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Prevalence and Associated Factors of Tinea Capitis among School-Aged Children at Buseko Primary School in Buchi Compound, Kitwe, Zambia

Broker Mubanga [a,b], Seter Siziya [a] and Malan Malumani [c,d*]

[a] Michael Chilufya Sata School of Medicine, Copperbelt University, Hill Crest, Ndola, Zambia.
[b] Livingstone Central Hospital, Livingstone, Zambia.
[c] Department of Internal Medicine, Head of Dermatology and Venereology Unit, Livingstone Central Hospital, Zambia.
[d] Mulungushi University, School of Medicine and Health Sciences, Zambia.

Authors' contributions

This work was carried out in collaboration among all authors. Author BM conceptualized the study, participated in the protocol preparation, data collection, analysis and interpretation and preparation of manuscripts. Authors SS and MM participated in analysis and interpretation of findings and revision of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Background: Tinea capitis is the most common superficial fungal infection among school-aged children, especially those from low socio-economic status, globally. This study aimed to determine the prevalence of Tinea capitis and associated factors among school-aged children at Buseko primary school, Kitwe, Zambia.
Methods: A cross-section study design was conducted among 252 pupils from the age of 5 years to 12 years from 1st July to 7th August using a multistage random sampling technique. Data was collected through an interview administered questionnaire which elicited socioeconomic and demographic data from the recruited pupils, and physical examination to look for the presence of Tinea capitis. Data were analysed using SPSS version 20.0.
Results: The prevalence of clinically diagnosed Tinea capitis among the study subjects was 28.5%. General hygiene status of the child (AOR=0.35, 95% CI: 0.17, 0.12), Sex of the child (AOR=2.97, CI (1.60, 5.51), and presence of Tinea capitis in the family (AOR= 11.56, 95% CI: 5.85, 22.88), were independently associated with Tinea capitis.

**Corresponding author: E-mail: drmalumaniimla@gmail.com, drmalumani@yahoo.com;*

Conclusion: The prevalence of Tinea capitis among the study subjects was high. There is a need of instituting health intervention programmes, emphasizing the promotion of good hygiene and early diagnosis and treatment of Tinea capitis.

Keywords: Tinea capitis; dermatophyte; ringworms; fungal skin infections; kerion.

1. INTRODUCTION

Dermatophytes also referred to as ringworms are one of the commonest fungal skin infections. Depending on the site of infection, they have specific names: Tinea corporis includes tinea gladiatorum and tinea faciei (ringworm of the body)[1], Tinea capitis (ringworm of the scalp), Tinea cruris (jock itch), Tinea pedis (athlete's foot) [2], Tinea unguium (onychomycosis or infection to nails) [3], Tinea manuum (fungal infection of hands, palm) [4], Tinea barbae (beard infection in male adolescents and adults) [5].

Tinea capitis is an infection of the scalp, eyelashes and eyebrows with a dermatophyte [6]. Ely et al.,2014 note that tinea capitis if unattended may progress to kerion, which is characterized by boggy tender plaques and pustules [5]. Tinea capitis is the commonest superficial infection among school-aged children in both developing and industrialized countries [7-11] and continues to be a major public health problem [12]. Low socioeconomic status, poor hygiene conditions, pet contacts, being male, contact with the infected person, sharing of fomite and overcrowding are some of the factors which favour the occurrence of Tinea capitis among school-aged children [13-17]. The highest incidence of tinea capitis is recorded among children between 5 to 10 years of age [18].

Although Tinea capitis has a worldwide distribution [19], higher prevalence rates of Tinea capitis are recorded in Africa, Asia and, South and Eastern Europe [8,20]. For instance in Nigeria, the prevalence varies widely between 9% to 51.8% [21,14]. Simpanya (1989) in study of tinea capitis in urban and rural schools of Lusaka, Zambia reported a prevalence of tinea capitis of sixteen per cent [22]. Most of the children affected in Europe and the United States are either African American or African immigrants [23,24].

Tinea capitis is highly contagious and many culminate to epidemic proportion, markedly in a crowed setup [23].The existing overcrowding, poor sanitation in most government school, and poor hygiene condition among school children makes them vulnerable to acquiring the infection.

To the best our knowledge, no study has been done to determine the prevalence of Tinea capitis and associated factors among school aged children in Kitwe district. This study was designed to determine the prevalence of tinea capitis and associated factors among school aged children at Buseko primary school in Kitwe, Zambia.

