

Assessment of *Tinea Capitis*' Exposure, Knowledge and Preventive Behavior among Residents of Teso South Sub County, Busia County

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Abstract-The study focused on exposure, knowledge and preventions behaviour of *Tinea Capitis* skin disease among residence of Teso South Sub County of Busia County Kenya. In 2017, Global burden of disease (GBD) placed fungal skin diseases 4th on the top 10 most prevalent diseases worldwide, of which *Tinea capitis* is one of the fungal skin infections. From Busia County- Kenya, Health Sector Strategic and Investment Plan 2018-2023 report, skin diseases was 3rd leading cause of morbidity in the county with 6.5%; of which *Tinea capitis* was one of the skin diseases, compelling the study to assess exposure, knowledge and prevention behaviour of residence. A cross sectional descriptive study design was adopted; multi stage sampling techniques was employed. Data was collected using a questionnaire and analyzed using descriptive and inferential statistics. The study revealed that 79% were exposed to *Tinea capitis*, 54.6% had good knowledge on *Tinea capitis* while 59.6% presented poor prevention behaviour. There was association of exposure with knowledge on *Tinea capitis*; and no association of knowledge with prevention behaviour in the community. The exposure percentages were high indicating prevalence of the skin disease. The respondents were knowledgeable on signs and symptoms, and transmission of the disease, but less knowledgeable on the cause and risk factors of *Tinea capitis*. Poor prevention behaviour was noted and could be attributed to poor economic status as this increased sharing of basic equipment and facilities that exposed them more. Also, lack of higher education in the community presented by almost a quarter of the study respondents who had attained post-secondary education could as well be associated to the poor prevention behaviour.

Index Terms— Exposure, Knowledge, Preventive behaviour, *Tinea capitis*.

I. INTRODUCTION

A *Tinea Capitis* infection has persisted as a public health problem particularly with overcrowding and sharing of basic grooming equipment, and poor hygiene. The socio economic status of a population contributes to minimizing the spread of the disease or predisposes it to infections. Global Burden of Disease (GBD) estimates noted that 15 categories of skin disease in 187 countries were fungal diseases. Also,

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prominence of fungal skin diseases ranked 4th on the top 10 most prevalent diseases worldwide (Hay *et al.*, 2013). Disability Adjusted Life Year (DALY) ranked skin and subcutaneous diseases at 18th globally; and 4th leading cause of nonfatal burden in GBD (Karimkhani *et al* 2017).

Tinea capitis is a fungal skin infection affecting the scalp. It is mainly caused by *Trichophyton tonsurans* and *Microsporum canis* species (Yang *et al.*, 2020); and is endemic in children in many parts of the world, with high prevalence among children in the rural areas (Hay, 2017). In adults, it is more subtle and not well understood since sebum is believed to have protective effects and decreases the risks of infection; and linked to hormonal imbalance in post-menopausal women (Auchus *et al.*, 2016).

Coulibaly *et al.* (2018), reported that there was a heavy burden of dermatophytosis in Africa, mostly affecting children all over the continent. According to Moto *et al.* (2015), a study conducted in Kenya, the prevalence rate of dermatophytosis infection is 81.3%. From Busia County Health Sector Strategic and Investment Plan 2018-2023 report, skin diseases was 3rd leading cause of morbidity in the county with 6.5%; of which *Tinea capitis* was one of the skin diseases. This triggered the study to assess *Tinea capitis*' exposure, knowledge and preventive behaviour in a rural community in Busia County, with the aim of providing evidences to support the development of a dermatology education programme for the community in order to create awareness through health education and promotion.

II. MATERIALS AND METHODS

Study Settings and Population - The study was conducted among the residents (≥ 18 years of age) of Teso South sub-county, Busia County, western Kenya. The sample size was estimated based on Cochran's formula (Cochran, 1963).

Enrolment criteria and Sampling - Multi stage sampling techniques were used to select the different levels of study units. Teso South sub-county was purposively selected based on the high population (n=165,929) (County Government of Busia, Health Sector Strategic and Investment Plan 2018 - 2023). Convenient sampling technique was used for selecting the Wards in the sub-county according to ease of accessibility and cooperation from the Ward Administrators. All villages in the selected wards were sampled and households in each village were randomly selected. In each household individuals were purposively enrolled into the study with the sample size proportionately distributed among the villages in the selected Wards based on population size.

Data collection - Data was collected using standardized questionnaires with closed-ended questions; with the assistance of the research assistants, who were trained by the principal researcher in order to familiarize them on the key terms in the questionnaire; and better understand the purpose of the research..

