DERMATOLOGICAL DISORDERS AMONG PRIMARY SCHOOL CHILDREN IN DAR ES SALAAM REGION, TANZANIA

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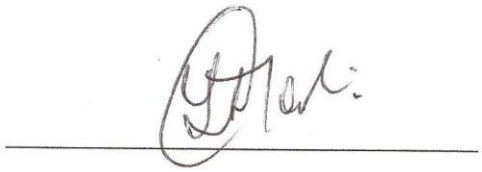
"A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Medicine (Internal Medicine) of the Muhimbili University of Health and Allied Sciences".

April, 2008



CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the Muhimbili University of Health and Allied Sciences (MUHAS) a dissertation entitled: Dermatological disorders among primary school children in Dar es Salaam region, in partial fulfilment of the requirements for the degree of Master of Medicine (Internal Medicine).



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Date 28/11/2008

DICLARATION

I, Ewaldo Vitus Komba, hereby declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

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ABSTRACT

Background: While skin diseases are very common among populations in many developing countries, they have not been regarded as a significant problem that could benefit from public health measures. According to previous studies, the prevalence of skin disorders ranges from 21% to 87%. Although skin disorders are commonly observed in children, there are no many studies on this subject. Few studies have established the etiology of the infective skin conditions and most of them are very old.

Objectives: To determine the prevalence of dermatological disorders among primary school children in Dar es salaam region.

Materials and Methods: The study was conducted among primary school children from six schools {two from each municipal) of Dar es Salaam region. Multistage sampling technique was used to get the study subjects. Pupils from standard I-VII whose parents/guardians had consented participated in the study. Pupils were visited and interviewed using interview administered questionnaires and were examined for skin disorders at their schools. The examination was performed by the author and in difficult cases the diagnosis was made with the help of a dermatologist (supervisor). The diagnosis of skin disorders was based on clinical features but in some infective skin disorders (fungal and bacterial infections and scabies) laboratory confirmation was made. Specimens from lesions suspected of fungal infections (skin scrapings, hairs, nails) were collected and subjected to microscopy (KOH preparation) and Culture on Sabouraud's Dextrose agar. Identification of growth was done on the 14^{th} and 28^{th} days by colonial characteristics and biochemical testing. Specimens suspected of bacterial infections (pus swabs) were processed by gram staining and culture on Blood and MacConkey agars. Identification of growths was done basing on colonial characteristics and biochemical testing.

Results: A total of 420 pupils were enrolled into this study, of whom 213 (51%) were boys and 207 (49%) were girls with a mean age of 11.4±2.8 (range 6-19 years). The overall point prevalence of one or more skin disorders was 57%. Of those studied, 201/420 (48%) children had only one skin disorder, 37/420 (9%) had two, and 3/420 (1%) had three skin disorders. Infectious skin diseases were frequently observed: Superficial skin fungal (dermatophyte) infections in 82/420 (20%), pityriasis versicolor in

36/420 (9%), pediculosis capitis in 15/420 (4%), pyoderma in 8/420 (2%), scabies in 6/420 (1%) and viral warts in 6/420 (1%). The other common skin disorders were acne vulgaris in 53/420 (13%), ulcers in 12/420 (3%), tropical folliculitis in 9/420 (2%), atopic eczema in 8/420 (2%), birth marks in 10/420 (2%), keratosis pilaris in 5/420 (1%), papular urticaria in 5/420 (1%), angular cheilitis in 5/420 (1%) and burn scars in 5/420 (1%). Overall, skin disorders were more common in boys and in older pupils. Dermatophyte infections were more common in boys and younger pupils. Acne vulgaris and pityriasis versicolor were more common in older pupils. The majority of pupils did not seek any medical care for their skin disorders. The socioeconomic parameters that were assessed were not associated with dermatophyte and pityriasis versicolor infections or pediculosis infestation except for a large mean number of persons sleeping in one room which was significantly associated with infection with pityriasis versicolor. *Microsporum canis* was the most frequent isolate from fungal specimens and was also responsible for most of tinea capitis cases. *Trichophyton rubrum* was the most common agent for tinea pedis. Among the bacterial isolates, Staphylococcus aureus was the most common agent.

Conclusions and recommendations: This study shows that skin disorders are common in children and about two thirds are affected at any given time. The finding that about 95% of the disorders can be grouped into fewer than ten categories is important in designing training programmes for medical teams involved in the delivery of primary health care services in developing countries like Tanzania. Pupils were not adequately motivated to seek medical assistance for their skin conditions despite the fact that most of the skin disorders were potentially treatable. There is need to strengthen school health programmes that exist so that regular skin examinations are performed to limit the spread of contagious skin disorders such as tinea capitis and scabies. Efforts should be made to educate families of infected pupils about seeking medical care once they find that they have skin disorders.

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LIST OF ABBREVIATIONS

1. BHS – Beta Haemolytic Streptococci
2. BA – Blood Agar
3. CO_2 - Carbon dioxide
4. HIV –Human Immunodeficiency Virus
5. IMViC – Indole, Methyl red, Voges-Proskauer, Citrate
6. IBIH – Insect bite-Induced Hypersensitivity reaction
7. KOH – Potassium Hydroxide
8. MUHAS – Muhimbili University of Health and Allied Sciences
9. MCA – MacConkey Agar
10. NIMR – National Institute for Medical Research
11. PSG – Post streptococcal glomerulonephritis
12. SDA – Sabouraud's Dextrose Agar
13. SPSS – Statistical package for Social Sciences
14. WHO – World Health Organization

1. INTRODUCTION AND LITERATURE REVIEW

1.1. Background

The skin is the body's largest organ, covering the entire body. It is the principle site of interaction with the surrounding world. It consists of four distinct layers: the epidermis, the basement membrane zone, the dermis and the subcutaneous layer (sub-cutis). [1,2]

It has multiple functions including ***protection*** against heat, light, injury, and infection; ***regulation*** of body temperature, water and electrolyte balance; ***storage*** of water and fat; ***endocrine*** functions like metabolism of vitamin D; ***immunoregulatory*** functions; ***sensory*** functions; and ***social*** function as it marks people as individuals. [1,2]

Skin disease can rarely be fatal. Examples are malignant melanoma, toxic epidermal necrolysis, pemphigus, skin burn and staphylococcal scalded skin syndrome. [1]

While skin diseases are very common among populations in many developing countries, they have not been regarded as a significant problem that could benefit from public health measures.[2] Indeed, more attention is frequently given to some less common health problems in the same countries. This attitude is due to the assumption that skin diseases are a benign, not life-threatening minor nuisance, and that they do not merit measures that may appear out of proportion to their low priority. However, at least in some countries, there seems to be a high demand by patients and healthcare workers for more consideration to be given to skin diseases. [2]

1.2. Prevalence of skin diseases

Several studies done in developing countries have reported high prevalence of skin disorders. In a review of 18 prevalence studies by WHO, the prevalence ranging from 21% to 87% was noted; the following disorders being the commonest in children: pyoderma, tinea capitis, scabies, viral skin disorders, mainly molluscum contagiosum, pediculosis capitis, dermatitis, and reactions due to insect bites. [2]