2. MATERIALS AND METHODS

2.1 Study Setting

The study was conducted in Kitwe, which is the second largest city both in size and population in Zambia. It is located in the central part of the Copperbelt province. The city is made up of townships and suburban areas, Buchi is one of Kitwe's highly populated suburban areas.

2.2 Study Design and Population

A cross sectional study was used to determine the prevalence of Tinea capitis and associated factors among school aged children (between the ages of 5-12 years) at Buseko primary school with their parents/guardians.

2.3 Sample Size and Sampling Method

Sample size was calculated according to a formula by Yamane [25] as follows:-

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n = Sample size,
N = Population size (525 pupils).
e = Level of precision at 0.05.

$$n = \frac{525}{1 + 525(0.05)^2}$$

n = 227, However, to carter for response failure, the sample size was adjusted using 90%

response rate. This was calculated as sample size divided by 90%. 259/ 90% which is equal to 252. The sample size therefore comprised of 252 pupils. Multistage sampling was used in the selection of the study subjects.

2.4 Data Collection

An interview administered questionnaires. The questionnaire comprised of three sections A, B & C. Section A sought out personal details of the pupils. Section B focuses out socio-economic variable, Section C covered the History on the skin condition. The skin of the scalp, eyebrows and eyelashes of each selected pupil will be carefully examined in a well-lit room for lesions clinically suggestive of Tinea capitis. Physical examination and clinical diagnosis were done by qualified clinician with training in skin diseases.

2.5 Data Processing and Analysis

Each questionnaire was checked for completeness, only completed dated had information entered into computer. Analysis of data was done using (SPSS) version 20.0. Frequencies and percentages were used to describe the study characters using univariate analysis .Binary Logistic regression was performed to identify factors associated with presence of tinea capitis. The p-value and Adjusted Odd Ratio (AOR) with 95% Confidence Interval (CI) were computed to measure the associations between the outcome variable and explanatory variables. The level of significance was set at 0.05.

2.6 Ethnical Concerns

An approval to carry out this research was obtained from Tropical Disease Research Centre (TDRC) and District education board (DEB) in Kitwe. Informed consent was obtained from guardian (Appendix 1and 2) as well as individual verbal assent from participants before engaging them in the study. Children who were found with Tinea capitis or other skin infections were offered with health Education and referred to the nearest health centre for further treatment and investigations.

3. RESULTS

3.1 Socio-Demographic Characteristic Factors of Participants

The total number of 252 pupils from grade 1 to 5 where recruited in the study with a response rate 96.1 %, where 125(51.7%) were males .The age range of study subjects was 5-12 years, of which the majority (68.6%) were found in age range 9-12 years and the mean age of the study subject was 9.49 years (+ 1.610) standard deviation (SD).The average family size of the study participants was 5.45 with the minimum and maximum being 2 and 13 respectively. Pertaining to Education status, three among five children attended grade 3 to 5 and 100(41.3%) guardians attended secondary school. Nearly three in ten of the guardians were either in casual jobs or in permanent salary jobs. More than half of the participants resided in 1-2 bedroomed house (Table 1).

3.2 Tinea Capitis Related Characteristic among Participants

More than 4 in 5 of the participants were sharing beddings with siblings and parents. Majority (54.1%) of children had a fair general hygiene status. More than half of the participants shave their hair at the barbershop. It was found that 207(85.5%) of the participants were sharing combs and fomites. Furthermore, 197(81.4%) of the participants were keeping pets (Table 2).

3.3 Prevalence of Tinea Capitis

The overall magnitude of tinea capitis among the participant was 69(28.5%)

3.4 Factors Associated with Tinea Capitis

After considering all factors that were significantly associated with Tinea capitis in bivariate analysis in binary logistic regression analysis, Sex, hygiene status and presence of Tinea capitis in the family members were found to be significantly associated with occurrence of Tinea capitis. Males were three times (AOR= 2.97, CI (1.60, 5.51) more likely to have Tinea capitis as compared to females. Children with a good hygiene status were 65% (AOR= 0.35 (0.17, 0.12) less likely to develop Tinea capitis than who had a poor hygiene status. Children whose family member had Tinea capitis were twelve times (AOR=11.564 (5.847, 22.8729) likely to have Tinea capitis compared with whose family members didn't have Tinea capitis (Table 3).

