[3-5] Good hygienic practices like avoiding sand on hair, social education; good grooming and hygiene have been reported to significantly reduce the prevalence of lice.[6,7] Hair hygiene promotes growth of hair, and prevents loss of hair, itching, infection, accumulation of dirt, dandruff, oil, and tangles and helps to destroy pediculi.[8]

Pediculus humanus capitis, the causative organism of head lice infestation, is distributed worldwide. Worldwide prevalence of *Pediculosis capitis* ranges from zero – 59% in various regions.[9] It is endemic both in developing and developed countries and affects persons of all socioeconomic backgrounds.[10] An estimated 6 to 12 million head lice infestations occur each year in the United States among children 3 to 11 years of age.[1,11] It can affect people of all ages but school – aged children are mostly affected.[1]

Pruritus is the most common symptom of head lice infestation.[12] Excoriations and secondary pyoderma may follow trauma resulting from scratching of the scalp. This occurs commonly in tropical environments where there is poor sanitation and hygiene.[12] Since head lice feed on human blood, chronic heavy infestation among school children may lead to anemia, which is manifested as fatigue, sleepiness in the classroom, and poor learning performance and cognitive function. Infested children may also experience disturbance of sleep at night due to intense scratching since the head lice are most active at night.[2] Head lice infestation also causes stigmatization and negatively affects school attendance.[13]

This study was conducted to examine the relationship between head lice infestation in primary school children and hair grooming practices including length of hair, hair treatment with oils or straightening chemicals and heat.

Methods

The study was carried out in Port Harcourt city (PHC), capital of Rivers State of Nigeria. Rivers State is located in the South-South geo-political zone of Nigeria. Port Harcourt is a cosmopolitan city with diverse Nigerian ethnic groups and foreigners living in the city. Port Harcourt is the nerve centre of the oil industry. The urban nature of the area and oil exploration and production activities has caused a great influx of people from all over Rivers State, neighbouring states and indeed, the country.

The study was a cross-sectional population-based study carried out between 1st February and 31st May 2011. A stratified multi-staged sampling technique was used to recruit pupils between 6-12 years of age, from thirteen primary schools located in the three school districts in Port Harcourt. A minimum sample size of 1344 was calculated using the formula, $n = z^2(pq) / e^2$ where: n = minimum sample size, z = 2.243 (constant at a confidence level of 97.5%), p= prevalence, q = 100 – p and e = sampling error of 2.5. Data was collected using a pre-tested questionnaire completed by parents / guardians that had duly signed consent letters that were sent to them via their children / wards. A total of 1350 questionnaires were retrieved.

The schools were first stratified into three school districts. They were also stratified according to school proprietorship into private and public. The thirteen schools were then selected by simple random method from the three school districts according to the ratio of schools in these districts. Six (three public and three private) schools were selected from Diobu, five (three public and two private) from Township and two (one public and one private) from Trans-Amadi school districts. In schools with more than one arm of a class, one arm was selected randomly to represent the others, while in schools with only one arm of a class, that arm was chosen. Arms were selected from all six classes in all the selected schools. In each selected school an average of 105 pupils aged 6- 12 years were recruited. Fifteen to twenty pupils were selected randomly from each class using the class register.

The children's heads were inspected and hair thoroughly combed from base to tip using a battery operated Robi lice comb, model number ME 400-01, made in China. The lice comb emits a light buzzing sound when switched on and the buzzing stops once lice or nits are detected. The comb effectively kills lice and destroys nits. The comb was afterward, inspected for lice and nits which were cleaned off the comb unto a white sheet of paper which was also inspected, using a magnifying glass, for the presence of lice and nits. A total of four lice combs were used. They were cleaned after use on every child by removing the combing unit and cleaning same with methylated spirit to help maintain asepsis. A new comb was used whilst one was being cleaned up. The lice comb was then re-assembled after the combing unit had dried completely.

When nits were found on strands of child's hair during inspection, their distance from the scalp was measured using the wooden ruler and classified as either less than or equal to 0.6cm, or greater than 0.6cm from the scalp. Each child's hair was examined for a period of five minutes, timed with a stop-clock, by an assistant. Hair length was measured with a 30cm wooden ruler using the maximum stretch length, and classified as short (less than or equal to 5cm) and long (greater than 5cm). Hair type was classified as untreated or straightened with chemicals / hot comb. In this study, a child was said to have head lice infestation if there was visualization of nits less than 0.6cm from the scalp on inspection[14] or visualization of at least one head louse on inspection and/or following combing.[11,15] This is because a viable nit, signifying a current infestation is more likely to be found close to the scalp (less than 0.6 cm) on the hair.[14] Data was collated and analyzed using the Epi-info 3.5.1 statistical software. The association between presence of pediculosis and hair length, (grouped into two discrete variables of "long" and "short") was determined using Chi Square (χ^2); so also was the association between presence of pediculosis and use of chemicals / social status of parents. A p value of less than 0.05 was regarded as significant.