In India, Sunil Dogra et al documented the overall point prevalence of one or more identifiable/apparent skin conditions of 38.8%. The most common skin conditions were skin infections, pityriasis alba, dermatitis/nonspecific eczemas, infestations, disorders of pigmentation, keratinization disorders (mostly keratosis pilaris), and nevi/hamartomas. [3]

The prevalence of Skin Disorders in School Children in Ibadan, Nigeria was 35.2%. Infectious dermatosis was commonly observed: dermatophytosis, most often tinea capitis, pityriasis versicolor, and scabies. Other dermatoses observed included papular urticaria, angular cheilitis, melanocytic nevi, tribal and scarification marks. Atopic eczema and viral warts were virtually absent. [4]

The prevalence of skin diseases among school children in rural Ethiopia was 80.4% with children having one or more skin diseases. Infestations were the most prevalent skin pathology, followed by fungal infections. [5]

In rural Tanzania, 55% of the school children had one or several skin disorders. Tinea versicolor was found in 26.2%, pyoderma and dermatophytoses in less than 10%, while few children had scabies or eczematous lesions. [6] Other two surveys in different rural Tanzanian communities (including both children and adults) showed prevalence of skin disorders of 34.7% and 26.9 % respectively. [7,8] Transmissible diseases comprised the bulk of skin disease with younger age groups being affected most.

Elsewhere in the world, similar prevalence figures as in developing countries have been reported.

In Turkey, Isil Inanir and his colleagues demonstrated a prevalence of skin disorders among primary school children of 77%. [9] Infectious skin diseases were frequently observed: pediculosis capitis, scabies, viral skin diseases and fungal skin infections. The other common conditions were melanocytic naevi, keratosis pilaris, pityriasis alba, xerosis and atopic dermatitis.

In Hong Kong, in a health service center-based study, a total of 314 students (31.3%) had one or more skin disorders, the most common of which were acne vulgaris, eczema, café au lait spots, congenital melanocytic nevi, superficial fungal infections, keratosis pilaris and pityriasis alba. [10]

1.3. Factors associated with skin disorders

Three main factors have been generally incriminated to explain the high prevalence and incidence of common skin diseases in developing areas: climatic factors; a low level of hygiene, including difficulties in access to water; and overcrowding. [3]

1.3.1. Climatic factors

A hot climate, especially if humid, is a classical predisposing factor to the development of pyoderma. In rural India, the maximum incidence of pyoderma in health centres was during the summer, followed by rainy and winter season. [11] In rural Pakistan, skin and eye infections, in particular, followed clear seasonal patterns. [12] In rural Gambia the greatest effect of climatic change was on the prevalence of the dermatomycoses and pyoderma in children under 10 years of age; the examination of the same community showed a prevalence of pyoderma of 8.9% during the wet season versus 7.2% in the dry season. [2,13]

1.3.2. Poor hygiene

Pyoderma is a skin disorder for which the role of hygiene appears to be best established. Thus, in Colombia, for each climatic zone, the prevalence of pyoderma was higher in children with a low level of hygiene. [14] In Mali, Pyoderma was the only dermatosis associated with poor individual or household hygiene.[15] In the United Republic of Tanzania, the high prevalence of scabies-related pyoderma was attributed to poor hygiene and overcrowding with intimate personal contact. [16]

Concerning scabies, the influence of hygiene appears to be much less clear. It is well known that scabies may affect people with good standards of hygiene (like the Cuna Indians from Panama, who are known to have careful daily personal hygiene). [2,17] A correlation between low socioeconomic status and the presence of scabies has been suggested, although the disease can be present in every social class, sometimes at very high rates. For example, the mean duration of scabies in children in urban Bangladesh was significantly shorter in families with the highest income, but prevalence in that group was still 76%. [18]

Low level of knowledge about hygiene practices has been found to be associated with a higher prevalence of scabies, but this might be only a confounding factor. [18] No correlation between scabies and personal or household hygiene has been found in other deprived settings. [15] On the other hand, superinfection of scabies has been shown to be more common in cases where there is poor hygiene, [16] and where there is a lower socioeconomic status. In Bangladesh, 73% of scabies cases in a deprived population were superinfected versus 3% of cases with a high socioeconomic level. [19] Post-streptococcal glomerulonephritis cases were seen almost exclusively in the category with the lowest socioeconomic level. [19]

1.3.3. Person-to-person transmission

The main diseases considered under this section (pyoderma, scabies, and tinea capitis) are infectious communicable disorders, which are more or less contagious.

Interpersonal transmission of pyoderma and the importance of this way for dissemination are established. [20] However, this has been specifically studied only rarely and did not take into account multiple possible biases in the interpretation of the available data. [8]

Concerning scabies, there are more objective data. The occurrence of severe scabies epidemics in communities with close interpersonal contact such as prisons, [21] refugee camps, [22] or orphanages, [23] strongly suggests the importance of such contact. Sharing bedding is common in many settings, especially among children, and it is a major factor in dissemination of communicable disease, especially scabies, in families, as suggested in one study by the rising prevalence of this disorder with the level of crowding at night (i.e. family size divided by the number of rooms for sleeping) in an Egyptian village. [24] In rural Mali, for each case of scabies identified during a cluster prevalence study in children, there was an average of 6 other cases by family. [15] Children have repeatedly been considered as a main vector of transmission of scabies in families and, as already pointed out; they often show higher rates than adults. [24,25,26]

1.3.4. Role of other skin conditions

Some dermatoses can be considered as a definite risk factor for pyoderma. This is especially true for scabies, which is commonly superinfected, and, to a much lesser extent, tinea capitis. When present, scabies is a major risk factor for pyoderma in patients with lesions of scabies, but also in those without scabies, because of separate dissemination of pyoderma from superinfected scabies. This has been shown by control programmes that found a lower prevalence of pyoderma which followed a reduction in the prevalence of scabies. [27,28,29] Thus, in aboriginal communities from Australia where prevalence rates of scabies and pyoderma are very high, it has been stated that scabies underlies 50-70% of cases of streptococcal pyoderma, by way of either superinfection of scabies or secondary dissemination. [27,30] The contribution of scabies to the prevalence of pyoderma varies with the prevalence of scabies, and with the proportion of cases of scabies that are superinfected (i.e. according to studies: 16%, [26] 24%, [21] 28%, [31] 30%, [23] 33%, [28] 30-50%, [29] and 67%. [15]

The role of traumatic sores as a predisposing factor for pyoderma is also very common, although poorly assessed. Limbs, especially legs, which are main locations for pyoderma in older children, and, less commonly, ears (because of septic ear piercing) in girls (e.g. a sixth of all pyoderma cases in girls from rural Mali are common examples of post-traumatic pyoderma. [15] As judged by clinical experience, local reactions due to insects, either biting or not (e.g. mosquitoes, flies), taking sometimes the form of "prurigo" or "papular urticaria", appear to be a very common cause of secondary pyoderma in many tropical areas. [14,16,32-36]

1.4. Common skin disorders in children

1.4.1. Pyoderma

The available data suggest that beta haemolytic streptococci (BHS), especially group A, remains the main agent of pyoderma in many tropical areas, either primary or secondary to scabies; the role of S. aureus is less well documented, although it was reported to predominate in more recent studies [2]

Complications of pyoderma

The prognosis of superficial bacterial skin infection has been little studied, but is considered to be generally good. Overall, the risk for septic dissemination, either local or regional (adenitis, cellulitis, abscess), is probably statistically relatively low, the commonest possible negative outcome being superficial dissemination of impetigo. Dissemination of follicular infection to abscess or cellulitis might also be seen, mainly after puberty. The most widely documented serious complication of pyoderma is post-streptococcal glomerulonephritis (PSG). [37] The annual incidence of PSG in tropical areas has been estimated at around 20 cases for 100,000 inhabitants (with striking peaks in aboriginal communities from the Pacific). [37] Pyoderma resulting in glomerulonephritis may be primary or secondary, especially to scabies.

