# INTERVENTION PROGRAMME TO REDUCE *TINEA PEDIS* (ATHLETE'S FOOT) INFECTION AMONG FIELD WORKERS IN NPDC OREDO FLOWSTATION OML 111 IN OLOGBO COMMUNITY

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**JUNE, 2020.**

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**BEING THE REPORT OF A PRECEPTORSHIP PRESENTED TO THE DEPARTMENT OF HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION, UNIVERSITY OF BENIN, BENIN CITY, NIGERIA.**

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTERS DEGREE IN PUBLIC HEALTH EDUCATION (MPHE)**

**SUPERVISOR: PROFESSOR IKPONMWOSA OWIE**

**JUNE, 2020.**

## CERTIFICATION

We certify that this work was carried out by **ADEUSI OLUWAFUNMISE IMOLEAYO** in the Department of Health, Safety and Environmental Education, Faculty of Education, University of Benin, Benin City.

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Supervisor

**Date: _____**

**Dr. E.O Igudia**
Head of Department

**Date: _____**

**Prof. E O. S. Iyamu**
**Dean of Faculty**

**Date: _____**

## DEDICATION

This work is dedicated to the Almighty God and to my late father. Daddy I will forever love and miss you.

## ACKNOWLEGDEMENT

I wish to express my sincere appreciation to my supervisor, Professor Ikponmwosa Owie, who has thoroughly guided me through the course of the preceptorship programme and also making this project itself a success. My appreciation also goes to all my lecturers for the knowledge imparted in me during the course of my study. I will also not fail to appreciate the entire staff of Health, Safety and Environmental Education department for their immense support throughout my course of study.

Also, my appreciation goes to my family and friends, for their great support and love that kept me going and this work would not have been possible without their input.

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# PART ONE

# INTRODUCTION

## The Preceptorship Programme

As part of the requirement for a master's degree in Public Health Education (MPHE), a preceptorship programme is usually carried out in fulfillment of the programme for a period of one academic session. The main objective is to have practical experience in the chosen field.The researcher is allowed to spend this period in an establishment that has implication for public health safety in line with the chosen area of interest. The researcher indicated Nigerian Petroleum Development Corporation (NPDC), 62/64, Sapele Road, P.M.B. 1262, Benin City, Edo State to carry out the programme. Preceptorship programme is a period of practical experience, training and learning as well as a period where the researcher observe the activities, problem or challenges and attempt to recommend intervention strategy for the observed challenges.

## Description of the Study Area

The introductory letter given by the Department of Health, Safety and Environmental Education was taken to the Human Resource Manager, Nigerian Petroleum Development Corporation (NPDC), 62/64, Sapele Road, P.M.B. 1262, Benin City, Edo State (Nigerian Petroleum Development Corporation (NPDC)

deals with the upstream aspect of the mother company Nigerian National Petroleum Corporation (NNPC), which is charged with the exploration and production of crude oil) for approval. The researcher was attached to the Health, Safety and Environment (HSE) Department and the medical department of the company on the field, which are charged with the responsibility ofadministration of occupational health, safety and environmental practices, protection and also the safety and treatment of her workers respectively. NPDC is made up of various departments but attention is on Health, Safety and Environment (HSE) department where the researcher carried out her research in conjunction with the medical department on the field.

The intervention programme took place at the NPDC Oredo Flow station OML 111 in Ologbo Community area of Edo State, Nigeria. The strength of the HSE department includes the general manager, the manager HSE Operations and manager loss prevention. The HSE team ensures that all workers adhere strictly to all occupational rules and regulations, monitor health and safety, assess risks and design strategies to reduce potential hazards in the workplace while the medical department team are in charge of prevention of health problems related to the work environment and treatment of the workers.

## Duration of the Programme

The programme was for a period of one academic session (9 months). During the period, the writer reported twice to three times a week and spent about 8 hours each day at the HSE department while also alternating with the field work (flow station) for one to two weeks depending on the schedule. The flow station runs from Monday through Sunday and this work represents what was written on the intervention programme carried out at the company.

## Objectives of the Programme

The objective of the preceptorship programme was to join the HSE and the medical department teams in the field on their day-to-day activities and during this period the researcher kept a careful watch of anyhealth risk or challenges related to the work environment. This observation would then help the researcher identify relevant health risks that formed the focus of this study.

## Activities carried out during the programme

- Introduction of the researcher to the staff of the Health, Safety and Environment Department in the office, at the field and the Medical staff at the field.