4. DISCUSSION

The study revealed the overall prevalence rate of clinically diagnosed tinea capitis of 28.5%. This prevalence was higher than previous reported

from a study done among children attending urban and rural schools in Lusaka, Zambia (16.8%) [22]. However, it was found to be lower than that reported in Nigeria (35.2%) [21], in Hawassa Zuria district in Southern Ethiopia (32.3%) [13], Mathare Nairobi, Kenya (81.2%) [20], in Tulugudu Island, Ethiopia (79.5%), but similar with a study conducted in South-Western Ethiopia (29%) [16], and higher than a study done in Southern Ivory Coast (13.9%) [15], in Iraq (1.25%) [26], in Iran (1.1%) [27], in Nigeria [21,14]. A study done in Egypt had a lower prevalence of 0.4% despite this being a major public health concern [28]. These variations may be related to age structure of the study, genetic and racial differences, socioeconomic factors, hygiene factors, nutrition status, climate factors and state of industrialization.

Sex seems to play a role in the infection. In this study tinea capitis was significantly high in males than female, contrary to what was reported in a research by Attal et al. [29] and Dogo et al. [30]. However the male predominance of infection was documented in other studies [26,31,15,14,32]. High rates of tinea capitis in males may be attributed to the fact that females generally care more about their personal hygiene and hair, which promotes health than males, and easy implantation of spores in males due to short hair.

Table 1. Socio-demographic characteristics of the study subjects (N=242)

Characteristics		Frequency	Percentage
Age of the child in years	5-8 years	76	31.4
	9-12 years	166	68.6
Sex	Male	125	51.7
	Female	117	48.3
Educational status of children	1-2	95	39.3
	3-5	147	60.7
Next of kin	Parents	208	86.0
	Relatives	34	14.0
Occupation of parent/guardian	Small-scale business	42	17.4
	Casual jobs	65	26.9
	Permanent salaries	68	28.1
	[1]Others	67	27.7
Educational background of guardian/parent	Primary	93	38.4
	Secondary	100	41.3
	Tertiary	48	19.8
No.of living rooms in the house	1-2	137	56.6
	≥3	105	43.4
Family size	1-5	130	53.7
	>5	112	46.3

Table 2. Tinea capitis related characteristics among the study subjects (N=242)

Variable		Frequency	Percentages
Sharing bed/ Beddings	Yes	199	82.2
	No	43	17.8
Sharing combs and towels	Yes	207	85.5
	No	35	14.5
Shave hair	Yes	37	15.3
	No	67	27.7
Keeping pets	Yes	45	18.6
	No	197	81.4
General hygiene status	Good	88	36.4
	Fair	131	54.1
	Poor	23	9.5
Presence of tinea capitis in family member	Yes	48	19.8
	No	194	80.9