1.4.2. Ectoparasitoses

1.4.2.1. Scabies

The only currently known means of transmission of scabies is from human to human. Close interpersonal contact is the main way of transmission, the act of sleeping together often being underlined. [38,39] Fomite transmission is theoretically possible after the demonstration that mites live for up to three days away from the human body, but, in practice, this is probably very unusual. [38] Bacterial superinfection of scabies occurs commonly, and, according to the context and geographical area, varies from 16% to 67% of the cases, with similar bacteriological agents to those observed in primary pyoderma. The medical risk is the same as for the most serious variants of pyoderma, including the risk for glomerulonephritis. [40] Mortality due to scabies, which overall is extremely low, appears to be related mainly to nephritis, or, as recently described, to bacteraemia in young infants. [41-44] Crusted scabies represents a rare variant which seems to have a higher mortality, mainly because of secondary severe sepsis. [45]

Another important issue for prognosis of scabies is the occurrence of *epidemics*. Children appear to be particularly affected, with prevalences of 77% in children under 5 years of age in refugee camps [22] and 70% in under-15-year-olds in a village in India. [46] Closed communities, such as prisons or displacement camps, are at high risk for the highest figures [22,21]

1.4.2.2. Other ectoparasitoses

According to prevalence studies, *Pediculosis capitis* is common in some areas. Many authors have determined the prevalence of pediculosis in children from different countries. Values ranged from 5-8% to more than 50%. [82,83] It is generally considered a minor health problem in developing countries, even by families. Body lice do not seem to be a common skin problem, except in high-risk conditions, e.g. refugee camps, and other situations where there are opportunities for very close contact. The body louse is a potential vector for Life-threatening bacterial infections, such as epidemic typhus, relapsing fever, and trench fever. [47] Sex and social condition are important modifiers of pediculosis prevalence. Studies have shown females to be significantly more affected than males. [82]

In endemic areas, such as certain zones of Brazil, tungiasis appears to be exceedingly common in poor communities with, for example, an incidence rate of 100% over 3 weeks in an exposed community. [48] This disorder yields high risks for superinfection and, eventually, tetanus.

1.4.3. Superficial mycoses

1.4.3.1. Tinea capitis

Prevalence studies using a confirmation of the diagnosis of tinea capitis by a mycological examination produced similar high rates in children as in studies in which diagnoses were only clinical without laboratory confirmation. The prevalences ranged from 7 to 33% of children of various age groups in every developing area where such research was carried out. [49-55] Several studies have documented the spectrum of the organisms involved, with variations according to the geographical area. [56-62]

In fact, almost all the varieties of dermatophytes involved produce a similar picture of pseudo-alopecia associated with scales, with the exception of *Trichophyton schoenleinii*, the agent of favus. In this last entity, lesions are extensive, very symptomatic, and may induce definite widespread alopecia, compared with other variants. Favus can be observed occasionally in many tropical areas, but it has been reported to be common in very limited zones. [63]

Data on the public health importance of tinea capitis are scarce. Owing to its high frequency in many tropical developing countries, it appears that complications of tinea capitis are unusual. Pyoderma appears possible, although its incidence and severity in patients with tinea capitis have not been studied. Kerion, which is a pustular, parasitic non-bacterial variant of tinea capitis, is unusual. [2]

It is well known that the great majority of tinea capitis cases will heal spontaneously with time, although slowly, generally around puberty. This is attested by the rarity of this picture in adults, coincidently with the fact that the majority of infected children in many areas were never treated for this condition. Another important epidemiological issue concerning tinea capitis is that it is highly communicable, especially at family level. Data from developed countries have established the common occurrence of cases as well as healthy carriers among children and adults from the same families and in schools. These facts suggest that huge difficulties would arise from the implementation of a control programme on a large scale for this problem in developing areas. [2]

1.4.3.2. Other superficial cutaneous fungal infections

Although some of these infections are extremely common, such as pityriasis versicolor or fungal infections of the web spaces, few data are available concerning the epidemiological and public health aspects of what appears to be generally a minor nuisance in the tropics. [6,64-69]

1.4.4. *Molluscum contagiosum* and other viral disorders

Molluscum contagiosum is due to a poxvirus and is common in children. It is transmitted by incidental contact and the prevalence may be high, particularly in young children. [1]

In adults it is likely to be a sexually transmitted disease. Cure is often spontaneous, but superficial dissemination is possible. Superinfection, the only known complication, appears to be relatively unusual. Widespread dissemination can also occur in immuno-compromised HIV-infected people. Other common viral disorders with low impact on health are viral warts. [84,85,94]

1.4.5. Dermatitis and other non-infectious disorders

Data for the general population are scarce, but the prevalence of 'dermatitis' in children has been found to vary from 0% to 5%. The fact that data are coming from reference centres makes it difficult to estimate the real impact of this problem in the general population. [2]

In adults, **contact dermatitis** appears to be the commonest variety of dermatitis encountered and is frequently due to work-related exposure or self-treatment, or use of cosmetics and traditional topical plant remedies. In children, **atopic dermatitis** is another common possibility, but the frequencies of these two main types of dermatitis have not been established in this age group in tropical areas. [2]

Acne vulgaris is another common skin disorder among children, occurring at puberty in almost every one although varying in severity, duration and age of onset. It is basically a disease of the adolescent and the young adult, developing much earlier in females than males which may reflect the earlier onset of puberty. The lesions can be distressing in some cases in whom it carries a significant aesthetic implication, which explains the mental stress in the affected individuals. [95] In one study among 230 secondary school students in Dar es Salaam the prevalence of acne was 81%. Of these 53% were males. [95]

Prurigo / papular urticaria, another common entity, is distinct from dermatitis and is believed to be secondary to hyperergic reactions to acarids or insect bites. [70,71,91] The most common variant affects the limbs, and appears to be secondary to common insect bites, e.g. by mosquitoes or sometimes sandflies. The prevalence of prurigo in children has been estimated to vary from 0.1% to 24%. It is most common in young children, with a marked tendency to improve spontaneously with time, as the disease is uncommon in older children. [2]

Superinfection is common, and probably represents a very common cause of pyoderma in many areas, especially in humid climates. In one study it was found that this common clinical entity was frequently not included in the differential diagnosis for pruritic pediatric rashes, suggesting that this may be an unfamiliar and elusive diagnosis for referring among primary care providers and dermatologists alike. [91] Early diagnosis allows for appropriate patient and family counseling resulting in averting use of expensive, unnecessary laboratory studies and avoidance of painful procedures. [91]

1.4.6. HIV-related skin disorders

The spectrum of skin complications of HIV infection in tropical/developing areas has been documented, including in children. [72-77] The main skin complications of HIV infection are herpes zoster, herpes simplex virus infections, common bacterial skin infection, scabies, superficial mycoses, prurigo, drug reactions, verrucae, molluscum contagiosum (often widespread), seborrheic dermatitis, and Kaposi's sarcoma; this last complication appears to be less common in children than in adults.

