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Chapter 1

General introduction

Children are the most vulnerable citizens in any society and the greatest of our treasures.

Nelson Mandela
Nobel Peace Prize Ceremony, Oslo, Norway, 1993
General Introduction

Skin diseases in developing countries are present in large numbers, especially among children and deserve our sincere and full attention. They are accounting for a high percentage of visits to hospitals and primary healthcare centers and create a serious impact on health care services. In a review of prevalence studies in children by the WHO, the prevalence of skin diseases were ranging from 21% to 87%. These high figures warrant the study of morbidity, causative factors and economic costs. Skin diseases are often considered less important in health priority programs compared with diseases that cause high mortality like tuberculosis, HIV/AIDS, meningitis or hepatitis. Compared with other diseases, skin diseases have a lower mortality rate but can affect the wellbeing, quality of life and health conditions of children who already form a vulnerable group.

Using a comparative assessment of disability-adjusted life years (DALY’s) the World Health Organization’s 2004 report on the global burden of diseases showed a total amount of 376,525,000 DALY’s in Africa which was at least two times higher than in any other region in the world. For skin diseases in Africa there was a total of 902,000 DALY’s (0.2% of the total burden) which was similar to that caused by several psychiatric disorders.

Most of the prevalence data in Africa come from hospital or dispensary-based records and therefore are less reliable when estimating the prevalence on a national scale. Population-based prevalence figures are needed for reliable planning of national health and prevention programs. Only a few population-based studies on this subject are available. Most of these studies have been conducted on schoolchildren. In most recent prevalence studies, conducted in sub-Sahara Africa the majority of the skin diseases found among schoolchildren are dominated by infections like tinea capitis and pyoderma. This is a pattern found in most countries with poor socio economic circumstances. We performed several studies to gain more insight in the prevalence of tinea capitis and the causative organisms, to determine the burden of this infectious disease in communities and to identify possible strategies for prevention and treatment.

In industrialized countries the highest burden of skin diseases is formed by inflammatory diseases like acne vulgaris and eczema but recent studies from Africa reported also an increase in prevalence. Therefore, we performed several studies focusing on “western” skin diseases and the impact of socio-economic developments on the prevalence by comparing rural versus urban schools.

The prevalence of classical tropical diseases like leprosy or filarial lymph edema is low although the socio economical impact can be enormous. This thesis focuses on three skin diseases in particular, namely, tinea capitis, eczema and acne, which diseases are discussed in some more detail below.
The most common skin diseases among children in Africa are described in Chapter 8. In this chapter several skin diseases among preschool children and some typical tropical diseases are presented. With this chapter (and a website to match: www.africanskin-diseases.org) the author hopes to offer an easy access to basic information and pictures for healthcare workers in Africa.

**The prevalence and causative organisms of tinea capitis in Africa**

Tinea capitis is endemic among schoolchildren in tropical Africa. Factors like overcrowding, malnutrition and climatic conditions such as heat and humidity can lead to an increase in fungal infections in tropical and semi-tropical countries. The prevalence of tinea capitis is higher among schoolchildren in rural areas due to the lack of anti-fungal treatments, poor hygienic conditions, and school and household overcrowding. Superficial infections of the scalp are caused by Trichophyton and Microsporum species. Those causing an endotrix infection are frequently seen in Africa. The most important causative agents are Trichophyton soudanense, Trichophyton tonsurans, Trichophyton violaceum and yaoundei. The species that cause an ectotrix infection are Microsporum audouinii, Microsporum canis and gypseum. Microsporum audouinii is frequently seen in Africa while canis is seen more often in European countries. Which species is causing tinea capitis is highly dependent on geography, time and social status. During the past 60 years the predominant etiologic agent of tinea capitis in the USA has changed from M. audouinii to T. tonsurans most probably due to the sensitivity of M. audouinii to griseofulvin treatment and the import of T. tonsurans by immigrants. During the late 19th and 20th centuries, M. audouinii and M. canis were the most frequent etiologic agents in Western and Mediterranean Europe while Trichophyton schoenleinii was often seen in Eastern Europe. In Africa the most frequently seen agents were Trichophyton soudanense, violaceum and tonsurans and Microsporum audouinii. These agents are all anthropophilic and are spread rapidly in circumstances of overcrowding.

**The prevalence and characteristics of eczema among schoolchildren in Africa**

Higher prevalences of eczema are found in developed countries like Northern Europe, North America, Japan and Australia compared with African countries. Recent studies however show a sharp increase in African countries, especially amongst infants. Most of these studies are hospital based and therefore less reliable than community based studies. The questionnaire based period-prevalences are higher than the point-prevalences as measured by physical examination, which can be explained by the chronic relapsing character of eczema.

The rising prevalence of eczema might be related to improved sanitation and reduction in childhood infections, the so called hygiene hypothesis. Also helminthic infections have shown to induce hypo responsiveness and are negatively associated with atopy and allergy. Other risk factors for the development of eczema are changes in lifestyle because of a higher socio-economic status, reduced crowding at home, changes in food consumption. Also the growing urbanization in Africa has been associated with an increased risk of eczema.