- Orientation on the objectives of the programme.
- Health talk.
- Health education and counselling.
- Follow-up
- Feedback from workers.

# PART TWO

# ACTIVITIES AND FINDINGS FROM INITIAL ASSESSMENT

## Findings from initial assessment

On resumption at the HSE department and medical department on the field, the researcher was introduced to the staffs present and immediately orientation on the activities at the flow station, activities of the HSE team and activities of the medical team was given. The HSE and medical team works hand in hand on the field. Health and safety meeting/ tool box meeting is held every morning at 6am and evening at 6pm depending on the work shift. Here, health talk on a wide range of subjects and safety rules in relation to the work environment are given to the workers by the medical staff and the HSE team. Subsequently, the researcher was oriented on how to register the workers who came for treatment at the medical building and also work with the HSE team on how to give health talks and properly guide the workers on what is expected of them on a daily basis. After the health talk and meeting, any worker can then go for medical treatment or counselling.

## PROGRAMME COMPONENT

## ASSESSMENT

### The Problem as seen on Site

During the course of the programme, the reporter observed that many of the workers usually do not engage in proper foot hygiene/ preventive measures towards Tinea Pedis (Athlete's Foot Infection); that is, they do not take prevention and proper foot hygiene seriously as they see athlete's foot as nothing serious and as also part of the job. Despite the reoccurring athlete's foot infection scenario, adequate effort has not been made by the health officers and medical staff on the field towards the education of workers on proper foot hygiene practices, prevention and possible consequences of long exposure to athlete's foot infection.

### Problem Identified

The researcher observed that;

i. The sensitization of the workers on proper foot hygiene/ prevention practices was very poor.
ii. Health talk was focused more on other health problems in relation to the work environment such as malaria, contact dermatitis, upper respiratory tract infection, noise pollution etc.

iii. No public health message tools to sensitize the workers e.g. posters.

**Aim of the Programme**

The aim therefore of this exercise was to design an intervention programme, which will increase the foot hygiene / preventive practices on athlete's foot infection among field workers in NPDC Oredo Flowstation OML 111 in Ologbo Community area of Edo State, which will eventually reduce the number of its prevalence and also reduce the complications that may arise from long exposure to athlete's foot infection.

However, specific objectives set to achieve the identified goals are as follows:

- To work closely with the staffs of Health, Safety and Environment Department and the health personnel at the flow station to assess their previous effort towards educating the workers on proper foot hygiene/ preventive practices on athlete's foot infection.
- To find out the level of prevention undertaken by the workers on athlete's foot infection.
- To sensitize the workers on athlete's foot infection and the need to seek medical attention when complications arise or when the need be.

- To carry out an intervention programme that will be sufficient to provide adequate and correct information on proper foot hygiene / preventive practices on athlete's foot infection to the workers.
- To measure the extent of the impact the intervention had on the workers.

# PART THREE

# LITERATURE REVIEW

The related literature for the study is reviewed under the following sub-headings;

- Theoretical Framework
- Overview of Athlete's Foot Infection
- Etiology of Athlete's Foot
- Signs and symptoms according to the type of Athlete's Foot
- Diagnosis of Tinea Pedis
- Management and control of Tinea pedis infection
- Prevention of Tinea pedis infection
- Prevalence of Tinea infections
- Predisposing factors of tinea pedis
- Treating fungal infections of the skin
- Knowledge towards the prevention of athlete's foot
- Summary of related literature reviewed

## Theoretical framework

Although there are a number of theories related to behaviour and behaviour change, one of the well-researched and widely used theories of health-related

behaviours is the health belief model (Champion & Skinner, 2008). The HBM emerged from the research of several social psychologists in the 1950s, which sought to explain why some individuals declined participation in preventive health care programs such as immunization and tuberculosis screening that could aid with early diagnosis and prevention of disease (Janz & Becker, 1984). As with other theories exploring behaviour modification or change, the HBM includes a belief component, an attitude component and a behaviour component. The belief component pertains to what the individual assesses as the true situation, while the attitude component pertains to how the individual feels about the situation. Together these two components work as the driver for the individual to behave in a specific manner. The model has been revised and expanded over the years to include a self-efficacy component, based on the research of Albert Bandura, and a cues to action or stimulus component, and has been extensively used by social science researchers to explain and predict health-related behaviours.