2. STATEMENT OF THE PROBLEM

Although skin disorders are commonly observed conditions in children, there are no many studies of this subject. [9] Only a few population-based epidemiological studies measuring the prevalence of skin diseases in school children exist. [4] In these studies high prevalence figures ranging from 21% to 87% have been reported, demonstrating that skin disorders are a common problem among school children. The socioeconomic factors associated with skin disorders are yet to be determined among primary school children in Dar es Salaam. Very few studies have established the etiology of the infective skin conditions in Tanzania and they are old.

3. RATIONALE

There is need to determine the prevalence of skin disorders among primary school children in Dar es Salaam region given the paucity of data in this population. There is also need to know which socioeconomic factors influence the prevalence of skin disorders in Dar es Salaam region. This study also aims to establish the etiology of the infective skin conditions as there is very little (and old) data that provides this information.

RESEARCH QUESTIONS

1. What proportion of primary school children has skin disorders?
2. What types of dermatological disorders affect primary school children?
3. What is the distribution of dermatological disorders among the affected individuals (by demographic characteristics)?
4. Where do they go for treatment when they get skin disorders?
5. What socioeconomic factors influence the prevalence of dermatological disorders in this population?
6. What etiologic factors (causative organisms) are responsible for infective skin disorders?

4. OBJECTIVES

4.1. Broad objectives

To determine the prevalence of dermatological disorders among primary school children in Dar es salaam region.

4.2. Specific objectives

1) To determine the prevalence of dermatological disorders among primary school children in Dar es salaam region.

2) To determine the types of dermatological disorders among primary school children in Dar es salaam region.
3) To determine the distribution of dermatological disorders among the affected individuals by demographic characteristics.
4) To determine the initial source of care for dermatological disorders among primary school children in Dar es Salaam region.
5) To determine the etiology of infective skin disorders among primary school children in Dar es Salaam region
6) To determine the socioeconomic factors associated with skin disorders among primary school children in Dar es Salaam region.

5. METHODOLOGY

This was a descriptive cross-sectional study conducted among primary school in Dar es Salaam region. Dar es Salaam's weather is humid and hot during the dry season from September to March, and humid and cooler following the long rainy season from June to August. During the dry season temperatures can easily rise to above 35^0C.

The pupils were recruited from six primary school; namely Mwongozo, Upendo, Madenge, Zingiziwa, Mbande, and Hekima. Data collection took place from July to October, 2007. Inclusion criteria were; parental and self consent, pupils from standard I to VII, and residing within the study region.

5.1. SAMPLING OF STUDY SUBJECTS

5.1.1. Sample size calculation

Sample size for single proportion Using EPITABLE calculator (EPIINFO Version 6. 04);

Desired precision	5%
Expected prevalence	55%
Design effect	1.0
Confidence level	95%
Sample size	381
Adding 20% of the sample size	457

Therefore the sample size for this study was about 460 pupils.

5.1.2. Sampling methods

A multi stage sampling technique was employed to select study subjects. Conveniently, pupils from Temeke, Ilala and Kinondoni public municipal primary schools were studied. Two schools from each municipality were selected randomly from a list of all public primary schools obtained from the respective municipal authorities; random number tables were used for this purpose.

These were Hekima and Zingiziwa from Ilala, Madenge and Mbande from Temeke and Mwongozo and Upendo from Kinondoni municipality. The total number of pupils from each school was obtained. These were added up to get the study population size (9948 pupils). The ratio of the calculated sample size (460 pupils) to the study population size (9948 pupils) was used as a sampling fraction.

The sampling fraction was in turn multiplied by the total number of pupils in each school to get the proportionate samples from them. Thus, Hekima primary school had 149 pupils recruited, Upendo 93 pupils, Mbande 67 pupils, Mwongozo 68 pupils, Madenge 56 pupils and Zingiziwa 27 pupils. One stream was randomly selected from each class from standard one to standard seven. Equal number of pupils was obtained from each selected stream based on the sample required to be drawn from that particular school. A list of all pupils in a given stream was obtained and random number tables were used to get the required number of pupils.

5.2. Study procedure

5.2.1. Clinical work-up

Several visits were made at each school. The first visit (one week before examination of pupils) was for explanation of the study objectives to the pupils and the teachers and the procedures that were to be done. An information sheet was provided to each pupil to take home. The sheet provided information to parents regarding the study. Parents were requested to give a signed consent. After consenting, parents were asked to self-complete a questionnaire attached to the information sheet, in which case socioeconomic status was assessed (i.e. family size, occupation of parents/guardians, and parents' education, source of water etc.). Subsequent visits were made a week later in which case all pupils whose parents had consented were interviewed and examined. A structured questionnaire designed for the purpose of the study was used to obtain information.

All pupils were examined in natural lighting being fully undressed with privacy and confidentiality being highly observed. The examination was performed by the author and in

difficult cases the diagnosis was made with the help of a dermatologist (supervisor). In this case prior arrangement was made and the dermatologist attended the pupils at the skin clinic at Muhimbili National Hospital. Diagnosis of various skin conditions was made based on characteristic clinical features and in some cases laboratory work up as described below.

5.2.2. Laboratory work-up

5.2.2.1. Scabies

A specimen from a lesion suspected of scabies was obtained by the use of a blunt side of a surgical blade on a burrow and the scraping was put on a glass slide which had a drop of normal saline; a cover slip was applied on top to be examined microscopically under low power objective for the mites.

5.2.2.2. Fungal infections

Specimen collection

Universal Precautions were followed when handling potentially infectious agents e.g. wearing gloves.

Skin site to be sampled was cleansed with 70% alcohol to remove contaminating microorganisms. If a characteristic dermatophyte "ring" was present on the skin, samples from the outer margin of the ring at its junction with the normal skin were collected using number 15 scalpels. Otherwise, samples were collected from areas where the skin appeared to be scaling. Scalpel was used to scrape off the surface skin scales.

Infected nails were cleaned with 70% alcohol to remove contaminating microorganism. The top layers of the nail were scraped away using number 15 scalpel and subsurface materials were collected.

Infected hairs were removed gently with forceps or scales on the lesions were scraped with glass slide.

The collected materials were placed in folded pieces of papers. Each specimen was labeled with the patient's name and number. The specimens were handed in to the laboratory on same day of collection.

Microscopy and Culture

The material to be examined was placed onto a clean glass microscope slide. About 1-2 drops of 20% KOH was added to the material. A cover slip was placed over the preparation.