Ethical Consideration

Ethical clearance was obtained from the Ethics Committee of the University of Port Harcourt Teaching Hospital. Permission was obtained from the Rivers State Ministry of Education, the Head teachers of the index schools and the parents / guardians of the pupils. Parents of children that were found to have head lice infestation were invited to the respective schools where they were counseled and given a prescription for a pediculicide shampoo. Treated children had their hair re – inspected a week after for head lice to ensure cure and confirm there was no re – infestation.

Results

A total of 1350 pupils were examined. There were 743 (55.0%) females and 607 (45.0%) males, giving a female to male ratio of 1.2:1. The age of the pupils ranged from 6 to 12 years with a mean age of 8.8 ± 1.9 years and mode of 9 years. Seven hundred and forty four (55.1%) of the respondents were from public schools while 606 (44.9%) were from private schools. None of the 1350 pupils examined had live lice, while 15 (1.1%) had nits in their hair. Of the 15 pupils that had nits, 10

(0.7%) had nits found less than or equal to 0.6cm from the scalp (signifying a current infestation). All of the pupils that had evidence of head lice infestation were females (10 out of 743) while none of the male pupils were infested (χ^2 = 8.23, df = 1, Fisher exact = 0.002). Ten (1.3%) of the 744 pupils from public schools were infested compared to none (0%) of the 606 pupils from private schools (χ^2 = 8.21, df = 1, Fisher exact = 0.004).

Of the 1350 pupils in the study, 276 (20.4%) had long hair (hair length greater than 5cm), while 1074 (79.6%) had short hair (hair length less than or equal to 5cm). All the pupils that had long hair were females. Seven (2.5%) of the pupils that had long hair were infested with head lice. In contrast, 3 (0.3%) of those that had short hair were infested. This observed difference was statistically significant (χ^2 = 15.21, df = 1, Fisher exact < 0.001).

One hundred and fifty one (11.2%) of the studied pupils had their hair treated (straightened with chemicals or hot combs), while 1199 (88.8%) had untreated hair. All the pupils that had their hair treated were females. Ten (0.8%) of the pupils with untreated hair were infested, while none (0%) of the pupils with hair straightened by chemicals or hot combs were infested. This observation, however, was not statistically significant (χ^2 = 1.27, df = 1, Fisher exact = 0.304).

Table 1 shows the distribution of head lice infestation in relation to frequency of hair wash. A steady increase (0.3% to 1.5%) in the prevalence of head lice infestation with a reduced frequency of hair wash was observed, except the peak of 2.6% observed in pupils that washed their hair weekly. This observed trend was statistically significant (χ^2 for trend = 4.48, df = 3, p = 0.034).

Table 1: Distribution of head lice infestation in relation to frequency of hair wash

Frequency of hair wash	Head lice infestation No. (%)	No head lice infestation No. (%)	Total
Daily	3 (0.3)	986 (99.7)	989
Weekly	5 (2.6)	186 (97.4)	191
Biweekly	1 (1.0)	102 (99.0)	103
Monthly	1 (1.5)	66 (98.5)	67
Total	10 (0.7)	1340 (99.3)	1350

χ^2 for trend = 4.48, df = 3, p = 0.034

Table 2 shows the distribution of head lice infestation in relation to socioeconomic class. The prevalence of head lice infestation increased with reducing social class from 0 (0%) in respondents from social class I to 3 (9.1%) in respondents from social class V. This observed trend was statistically significant. (χ^2 for trend = 20.67, df = 4, p < 0.001).

Table 2: Distribution of head lice infestation in relation to socioeconomic class

Socioeconomic class	Head lice infestation No. (%)	No head lice infestation No. (%)	Total
I	0 (0.0)	208 (100.0)	208
II	1 (0.2)	468 (99.8)	469
III	1 (0.2)	424 (99.8)	425
IV	5 (2.3)	210 (97.7)	215
V	3 (9.1)	30 (90.9)	33
Total	10 (0.7)	1340 (99.3)	1350

χ^2 for trend = 20.67, df = 4, p < 0.001

Discussion

Similar to previous studies,[2,4,16-,20] the present study shows a higher prevalence of head lice infestation in children with long (2.5%) than those with short (0.3%) hair which was statistically significant. Melann et al[16] found that children with long hair had a higher percentage of head lice infestation than their counterparts with short hair in primary schools in Plateau State, Nigeria. Similarly, Chunge,[4] Suleman and Fatima,[20] Bachok et al[2] and Kamiabi and Nakhaei[19] observed statistically significant higher prevalence of infestation among children with long than short hair in Kenya, Pakistan, Malaysia and Iran respectively. This is probably due to the fact that children with long hair wash their hair less frequently, which is related to an increased prevalence of head lice infestation. Also, head lice infestation can go unnoticed for a longer period of time in longer hair, compared to short hair that is combed and washed more frequently.