Data Collection Tool and Data analysis -Statistical analysis of data was conducted IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. Level of knowledge and preventive behavior on *Tinea capitis* were assessed using statements based on a 5-point likert scale: +5 (strongly agree) to +1 (strongly disagree) for positive statements, and +5 (strongly disagree) to +1 (strongly agree) for negative statements. 4 statements were used to assess knowledge on the cause of *T. capitis*, 4 on sign and symptoms, 3 on mode of transmission, 6 on risk factors, 7 on knowledge on prevention and 5 on the preventive behaviour. The overall scores for each respondent were summed-up and likert scores $\geq 75^{\text{th}}$ and $< 75^{\text{th}}$ percentiles were considered good and poor scores respectively. Age was summarized as median and while knowledge on cause, signs & symptoms, mode of transmission, prevention, preventive behaviour and the overall knowledge on *T. capitis* were summarized as frequencies and percentages. The Chi-square test was used to determine the distribution of levels of knowledge with exposure to the disease, and levels of knowledge on *Tinea capitis* with the preventive behaviour in the community. Subsequently all variables with a $P < 0.05$ were entered into a multivariate regression model to identify variables most associated with preventive behavior. All tests were two-tailed and $P < 0.05$ was considered statistically significant.

Ethical considerations -The study was conducted in accordance with the Helsinki declarations (REFs). Ethical approvals for the study were obtained from Masinde Muliro University of Science and Technology ethical review committee (MMUST/IERC/30/19); permit to conduct the study was obtained from NACOSTI (Ref. No. 946689); and clearance to conduct the study in Teso south sub-county was sort from the Busia County government. Written informed consent was obtained from the authorities in the study area and respondents after explaining the study in a language they understood well. Confidentiality of all information obtained as part of this study was maintained throughout the study.

III. RESULTS

Demographic characteristics of the respondents

The median age of the respondents was 36.0 years, ranging from 18 to 74 years. 50.4% (n = 201) of the study respondents were female; 43.9% (n = 175) had attained secondary level; 43.1% (n=172) were self employed; and 43.4% (n =173) had an average monthly income of less than ksh. 5,000. The demographic data is presented in Table 1.

Table 1: Demographic characteristics of respondents (Residents)

Demographics	Frequency	Percentage
Age (Year)		
Median (Range)	36.0 (18.0 - 74.0)	
Gender		
Female	201	50.4
Male	198	49.6
Education Level		
Post-Secondary	103	25.8
Secondary	175	43.9
Primary	102	25.5
No Formal Education	19	4.8
Occupation		
Employed	81	20.3
Self Employed	172	43.1
Unemployed	146	36.6
Average Monthly Income (Ksh)		
Median (Range)	5,001-10,000 (<5000 - >15,000)	
<5,000	173	43.4
5,001 – 10,000	91	22.8
10,001 – 15,000	77	19.3
>15,001	58	14.5

Data are presented as the frequency of respondents (number) and percentages (%) of respondents unless otherwise indicated.

Respondents' exposure to *Tinea capitis*

The results revealed that 79.0% of the study respondents had been exposed to *Tinea capitis*.

Respondents knowledge on *Tinea capitis*

11.0% of the respondents agreed that *T. capitis* was caused by poor personal hygiene while 85.0% disagreed; 27.5% agreed that it was caused by poor housing while 46.5% disagreed; 87.0% agreed that it was caused by fungal infection while 3.8% disagreed; and 11.1% agreed that it was caused by nutritional deficiency while 62.4% disagreed (Table 2).

54.9% (n = 219) of the respondents strongly agreed that 'itchy, scaly and bald patches on the head' were signs and symptoms of *Tinea capitis*; 37.0% (n = 148) strongly agreed that 'sections of the hair breaking off near the scalp, leaving scaly red areas or bald spots'; 33.3% (n = 133) strongly agreed that 'brittle hair that easily pulls out'; and 22% (n = 88) strongly agreed that 'painful scalp' were signs and symptoms of *T. capitis* (Table 2).

85.7% of the study subjects were of the opinion that direct contact with skin of an infected person would spread *Tinea capitis*; 66.7% of the respondents were in support that contact with infected pets/animals would spread the disease; and

84.7% supported that the disease could be transmitted through inanimate items to persons.

86.7% of the respondents supported that sharing hair brushes and other personal items is a risk; 75.4% were of the opinion that weakened immune systems is a risk factor; and 77.2% were in support that age (most commonly toddler and school-age children) is a risk factor to *T. capitis* (Table 2).