**Prevalence and risk factors of acne vulgaris in Africa**

Acne vulgaris is a common skin condition in children and adolescents between the age of 10 and 18 years which is much more frequently seen in the industrialized world compared with developing countries. Community-based studies, studying acne vulgaris in Africa are scarce. Most studies are hospital based and don’t give a correct figure about the prevalence. With the changing socio-economic situation in developing countries, especially westernization in urban areas, it is believed that the prevalence of acne vulgaris in developing countries will increase to the level of industrialized countries.

**Aim and structure of the thesis**

The aims of the thesis were:

1) To measure the point-prevalence of different skin diseases (with special attention for childhood eczema, acne and tinea capitis) among schoolchildren in both rural and urban schools and in three different African countries (Gabon, Ghana and Rwanda).

Between 2004 and 2007 cross-sectional studies with 4839 schoolchildren were conducted in Ghana, Gabon and Rwanda in urban and rural schools with different social economic levels (low, middle, high). All children were included in the study and were investigated by a dermatologist or a team of dermatologists.

2) To determine causative agents for tinea capitis in Ghana and Gabon.

In June 2004, 463 school children from 2 rural and 2 urban schools in the Greater Accra Region were fully examined by a team of dermatologists. The same happened in January 2005 in the region of Lambaréné, Gabon when 454 children in one rural and one urban school were examined. When there were clinical signs of fungal infection on...
the scalp (scaling, hair loss, black dots, pustules and scars), samples were taken for analysis and transported at room temperature to the Mycology Laboratory of the Department of Dermatology of the Leiden University Medical Centre in Leiden, The Netherlands.

3) To study (socio-economic and environmental) risk factors for eczema.

A matched case-control study was performed to identify risk factors in childhood eczema. Between February and December 2005, 86 schoolchildren with moderate to severe eczema were selected at the dermatological outpatient clinics of three hospitals in Accra, Ghana by a dermatologist. For each included child with eczema, one to three controls were selected from the same school and class. All children completed a questionnaire and were skin prick tested with a panel of allergens. Blood was drawn to determine the total and allergen-specific IgE.

4) To provide information about the point and period-prevalence of eczema in West and Central Africa.

Between 2004 and 2007 cross-sectional studies with 4839 schoolchildren were conducted in Ghana, Gabon and Rwanda. To determine the point-prevalence of eczema all children in all four studies were examined by at least one dermatologist or a team of dermatologists. In Ghana the period-prevalence was measured by questionnaires adapted from the International Study of Asthma and Allergies in Childhood (ISAAC).

5) To investigate the prevalence and risk factors of inflammatory acne vulgaris in schoolchildren in Ghana.

Between between January 2006 and February 2007 a total of 1394 schoolchildren from 11 urban and rural schools in the Greater Accra Region of Ghana were screened by two dermatologists for inflammatory acne vulgaris and other skin diseases. The height and weight of the schoolchildren were measured to calculate the Body Mass Index (BMI) as a marker of nutritional status and a questionnaire was administered to each child, collecting information concerning living conditions.

Our studies were supported by the local governments and conducted in cooperation with larger studies in which atopy and parasitic infections were investigated. Our study was facilitated by the fact that the primary investigator worked as a dermatologist in these countries at the time of the investigations and had easy access to local health care facilities.

Chapter 1 provides a short introduction and defines the aims of this study.

Chapter 2 presents prevalence estimates of most skin diseases diagnosed in our studies among schoolchildren in three different countries, Gabon, Ghana and Rwanda.

Chapter 3 presents the point-prevalence of tinea capitis among schoolchildren in the greater Accra region in Ghana including the most important causative fungal species.

Chapter 4 presents, like the study in Ghana, the point-prevalence of tinea capitis among schoolchildren in Gabon and the result of the determination of the fungal species and summarizes the results of the most recently published studies on tinea capitis in Africa.

Chapter 5 focuses on the point-prevalence and period-prevalence of eczema among schoolchildren in the three mentioned countries. The point-prevalence obtained by physical examination by one or more dermatologists are compared with the period-prevalence obtained by questionnaires based on ISAAC (The International Study of Asthma and Allergies in Childhood).

Chapter 6 determines allergic characteristics and identifies possible risk factors for eczema among schoolchildren in an urbanized area in Ghana.

Chapter 7 presents the prevalence of acne vulgaris among Ghanaian schoolchildren. The difference between the prevalence rates among rural and urban schoolchildren is presented as well as possible risk factors like a higher body mass index.

Chapter 8 This chapter is aimed as a practical guide for medical healthcare workers in Africa and describes the etiology, clinical signs and treatment of the most prevalent skin diseases among children in Africa and also describes some typical tropical skin diseases and some diseases among preschool children. This chapter can be accessed on internet via www.africanskindiseases.org.

Chapter 9 summarizes our results and discusses our findings in a broader perspective. The findings presented in this thesis are discussed and summarized in the Summary.
Reference List

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