The KOH was allowed to sit at room temperature for 15-30 minutes until the material was cleared. Microscopic examination to look for hyphae was done using low power objectives (10x and 40x). Specimens found to be positive in this examination were then cultured in Sabouraud's Dextrose Agar (SDA). Growth was observed on days 14 and 28. Positive cultures were those with evidence of fungal growth on either observation day i.e. day 14 or 28. Negative cultures were those without fungal growth on day 28.

Identification of fungi

Identification of etiologic agents was done based on colonial morphology and microscopic appearance of the organisms after staining with lactophenol blue reagent.

5.2.2.3. Bacterial infections

Specimen collection

Dry cotton swabs were used to collect pus from the skin lesions. The specimens were transported in Stuart's transport media on the same day of collection ready for laboratory processing.

Microscopy and Culture

On arrival to the laboratory, gram staining was performed immediately. The specimens were also inoculated on Blood Agar (BA) and MacConkey Agar (MCA). These cultures were incubated at 37^0c in 10% CO_2 overnight. The next day cultures were read for evidence of bacterial growth. Culture was considered negative if no growth was noted after 48 hours of incubation.

Bacterial identification

Organisms were identified on plates by colonial morphology and confirmed microscopically. Biochemical tests were used to identify the causative organisms, namely, catalase, coagulase, Streptex, urease and IMViC tests

5.3. Data management and analysis

Rechecking of questionnaire was done before another pupil was enrolled. Data entry and cleaning was done using computer programmed package, EPI info version 6. Using the statistical package for Social Science (SPSS) data was analysed. Chi square and Fisher's exact statistical tests were used to determine associations for categorical variables and student's t-test for numerical variables. And p-value of less than or equal to 0.05 was taken as statistically significant.

5.4. Ethical issues

Ethical clearance was obtained from the 'MUHAS' ethics board. Consent for pupil participation was obtained from parents or guardian and pupils themselves. Permission to use Schools for the study was granted by the Ministry of Education and Vocational Training, Regional, District and School authorities. Pupils provided implied consent to fully undress for dermatological examination. Those who refused, their decisions were respected. Explanation was provided to pupils about the discomfort that they could experience during all procedures like skin scrapings collection. The reasons why these procedures should be performed in order to reach a correct diagnosis of their conditions were also provided. It was made very clear to them that in case a photograph of a lesion had to be taken, it would never be used for purposes other than medical and would be kept as a confidential document. For pupils from whom specimens for laboratory confirmation of lesions had been collected, results of their examinations were communicated to them by the author at their respective schools. Pupils found to have skin problems both through clinical and laboratory diagnosis received a prescription for appropriate medications or were counseled in case the condition was incurable. The expenses

for medications were covered by parents/guardians. Confidentiality on candidate's information was highly maintained.

Study limitations

1. Study duration was limited according to the university requirements
2. I would wish to do more investigative tests like wood lamp examination for pityriasis versicolor but lack of funds was a limiting factor.
3. Financial constraints also limited wide coverage of primary schools to get even more representative sample

6. RESULTS

Parental consent was obtained for 420 of 460 selected children and these were enrolled into the study, making the overall response rate of 91%.

Demographic characteristics of the children who entered the study are summarized in Table 1. Out of a total of 420 pupils 213 (51%) were boys. The age range was from 6 to 19 years, with a mean age of 11.4 ± 2.8. Majority of them, 237/420 (56%) fell into the age group 11-15 years. The mean family size was 6.3±2.4. The mean number of rooms in the pupils' households was 3.2±1.7. The mean number of persons per room in pupils' households was 2.4±1.1.

Table 1: Demographic characteristics of primary school children in Dar es Salaam (n=420)

	Overall (n = 420)
Sex (%)	
Male	213 (51)
Female	207 (49)
Age group (%)	
6-10 years	156 (37)
11-15 years	237 (56)
16-20 years	27 (6)
Mean ± SD age (years)	11.4 ± 2.8
Number of children at household (%)	
One	30 (7)
Two	93 (22)
Three or more	297(71)
Response rate (n/N)	91% (420/460)

Prevalence of skin disorders

Of the 420 children enrolled, 241 had one or more visible skin disorders making the overall point prevalence of 57%. Among them, 201/420 (48%) had only one skin disorder, 37/420 (9%) had two and 3/420 (1%) had three skin disorders.

The prevalence breakdown according to specific skin disorders is shown in Table 2. The most common skin disorders and their respective point prevalences were superficial fungal skin (dermatophytes) infections 82/420 (20%), Acne vulgaris 53/420 (13%), Pityriasis versicolor 36/420 (9%), Pediculosis capitis 15/420 (4%), Ulcers 12/420 (3%), Birth marks 10/420 (2%), Tropical folliculitis 9/420 (2%), Atopic eczema 8/420 (2%) and Pyoderma 8/420 (2%). Tinea capitis was the most common among the dermatophytic disorders, 53/82 (65%).

Other skin disorders with point prevalence greater than 1% as shown in table 2 included Scabies, Viral warts, Seborrheic eczema, Keratosis pilaris, Papular urticaria, Angular cheilitis and Burn scars.

Age and sex distribution of primary school children with common skin disorders

Table 3 shows the age and sex distribution of primary school children with common skin disorders. According to sex, there were no significant differences in the overall point prevalence or specific skin disorders except for dermatophytes infections which showed a male predominance ($p=0.014$). According to age, there were significant differences with respect to overall point prevalence, dermatophyte infections, acne vulgaris and pityriasis versicolor ($p = 0.0001$, 0.045, 0.0001 and 0.001 respectively). Overall point prevalence of skin disorders was found to be highest among pupils aged 16-20 yrs 22/27 (82%), followed by those aged 11-15 yrs 148/237 (62%). Dermatophyte infections were most common among pupils aged 6-10 yrs 34/156 (22%), followed by those aged 11-15 years 37/237 (16%). Acne vulgaris showed a predominance in the age group 16-20 years 14/27 (52%), followed by those aged 11-15 years 39/237 (17%). Pityriasis versicolor was predominantly found in pupils aged 16-20 years 5/27 (19%), followed by those aged 11-15 years 21/237 (9%). The age and sex distribution of primary school children with other skin disorders in table 3 did not show any statistically significant differences.

Table 2: Point prevalence of skin disorders among primary school children in Dar es Salaam (n = 420)

Disorder	No. of cases (%)
Any skin disorder	241 (57)
One skin disorder	201 (48)
Two skin disorders	37 (9)
Three skin disorders	3 (1)
Superficial fungal (Dermatophytes) infections	82 (20)
Tinea capitis	53 (13)
Tinea pedis	19 (5)
Tinea corporis	7 (2)
Tinea unguium	2 (0.5)
Tinea cruris	1 (0.2)
Acne vulgaris	53 (13)
Pityriasis versicolor	36 (9)
Pediculosis capitis	15 (4)
Ulcers	12 (3)
Vaseline/Tropical folliculitis	9 (2.)
Atopic eczema	8 (2)
Pyoderma	8 (2)
Scalp folliculitis	4 (1.0)
Carbuncle	4 (1.0)
Scabies	6 (1)
Viral warts	6 (1)
Common	5 (1)
Plane	1 (0.2)
Seborrheic eczema	5 (1.2)
Miscellaneous	44 (11)
Birth marks	10 (2)
Keratosis pilaris	5 (1.)
Papular urticaria	5 (1.)
Angular cheilitis	5 (1)
* Scars	9 (2)
Vitiligo	3 (1)
Prurigo nodularis chronicus	2 (0.5)
Intertrigo	1 (0.2)
Hand eczema	1 (0.2)
Alopecia areata	1 (0.2)
Hematoma	1 (0.2)
Heat rash	1 (0.2)

*Scars included burn, post traumatic and post chicken pox infection.