Respondents' knowledge on avoidance of sharing hair brushes and other personal items as a prevention measure was held by a significant percentage of respondents. This was evident from 95.0% positive response to this respect. Community education (86.9%) as well as improved nutrition (77.4%) is believed to prevent the *T. capitis*. Regular shampooing scored 62.1%; avoiding petting animals that have patches on their skin scored 63.4%; maintenance of regular checkups for all pets scored 70.7%; and reduction in environmental pollution scored 60.7% (Table 2).

The respondents' knowledge on *Tinea capitis* was assessed on cause, signs & symptoms, transmission, risk factors and prevention. Overall respondents' knowledge on *Tinea capitis* was also assessed; 54.6% (n = 218) of the respondents had good knowledge on *T. capitis*. The results are presented in Table 2.

The overall respondents' knowledge on *Tinea capitis* was good, represented by 54.6% (n = 218) of the respondents, although poor knowledge was observed on the cause and the risk factors of the disease. The results are presented in Table 2.

Respondents' practices towards prevention of *Tinea capitis*

41.6% of the respondents avoided sharing hair brushes and other personal items very frequently while 34.8% practice frequently; and 33.8% very frequently practiced good hygiene while 47.6% practiced good hygiene frequently. The overall respondents' behaviour towards prevention of *Tinea capitis* was determined, and it was revealed that 59.6% (n = 238) of the respondents had poor prevention behaviours towards *Tinea capitis* Table 3 shows the results.

Association of exposure to *Tinea capitis* with knowledge

The association of exposure to *Tinea capitis* and knowledge revealed that; out of the 79.0% (n = 314) of the respondents who were exposed to *Tinea capitis*, 57.6% had good knowledge, and out of 54.6% (n = 218) of the respondents who had good knowledge on *Tinea capitis*, 83% were exposed. The results indicated that there was association of exposure to *Tinea capitis* with respondents' knowledge on the disease since the p-value was 0.02. The results are presented in Table 4.

Association of knowledge on *Tinea capitis* with the prevention behaviour

The association of respondents' knowledge on *Tinea capitis* with prevention behaviour revealed that; out of 54.6% (n = 218) who had good knowledge on *Tinea capitis*, 60.6% had poor behaviour towards prevention of the disease; and out of 59.6% (n = 238) of the respondents who had poor prevention behaviours towards *Tinea capitis*, 55.5% had good knowledge on the disease. The study revealed lack of association between knowledge on *T. capitis* with the prevention behaviour given by a p-value of 0.687. The results are presented in Table 4.

IV. DISCUSSION

Demographic characteristics of the respondents

The distribution of respondents by genders was relatively balanced with male participants comprising 49.6% while female participants comprising of 50.4% similar to (Aktas and Esin, 2016). The majority (43.9%) of the respondents had attained secondary school education level; 43.1% were self-employed, and 43.4% had an average monthly income of less than Ksh 5,000 similar to (Moto *et al.*, 2015) which reported income of most of the parents (54.7%) of the study participants was below Ksh 5,000 and 43.3% were unemployed.

*Exposure to *Tinea capitis**

The results revealed that 79.0% of the study respondents were exposed to *Tinea capitis*. This was in line with the findings of (Laraqui *et al.*, 2018) which indicated that only 17.4% of the study participants did not have any skin condition, meaning that majority had skin diseases. The results as well mirrors (Guto *et al.*, 2016) findings which indicated recurrent vaginitis and *Tinea capitis* account for 82% of the infections of Kenya's population; and (Hibstu and Kebede, 2017) which reported *Tinea capitis* accounts for up to 92.5 % of dermatophytoses in children younger than 10 years. Therefore, the high burden of *Tinea capitis* in Teso Sub-county is a reflection of similar cases in other part of the country.

*Respondents' knowledge on *Tinea capitis**

The respondents' knowledge on *Tinea capitis* was good similar to (Mahirah *et al.*, 2015) which reported good knowledge on prevention of scabies among the study participants. However, majority of the respondents presented poor knowledge on the cause and risk factors of *Tinea capitis* similar to (Laraqui *et al.*, 2018) which reported poor knowledge among 95% of the study participants. In addition good knowledge was observed on the signs and symptoms, and good knowledge on transmission of *T. capitis* similar to (Bilal *et al.*, 2018) which reported good knowledge on signs and symptoms and mode of transmission of scabies infections among nursing students at Sabia University College;; and good knowledge on prevention of the disease similar to (Mahirah *et al.*, 2015).