On the contrary, Salemi et al[21] in South – Eastern Iran, found that the difference in head lice infestation between children with short, medium and long hair was not statistically significant. Unlike the other studies that grouped subjects into those with short or long hair based on a particular hair length, Salemi et al[21] grouped children into short, medium and long hair based on if the hair did not touch the ears, touched the ears or shoulders respectively. This method may not capture the actual stretch-length of the child's hair, especially in children with curled and frizzy hair; hence the apparently near similar prevalence rates in pupils with short, medium and long hair.

The finding in the present study of a higher prevalence of head lice infestation in children with untreated hair, than in those with hair straightened by chemicals is similar to the study[16] in primary school children in Plateau State, Nigeria. Chemicals used to straighten hair may have pediculicidal properties, hence the finding of a low prevalence of head lice infestation in children with hair straightened by chemicals. The use of hair oils, hair straightening chemicals and hot hair dryers have also been shown to affect head lice infestation. The low incidence of head lice infestation in the black children has

been attributed to the use of hair-oils to straighten hair, which may coincidentally suffocate head lice.[22] Hair grooming that includes oiling the hair might also help to prevent nits from being stuck to the hair shafts.[23] Literature suggest that women who relax their hair with caustic creams have an advantage as this might help to kill the lice and control infestations.[23] When a woman goes under the hot air blast of the hair dryer for 30 minutes or more, any louse or egg on the hair may be destroyed. One promoted treatment for head louse is actually hot air.[23] The LouseBuster™ head lice treatment is a revolutionary new way to kill head lice and their eggs that use small blasts of hot air directed at the hair especially near the scalp. The marketers explain that "The LouseBuster™ device is highly effective because the small size and shape of head lice and their eggs make it difficult for them to conserve water. As such, when they are exposed to the right amount of heated air at the right temperature and for the right length of time, they dry out and die." The device was developed and tested at the University of Utah and has been approved by the Food and Drug Administration of the United States of America.

The statistically significant decreasing prevalence of head lice infestation with increasing frequency of hair-wash noted in the present study is in keeping with trends observed by Bachok et al[2] in Malaysia. Similarly, in a study in Lagos,[24] the absence of head lice infestation noted in LASU staff school pupils compared to pupils in other schools, was attributed to better general sanitation and hygienic conditions reported by students of LASU staff school as opposed to other schools surveyed. Students at LASU regularly washed their hair with medicated soap hence improving their personal hygiene standards unlike in the other schools. Social amenities including properly treated water supply, well spaced sitting conditions was better in LASU as compared to the other schools. The hygienic conditions of the other schools visited were low compared to LASU Staff School. All particles, including head lice and nits (if present) are usually removed by frequent hair washing and this will therefore, help in prevention and a reduction in prevalence of head lice infestation.

In the present study, the prevalence of head lice significantly increased from 0% to 9.1% with decreasing socioeconomic class[25] from class I to V. This finding is supported by some previous studies.[2,19,26-28] Olaitan[26] found the prevalence of head lice in school children in Ibadan to be higher in children of non-working mothers than those of working mothers. In a similar study[28] in Ile -Ife, children of artisans had a higher prevalence of head lice infestation than children of professionals. Just like the present study, the findings in both studies were statistically significant. On the foreign scene, Kamiabi and Nakhaei,[19] and Nazari and Saidijam[27] in two separate studies in Iran found the prevalence of head lice in children to significantly increase with decreasing level of mother's education and father's job, and decreasing level of both parent's education respectively. Similarly, Bachok et al[2] found a significant increase in infestation with decrease in father's income in school children in Malaysia. This is expected because a low education and income will provide poor housing with possible overcrowding and increased physical contact, which will promote spread of head lice and therefore, an increased prevalence of infestation.

This study has shown that head lice infestation is significantly higher in pupils with long hair, those that washed their hair less frequently and those from a lower social class. Head lice infestation is also less prevalent in pupils that have their hair treated with straightening chemicals or hot combs. It is therefore recommended that primary school pupils wear their hair short, to allow for better hair care (such as daily wash) and prevention of head lice infestation. Hair that must be worn long should be treated at regular intervals with hair-straightening chemicals or hot combs. Screening for head lice infestation should remain a part of the School Health Programme at pre-school entrance and periodic medical examination for children, in order to detect and appropriately treat those infested before it spreads to close contacts in school and at home.

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