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Table 3: Age and Sex distribution of primary school children with common skin disorders in Dar es Salaam

Skin disorders	Sex			Age			
	Male N (%)	Female N (%)	P-value	6-10 N (%)	11-15 N (%)	16-20 N (%)	P-value
Superficial fungal (Dermatophytes) infections	46 (22)	26 (13)	0.014	34 (22)	37 (16)	1 (4)	0.045
Acne vulgaris	27 (17)	26 (13)	0.972	-	39 (17)	14 (52)	0.0001
Pityriasis versicolor	19 (9)	10 (5)	0.098	3 (2)	21 (9)	5 (19)	0.001
Pediculosis capitis	5 (2)	10 (5)	0.170	7 (5)	8 (3)	-	0.430
Ulcer	8 (4)	4 (2)	0.262	6 (4)	6 (2.)	-	0.374
Tropical folliculitis	2 (1)	7 (3)	0.101	3 (2)	6 (2)	-	1.000
Atopic eczema	4 (2)	4 (2)	1.000	-	7 (3)	1 (4)	0.583
Pyoderma	4 (2)	4 (2)	1.000	3 (2)	5 (2)	-	1.000
Scabies	4 (2)	2 (1)	0.685	1 (1)	5 (2)	-	0.419
Viral warts	2 (1)	4 (2)	0.444	4 (3)	2 (1)	-	0.201
Any skin disorder	132 (62)	109 (53)	0.050	71 (46)	148 (62)	22 (82)	0.0001

P ≤0.05

Initial source of care for skin disorders

Table 4 is a frequency distribution table showing where pupils went for care when they first recognized that they had a skin disorder. Majority of them did not seek any care 162/241 (67%). Some went to hospital for medical consultation 40/241 (17%), while others practised self medication 35/241 (15%). A few went for care to traditional healers 3/241 (1.%)

Table 4: Initial source of care for skin disorders among primary school children in Dar es Salaam (n = 241)

Source of care	No. of cases (%)
Hospital	40 (17)
Self medication	35 (15)
Traditional healer	3 (1)
Chinese medicine	1 (0.4)
None	162 (67)

Factors that may influence the prevalence of skin disorders among primary school children in Dar es Salaam

Table 5 shows the relationship between the variables that may influence the prevalence of superficial fungal skin (dermatophyte) infections, pityriasis versicolor and pediculosis capitis. There were no significant differences in most variables between those who had these disorders and those who did not, showing lack of association, except for pityriasis versicolor, in which case those with the disease had a larger mean number of persons per room, 2.8±1.1, as compared to those without the disease, 2.4±1.

Table 5: Factors that may influence the prevalence of superficial skin fungal (dermatophytes) infections, Pityriasis versicolor, and Pediculosis capitis among primary school children in Dar es Salaam

Socioeconomic parameters	Diseases					
	Dermatophytes infections	P-value	Pityriasis versicolor	P-value	Pediculosis capitis	P-value
Mean family size (mean ±SD)						
With disease	6.21±1.913	0.673	6.34±2.176	0.953	7.19±2.639	0.147
Without disease	6.34± 2.541		6.32±2.464		6.28±2.432	
Education of father: N (%)						
Primary or less	40 (19.1)	0.278	14 (6.7)	0.674	7 (3.3)	0.306
Second. or more	21 (14.7)		8 (5.6)		8 (5.6)	
Education of mother: N (%)						
Primary or less	52 (17.9)	0.503	21 (7.2)	0.859	9 (3.1)	0.386
Second. or more	18 (15.1)		8 (6.7)		6 (5.0)	
Mean no. of siblings (Mean ± SD)						
With disease	3.63±1.640	0.975	3.83±1.466	0.538	4.13±2.187	0.258
Without disease	3.63±1.810		3.62±1.802		3.61±1.763	
Occupation of father: N (%)						
Employed	18 (14.6)	0.327	10 (8.1)	0.286	7 (5.7)	0.330
Unemployed	43 (18.8)		12 (5.2)		8 (3.5)	
Occupation of mother:. N (%)						
Employed	8 (15.1)	0.675	4 (7.5)	0.890	3 (5.7)	0.337
Unemployed	62 (17.4)		25 (7.0)		11 (3.1)	
Marital status: N (%)						
Both parents	59 (17.3)	0.902	22 (6.4)	0.424	14 (4.1)	0.747
Single parent	13 (16.7)		7 (9.0)		2 (2.6)	
Source of water: N (%)						
Piped	26 (17.9)	0.456	24 (7.7)	0.279	12 (3.8)	1.000
Unpiped	16 (14.8)		5 (4.6)		4 (3.7)	
Type of residence: N (%)						
Own	48 (17.6)	0.745	20 (7.3)	0.643	13 (4.8)	0.165
Rent	24 (16.3)		9 (6.1)		3 (2.0)	
Mean no. of persons/ room: (mean ±SD)						
With disease	2.29±1.041	0.413	2.83±1.104	0.025	2.19±1.047	0.456
Without disease	2.41±1.108		2.36±1.090		2.40±1.099	

Laboratory results

Laboratory results of microscopic examination and culture of various skin specimens obtained from primary school children are shown in table 6. The organisms isolated included bacteria, fungi and Ectoparasites (*Sarcoptes scabiei)*.

Overall, 82 pupils had a clinical diagnosis of superficial skin fungal (dermatophytes) infections. Among them, specimens were collected from 62 pupils. KOH preparation of the specimens was done and was positive for 48/62 (77%) of them. Due to some financial constraints culture was only done in KOH positive specimens Growth of fungi was evident in 42/48 (88%) culture preparations. All of the three genera of dermatophytes (epidermophyton, microsporum and trichophyton) were represented among the isolates obtained. The species isolated included *Trichophyton mentagrophytes, T. rubrum, T. violaceum, T. schoenleinii, Microsporum canis, M. audouinii* and *Epidermophyton flocossum.* Trichophyton represented the majority of the isolates followed by microsporum. Table 6 also shows the distribution of these dermatophyte species according to type of disease they cause i.e. tinea capitis, tinea pedis and tinea corporis. *M. canis* was the most common cause of tinea capitis, 14/30 (47%), while *T. rubrum* was the leading cause of tinea pedis, 5/11 (46%). There was only one agent isolated for tinea corporis and this was *M. canis*.

As regards bacterial infections, there were six specimens collected of which 3 (50%) were gram positive and 3 (50%) were gram negative. Staphylococcus aureus comprised 50% of all bacterial isolates (all 3 gram positive organisms). The others were *Klebsiella pneumoniae* 2/6 (33%) and *Escherichia coli* 1/6 (17%).

Six pupils were clinically diagnosed as having scabies. Of these, 5 (83%) had a positive skin smear for *Sarcoptes scabiei*.