*Respondents' prevention behaviour towards *Tinea capitis**

The study recorded poor prevention behaviour towards *T. capitis* contrary to (Mahirah *et al.*, 2017) which reported 60% moderate practice towards prevention of scabies among the Santri. Moreover, majority of the community members avoided sharing of hair brushes and other personal belongings as a prevention measure towards *Tinea capitis* similar to (Bilal *et al.*, 2018) which reported 100% of the nursing students supported that individuals should avoid sharing personal belongings. Similarly, (Adesiji *et al.*, 2019) reported that 57% of the study participants who shared combs were infected with *T. capitis* as compared to 11% who had the infection but did not share combs. A significant percentage of the community practiced personal hygiene to prevent the disease similar to (Alshehri *et al.*, 2018) which reported that 100% of the medical students supported personal hygiene. The respondents' behaviour on avoiding of animals suggested why the high burden of the disease similar to

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(Adesiji *et al.*, 2019) which revealed that 66% of pupils who were playing with animals were infected with *T. capitis*.

Table 2: Knowledge on *Tinea capitis*

Variable	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Knowledge on causes of <i>Tinea capitis</i>					
Poor personal hygiene	11 (3.0)	34 (8.0)	15 (4.0)	158 (40.0)	181(45.0)
Poor housing	32 (8.0)	78 (19.5)	104 (26.0)	127 (32.0)	58 (14.5)
Fungal infection	209 (52.4)	139 (34.8)	36 (9.0)	7 (1.8)	8 (2.0)
Nutritional deficiency	7 (1.8)	37 (9.3)	106 (26.5)	150 (37.6)	99 (24.8)
Knowledge on signs and symptoms of <i>Tinea capitis</i>					
Itchy, scaly, bald patches on the head	219 (54.9)	152 (38.0)	13 (3.3)	14 (3.5)	1 (0.3)
Sections of the hair may break off near the scalp, leaving scaly red areas or bald spots	148 (37.0)	203 (50.9)	28 (7.0)	13 (3.3)	7 (1.8)
Brittle hair that easily pulls out	133 (33.3)	174 (43.6)	52 (13.0)	29 (7.3)	11 (2.8)
Painful scalp	88 (22.0)	197 (49.4)	71 (17.8)	35 (8.8)	8 (2.0)
Knowledge on transmission of <i>Tinea capitis</i>					
Direct contact with skin of an infected person (person to person)	210 (52.6)	132 (33.1)	34 (8.5)	17 (4.3)	6 (1.5)
Contact with infected pets/animal (pet/ animal to person)	85 (21.3)	181 (45.4)	64 (16.0)	47 (11.8)	22 (5.5)
Contact with beddings, clothing of an infected person (inanimate item to person)	164 (41.1)	174 (43.6)	28 (7.0)	23 (5.8)	10 (2.5)
Knowledge on risk factors of <i>Tinea capitis</i>					
Age (most commonly toddler and school-age children)	188 (47.1)	120 (30.1)	50 (12.5)	26 (6.5)	15 (3.8)
Exposure to pets	49 (12.3)	165 (41.3)	94 (23.6)	72 (18.0)	19 (4.8)
Those who sweat excessively	45 (11.3)	96 (24.1)	131 (32.8)	77 (19.3)	50 (12.5)
Those participating in contact sports	64 (16.0)	160 (40.1)	81 (20.3)	64 (16.0)	30 (7.6)
Weakened immune System	101 (25.3)	200 (50.1)	48 (12.0)	38 (9.5)	12 (3.0)
Sharing hair brushes and other personal items	132 (33.1)	214 (53.6)	27 (6.8)	18 (4.5)	8 (2.0)
Knowledge on prevention of <i>Tinea capitis</i>					
Avoid sharing hair brushes and other personal items	246 (61.7)	133 (33.3)	11 (2.8)	6 (1.5)	3 (0.8)
Regular shampooing	54 (13.5)	194 (48.6)	76 (19.0)	59 (14.8)	16 (4.0)
Avoid petting animals that have patches on their skin	79 (19.8)	174 (43.6)	73 (18.3)	57 (14.3)	16 (4.0)
Maintain regular checkups for all pets	84 (21.1)	198 (49.6)	62 (15.5)	47 (11.8)	8 (2.0)
Educates the community	135 (33.8)	212 (53.1)	38 (9.5)	12 (3.0)	2 (0.5)
Improve nutrition	111 (27.8)	198 (49.6)	61 (15.3)	22 (5.5)	7 (1.8)

Reduce environmental pollution	84 (21.1)	158 (39.6)	76 (19.0)	67 (16.8)	14 (3.5)
Overall respondents' knowledge on <i>Tinea capitis</i>					
Variable	Good		Poor		
Cause	39 (9.8)		360 (90.2)		
Signs and symptoms	332 (83.2)		67 (16.8)		
Transmission	323 (81.0)		76 (19.0)		
Risk factors	174 (43.6)		225 (56.4)		
Prevention	276 (69.2)		123 (30.8)		
Knowledge on <i>Tinea capitis</i>	218 (54.6)		181 (45.4)		

Data are presented as the frequency of respondents (number) and percentages (%) of respondents unless otherwise indicated.