[1] *Farmers*

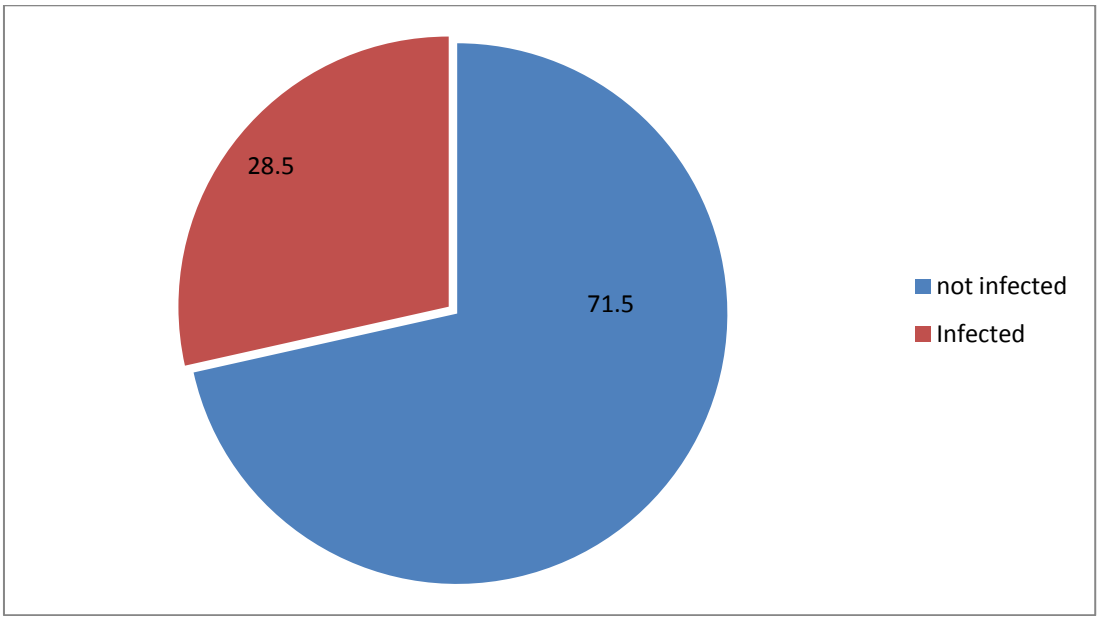

Fig. 1. Prevalence of Tinea capitis among primary school children at Buseke primary school in Buchi, Kitwe, Zambia (n=242)

Table 3. Factors associated with Tinea capitis among study subjects

Variable	Presence of Tinea capitis		Adjusted Odd Ratio (AOR)	P-value
	Yes	No		
Gender				
Male	43	82	2.97 (1.600,5.510)	0.001
Female	26	91	1	
Hygiene of participants				
Good	14	74	0.35(0.17,0.12)	0.004
Fair	39	92	1.10(0.589,2.056)	0.764
Poor	16	7	1	
Similar illness in the family				
Yes	47	7	11.56 (5.847,22.8729)	<0.001
No	22	166	1	

Tinea capitis is more likely to occur among children whose family members had tinea capitis compared with those whose family members didn't have tinea capitis .This was in agreement with finding in Southern Ethiopia [13] The community around Addis Zemen in Ethopia is characterized by large number of family member a single house, where total member of a family reach up to 16, this practice contributed to a higher prevalence of 21.7% [33]. This might be explained by the fact that there would high probability of frequent contact and sharing of fomites with infected persons [13].

The study also revealed that occurrence of tinea capitis was significantly associated with poor general hygiene of the child. This was expected because poor hygiene promotes establishment of infections.

5. CONCLUSION

The prevalence of tinea capitis among the study subjects was found to be high. There is need of instituting health intervention programmes, emphasizing promotion of good hygiene and early diagnosis and treatment of Tinea capitis.

ETHICAL APPROVAL AND CONSENT

Ethical approval was granted by Tropical Diseases Research Centre (TDRC) ethics review committee; IBR Registration No.00002911 and FWA No. 00003729. The local school

administration and guardians gave a verbal informed consent.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Appendix 1: Research participation consent form in Icibemba (Local Language)

Ninebo Broker mubanga, umusambi wapa Copperbelt university. Ndefwalikisha pafikumine ubulwele bwa ifiseseya pakati kabasambi ba pesukulu lya Buseko primary.Ukukufwailisha tamubimbilwe ukuleta ubukali kumusambi.Amashiwi yonse ayo aya kapelwa yakasendwa munkama.Nshilepatikisha ukwibimbamo eicho muli ne nsambu shakukanya atemwa ukusumisha umwana ukuibimbo.

Belengeni amashi aya konkelepo, shilenipo pafyo mwasala, pa kukana nangu uku suminisha Epo naufwa icishinto ca uku ukufwailikisha, Nasuminisha/Nakana umwana wandi ukuibimbamo

Ishina_____
Signature_____
Date----------
Kuti balanshanya naine pali
Cell: +260964173826
Email: brokermubanga@gmail.com

Appendix 2: Research participation consent form in English

My name is Broker Mubanga, from the Copperbelt University pursing a Bachelor's degree in medicine and surgery (MBBS). I am conducting a research on the prevalence of Tinea capitis (ring worms) and associated factors among school aged children at Buseko primary school as part of requirement of my study.

The study will involving Examination the child's scalp, eyes brows and eye lashes and taking the history of Condition, no painful procedures are involved. All pupils who will be found with Tinea capitis will be referred to the nearest health centre to receive treatment. All information collected will kept confidential, participation is not compulsory as such you have the right to accept or decline your child to voluntarily participation or revoke the consent during any course of the study. Please read carefully the statement below and underline anyone of the options you have selected.

Having understood the nature and purpose of the study and the implication of my child participating in the fore mentioned research, and fully assured that confidentiality will be upheld and that I can withdraw my consent and my child's participation at any time of the study without been victimised.
I hereby accept/decline my child to volunteer to participate in the fore mentioned study.

Parents/Guardians Name----------
Signature----------
Date----------
You can contact me on
Cell: +260964173826
Email address:brokermubanga@gmail.com

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The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/88438