Table 6: Laboratory results of microscopic examination and culture of various specimens obtained from primary school children with dermatological disorders in Dar es Salaam region.

Disease				
SUPERFICIAL CUTANEOUS FUNGAL INFECTIONS	**Specific diseases caused**			
	Tinea capitis	Tinea pedis	Tinea corporis	**Total**
	N(%)	N(%)	N(%)	N(%)
Culture positive	30	11	1	42
Microsporum canis	14 (47)	-	1 (100)	15 (36)
Trichophyton mentagrophytes	4 (13)	4 (36)	-	8 (19)
Trichophyton rubrum	3 (10)	5 (46)	-	8 (19)
Trichophyton violaceum	6 (20)	-	-	6 (14)
Trichophyton schoenleinii	1 (3)	1 (9)	-	2 (5)
Microsporum audouinii	2 (7)	-	-	2 (5)
Epidermophyton flocossum	-	1 (9)	-	1 (2)
BACTERIAL CUTANEOUS INFECTIONS	Pyoderma			
Gram staining	N (%)			
Gram positive	3 (50)			
Gram negative	3 (50)			
Culture	6			
Escherichia coli	1 (17)			
Klebsiella pneumoniae	2 (33)			
Staphylococcus aureus	3 (50)			
PARASITIC CUTANEOUS INFESTATIONS	Scabies			
	N (%)			
Skin smear	6			
Positive	5 (83)			
Negative	1 (17)			

Discussion

The point prevalence of skin disorders in this study was high (57%) and was comparable to a similar study among school children in rural Tanzania whose prevalence was 55%. [6] If all of these medical conditions are able to benefit from medical care in some way (even if this means provision of appropriate information), this represents a big burden to the health care system. This figure is likely to underestimate the total burden of skin disorders because point prevalence studies will miss many cases of incident skin diseases of short duration. There are only a few epidemiologic studies that have mentioned the point prevalence of skin diseases in school children. Some of these studies conducted in tropical and developing countries reported much higher figures of overall point prevalence (35% to 80%) [4-5] compared to the one conducted in Romania, a more advanced country with temperate climate, with a prevalence of 23%. [78] However there is no such large body of epidemiologic data reported for Dar es Salaam and Tanzania at large. Even though dermatology is characterized by an enormous range of disease-reaction patterns, prevalence surveys suggest that the bulk of skin disease is made up of fewer than ten diseases. [10] In this study the top nine skin disorders (Dermatophyte infections, acne vulgaris, pityriasis versicolor, pediculosis capitis, ulcers, tropical folliculitis, atopic eczema, pyoderma and scabies) comprised 95% of the skin disorders encountered. Overall, boys were more likely to have skin disorders than girls as it was true for older children than the young ones. These differences were statistically significant, $p= 0.05$ and 0.0001 respectively. Boys probably tend to have more activities that result in more frequent close contacts among them hence facilitating transmission of the disease.

Infections and infestations were the most prevalent disorders in this study population comprising about 63% of all skin disorders. Many other studies conducted in developing tropic countries had come up with a similar observation that infections and infestations constituted the bulk of the skin disorders identified. [3-6,8]

In this study superficial skin fungal (dermatophyte) infections were the most common with tinea capitis having the highest point prevalence (13%). This is consistent with findings from a Nigerian study in which tinea capitis had a prevalence of 15%. [4]

Tinea capitis has been reported as a common finding in school children in other developing countries. [3,7] As a speculation, the reasons for the high incidence of tinea capitis in this population could be inadequate treatment, contact with pets, poverty, ignorance, and the presence of individuals with asymptomatic infection who may spread it. Superficial skin fungal (dermatophytes) infections were more likely to occur in boys 46 (22%) than in girls 26 (13%), and in younger than older children. These differences were statistically significant p=0.014 and 0.045 respectively. When socioeconomic parameters were assessed in relation to prevalence of dermatophytes infections no associations were found. However, in a study conducted in Ibadan, Nigeria, the family size, presence of pets in the home, and sharing of articles of clothing were found to be associated with dermatophyte infection ($p < 0.001$, $p < 0.024$, and $p < 0.034$), respectively. [4] The frequencies of dermatophytes isolated from patients vary among different studies done in different countries or within same country but different geographical locations. Overall, considering isolates from all body sites, *Microsporum canis* was the most common isolate 15 (36%), followed by *Trichophyton mentagrophytes* 8 (19%) and *Trichophyton rubrum* 8 (19%). In Iran study, Khosravi AR et al, [69] found the highest frequency with *Microsporum canis* 19.4%, followed by *Trichophyton rubrum* 16.5% and *Epidermophyton floccosum* 14.9%. In this study, *M. canis* was the most common cause of tinea capitis (47%) followed by *T. violaceum; T. rubrum* was the most common cause of tinea pedis (46%) followed by *T. mentagropphytes* (36%) and there was only one case of tinea corporis which was caused by *M. canis*. Elsewhere in the world studies have reported a varying picture in terms of the most common dermatophytes isolated. [49-62]

Acne vulgaris was the second most common skin disorder in this study with a frequency of 13%. Boys and girls were equally affected. However, previous studies have estimated its prevalence at 95-100% in boys aged 16-17 years and 83-85% in girls showing some male dominance. [87] The reason for significantly low prevalence of acne in this study could be the fact that there were no strict criteria for diagnosis and therefore some mild cases could have been missed out. Among the different age categories there was an increasing trend whereby older children were more affected, and the differences were statistically significant (p=0.0001). These findings confirm the findings of previous studies in that the prevalence of

acne vulgaris increases with age. [86] In these studies it was shown that, in 10-12-year old children, 28% to 61% of the population has clinically diagnosed acne, whereas 79% to 95% of 16 to 18-year old adolescents are affected.

Studies conducted in Brazil, Peru and South Africa have suggested that the prevalence of acne is lower among rural, nonwesternized people than in fully modernized Western societies. [86]

Pityriasis versicolor was found in 9% of the pupils. Pupils in the age group 16-20 years were significantly more affected than were the younger ones, p=0.001. This was a lower figure compared to a prevalence of 26% documented by Ferie J et al in rural Tanzania. [6] The older children were more likely to have the disease because this disease is common in the post-pubertal age where sebaceous glands are active. [65] It is also more common in individuals who sweat more. [65] Pityriasis versicolor was found to be associated with a larger mean number of persons sleeping in one room, 2.83±1.104, p=0.025. Ogunbiyi AO et al showed in their study that larger family size and fewer sleeping rooms were associated with a higher prevalence of pityriasis versicolor. [4] All these findings confirm that overcrowding is a risk factor for contracting pityriasis versicolor. A tropical climate encourages the growth of *Malassezia.* This may be responsible for the earlier age of onset in the tropics when compared with that reported from temperate regions. [4]

Pyoderma was another relatively common skin disorder being found in 8 (2%) of the pupils. This consisted of scalp folliculitis and carbuncles. These have also been reported to be the most frequent pyodermas in some other studies [79,81] There was no sex difference in their occurrence and age differences could not be ascertained because of the small sample. Some primary bacterial infections like impetigo were not seen in this study since the study population comprised older children and impetigo is the disease of younger children. All six samples which were cultured yielded monomicrobial flora, with S. aureus being isolated from 50% of patients, K. pneumoniae from 33% and E. coli from 17%. There were no negative cultures. The negative culture rate in other studies was in the range of 15% - 16%. [80,79] Data from previous studies suggested beta haemolytic streptococci to be the

main agent of pyoderma in many tropical areas but more recent studies have reported S. aureus to predominate. [2] These findings support this observation.