Table 3: Respondents' behaviour towards prevention of *Tinea capitis*

Variable	Very frequently	Frequently	Occasionally	Rarely	Never
I avoid sharing hair brushes and other personal items	166 (41.6)	139 (34.8)	61 (15.3)	18 (4.5)	15 (3.8)
I shampoo hair/ scalp	65 (16.3)	114 (28.6)	69 (17.3)	75 (18.8)	76 (19.0)
I practice good hygiene	135 (33.8)	190 (47.6)	56 (14.0)	12 (3.0)	6 (1.5)
I avoid petting animals that have patches on their skin	80 (20.1)	104 (26.1)	129 (32.3)	63 (15.8)	23 (5.8)
I carry out checkups for pets	33 (8.3)	102 (25.6)	82 (20.6)	100 (25.1)	82 (20.6)
Overall respondents' prevention behaviour					
Variable	Good		Poor		
Preventive behaviour	161 (40.4)		238 (59.6)		

Data are presented as frequency (number) and percentages (%) of respondents; unless otherwise indicated

Table 4: Association of exposure to *Tinea capitis*, knowledge and prevention behaviour

Association of exposure to <i>Tinea capitis</i> with knowledge					
Variable	Good knowledge, n (%)	Poor knowledge, n (%)	df	χ^2	P-value
Not Exposed	37 (17.0)	48 (26.5)	1	5.376	0.02
Exposed	181 (83.0)	133 (73.5)			
Good knowledge, n (%)	37 (43.5)	181 (57.6)			
Poor knowledge, n (%)	48 (56.5)	133 (42.4)			
Association of knowledge on <i>Tinea capitis</i> with prevention behaviour					
Variable	Good practice, n (%)	Poor practice, n (%)	df	χ^2	P-value
Good knowledge, n (%)	86 (53.4)	132 (55.5)	1	0.162	0.687
Poor knowledge, n (%)	75 (46.6)	106 (44.5)			
Good practice, n (%)	86 (39.4)	75 (41.4)			
Poor practice, n (%)	132 (60.6)	106 (58.6)			

Data shown are number (n) of subjects and proportions (%) unless otherwise indicated. *cells with <5 counts were excluded from the analysis. df, degrees of freedom. χ^2 , Pearson's Chi-square.

The poor prevention behaviour towards *Tinea capitis* observed in the community could be attributed to poor economic status since the majority (43.4%) of the study participants had an average monthly income of less than kshs. 5000, and only 20.3% were employed. Lack of higher education in the community presented by almost a quarter of the study respondents who had attained post-secondary education could as well be associated to the poor prevention behaviour.

Association of exposure with Knowledge on *Tinea capitis*

The study findings revealed that there was no association between respondents' knowledge on *T. capitis* with the prevention behaviour.

The results indicated that exposure to *Tinea capitis* ($X^2(1) = 5.376$; $p = 0.02$) was associated to the respondents' knowledge on the disease. The findings mirror (Rennie *et al.*, 2019) which reported association between knowledge and exposure human immunodeficiency virus (HIV) ($X^2 = 104.5$, $p < 0.001$). The knowledge scores were as well associated with the student's year of study

V. CONCLUSION

The study concludes that there is a high burden of *Tinea capitis* infection in the community. The community has good knowledge on *Tinea capitis*, although poor knowledge was presented on the cause and risk factors of the disease. Also, the community has poor prevention behaviour towards *Tinea capitis*.

Furthermore, exposure to *Tinea capitis* was associated to the respondents' knowledge on the disease. Additionally, community knowledge on *Tinea capitis* and prevention behaviour were not associated.

VI. RECOMMENDATION

Due to the high burden of *Tinea capitis* and poor knowledge in the community, the study recommends for community health education. Emphasis should be put on the cause and risk factors to the disease.

The study findings revealed that there was association between exposure with knowledge on *Tinea capitis* and therefore this study recommends broader engagement of community members when community education is conducted to increase rate of information dissemination and impact.

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