Pediculosis capitis was another common skin disorder in this study with a point prevalence of 4%. This prevalence is lower than that reported previously in many other studies which ranged from 9.9% to 78.6%. [83] In this study girls were more affected 10 (5%) than boys 5 (2%), but this difference was not statistically significant (p=0.170). Silvia catala et al, [82] found a significantly higher prevalence in girls (79%) than in boys (44%) (p=0.0001), which confirms findings in previous studies Lack of significance in this study could be attributed to the fewer number of cases that were compared. Hair length in girls interferes with the cleanliness; however, there could be a hormonal and/or skin factor which could also produce a greater susceptibility to P. capitis in girls. [82]

The point prevalence of scabies was noted to be 1.4%. This has been shown to vary from place to place in previous studies. For example, in a study done in a rural community, India, prevalence rates were 13% by population and 30.9% by household; [26] and that done among preschool children in Afyon, Turkey, the prevalence was 0.4%. [83] Further more, the prevalence of scabies was 77% in children under 5 years of age in refugee camps [22] and 70% in under-15-year-olds in a village in India. [46] Closed communities, such as prisons or displacement camps, are at high risk for the highest figures. [22,21] Differences in socioeconomic standards are responsible for such great variation in prevalence. Factors associated with increased incidence include large family size, high crowding index at night, and water supply from hand pump. [4] Other factors related to increased frequency of scabies are level of education and occupation of the mother. [83] However, these factors could not be assessed in this study due to the fact that scabies cases were fewer for such an assessment.

The point prevalence of viral warts found in this study (1.4%) was slightly lower than what has generally been seen in previous studies (3-20%) the explanation of which is not clear. [94,84,85] Warts were more commonly seen in girls 4 (2%) than in boys 2 (1%) but this difference was not statistically significant. The reason for lack of significance could be that fewer cases were compared, thus a larger sample size could probably show significance. In

their study, Walter K et al, also found a higher incidence of plantar warts among girls than among boys, 59.8% of the cases occurred in girls. [84]

Ulcers and post trauma scars (burn, injuries) were also among the common skin disorders occurring at a prevalence of 3% and 2% respectively. These were mainly due to injuries related to childhood physical activities. Regarding ulcers, boys were more often affected than girls (4% versus 2%). This difference was not statistically significant. Spinks A.B. et al got similar results in their study conducted among school children in Brisbane, Australia. [88] Physical activity and sporting-related injuries are leading causes of visits to the emergency department and hospitalizations among children from several countries including Norway, France, New Zealand12 and the US. [88] In this study, ulcers and post trauma scars reflect the risks posed by childhood physical activities to injuries and therefore call upon improvement of safety on these activities.

Both atopic and seborrheic eczemas were observed among primary school children with frequencies of 2% and 1%. This is consistent with the observation in general population whereby eczema in children has been found to vary from 0% to 5%. [2] Atopic eczema in particular affected boys and girls equally.

Tropical folliculitis was seen in 9/420 (2%) children. This condition is common in Negroes and in other tropical races, and is characterized by its chronicity and by its atrophic sequelae. [89] In this study girls were more affected than boys, (3% versus 2%). However, statistically this difference was found to be nonsignificant. A small sample could have contributed to lack of significance. A larger study is needed to ascertain this difference.

Birthmarks were observed in 10/420 (2%) of the pupils. These were mainly melanocytic nevi. Ogunbiyi A.O. et al in Ibadan, Nigeria reported a prevalence of 3.8%, [60] a figure close to this. There are no documented studies in Tanzania with regards to melanocytic nevi. Studies done elsewhere have reported a prevalence of 3.6-50%. [60]

Papular urticaria and prurigo nodularis chronicus comprised 1% and 0.5% of skin disorders respectively in this study population. These conditions are said to be insect bite-induced hypersensitivity reactions (IBIH). [91] The prevalence of prurigo in children has been estimated to vary from 0.1% to 24%; it is most common in young children, with a marked tendency to improve spontaneously with time, as the disease is uncommon in older children.

[2] The complaint of itch may prompt a costly, exhaustive and invasive evaluation. [9] So it is important for health care providers to be familiar with such conditions to avoid unnecessary course of action during their diagnosis.

Other skin disorders seen with a relatively higher frequency included keratosis pilaris and vitiligo and angular cheilitis. Keratosis pilaris is a common benign disorder of unknown etiology. [92] It develops most often in early childhood, with remission by adulthood in many patients. Vitiligo is a common acquired idiopathic depigmentary condition. In this study it was seen in 3 (1%) pupils. The reported incidence of vitiligo in various dermatological clinics varies from 0.5% to 1%. [93] This disorder does not result in restriction of capacity to work or expectancy of life, but it causes cosmetic disfigurement leading to psychological trauma to the patients. [90] The presence of angular cheilitis in some of the pupils, 5 (1%) may have been the result of nutritional deficiencies although infection could not be ruled out.

Where pupils go to seek health care when they get a skin disorder was another objective to be assessed in this study. Results showed that of 241 pupils who had skin disorders 67% did not seek care from any source at all. Only 17% of them sought medical assistance from health care facilities and 15% practised self-medication. The rest went for traditional and Chinese medicine, 1% and 0.4% respectively. Jorg Heukelbach et al conducted a study in north-east Brazil to assess health care seeking behavior among patients with parasitic infestations and found that only 28 of 54 patients with scabies, three of 55 patients with tungiasis, four of six patients with cutaneous larva migrans and zero of 110 patients with head lice sought medical assistance. There are explanations why patients would prefer one source of health care and not the other. A study conducted in rural Tanzania, [7] 43% of heads of households preferred traditional healers than modern health facilities. This is because traditional healers are accessible, affordable, culturally appropriate and acceptable. They explain diseases in terms that are familiar. For those who do not seek health care do not regard these disorders as a significant problem that could benefit from public health measures. This attitude is due to the assumption that skin diseases are a benign, not life-threatening minor nuisance, and that they do not merit measures that may appear out of proportion to their low priority. [2] Others practice self-medication probably because of

insufficient staff in our health care facilities. This may lead to inappropriate use of medications as a result of misdiagnosis and hence wastage of resources.

Conclusions: This study shows that skin disorders are common in children and about two thirds are affected at any given time. The finding that about 95% of the disorders can be grouped into fewer than ten categories is important in designing training programmes for medical teams involved in the delivery of primary health care services in developing countries like Tanzania. Pupils were not adequately motivated to seek medical assistance for their skin conditions despite the fact that most of the skin disorders were potentially treatable.

Recommendations

There is need to strengthen school health programmes that exist so that regular skin examinations are performed to limit the spread of contagious skin disorders such as tinea capitis and scabies. Efforts should be made to educate families of infected pupils about seeking medical care once they find that they have skin disorders since most of the skin disorders are treatable.

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