The six key components of this model are cognitive-based, stipulating specific factors that a person who believes himself to be healthy must consider when deciding whether or not to adopt a recommended health behaviour. These six components include:

- **Perceived threat:** the combination of perceived susceptibility and perceived severity of a health condition.
    - Perceived Susceptibility: perception of the risk of contracting a specific illness.
    - Perceived Severity: perceptions of the seriousness associated with contracting a specific illness or of leaving it untreated (medical, clinical and possible social consequences).
- **Perceived Benefits:** The believed effectiveness of adopting specific strategies designed to reduce the risk of the severity, morbidity or mortality.
- **Perceived Barriers:** The potential negative consequences that may result from taking particular health actions, including financial, physical and psychological costs; the inability to access resources to take specific actions, or the belief that the threat does not exist for a particular individual, group or region for specific reasons.

  These two constructs have often been shown to be more significant than the others, with the barriers construct most often shown to be the most important one for predicting performance of preventing behavior towards athlete's foot (Norman & Brain, 2005; Carpenter ccx, 2010).

- **Cues to Action:** Private or public events such as physical signs of a health condition, a friend or acquaintance who has contracted the condition or publicity, media attention that motivate people to take action.
- **Self-efficacy:** The belief in being able to successfully execute the behavior required to produce the desired outcomes with little or no help from others.

Developed initially to explain preventive health-related behaviour, the HBM has also been successfully used to study sick-role behaviour (those already ill, including acute and chronic illness). The HBM has been used extensively in the study of health screening behaviours ranging from influenza inoculations, seat-belt use, nutrition, chronic illness, smoking, breast cancer screening--both self-examination and mammography, to health beliefs and AIDS-related health behaviours (Champion & Skinner, 2008).

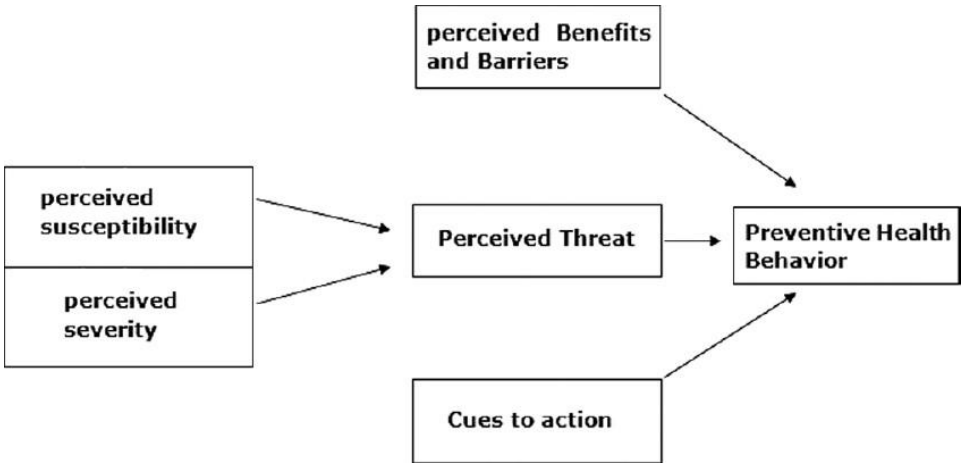


**Figure 1: The Health Belief Model**

Application of Framework to Intervention Programme

**Perceived Susceptibility and Perceived Severity:** Here, the workers will be exposed to adequate and correct information on athlete's foot infection which also includes their susceptibility to the infection. In other words, they will be exposed to the fact that, it is imminent for them to contract athlete's foot infection due to the nature of their work which involves them putting on occlusive footwear/safety boots for long hours either in the sun or rain which promotes infection of the foot because it creates warm, humid, macerating environments where dermatophytes thrive.

Also, they will be exposed to the perceived severity that may arise from long exposure or untreated athlete's foot infection which includes fungal nail infections, secondary bacterial infection, hand and groin fungus etc. If the perception of severity is low, then there might be no subsequent consideration of susceptibility, but when the perception of severity reaches a certain point, then susceptibility becomes more real and proper foot hygiene and preventive measures are considered. Field workers are more likely to change health behaviours, the model proposes, when they perceive a condition to be serious, and are less likely to engage in healthy behaviours if they believe the condition is not serious.

**Perceived Benefits and Barriers:** Even if a field worker perceives the susceptibility to athlete's foot infection to be serious, whether the field worker will change unhealthy behaviours is influenced by the perception of benefits resulting from making the changes. In this case, the workers are exposed to the fact that if they engage in proper foot hygiene practices and preventive measures, their susceptibility to athlete's foot infection is reduced to the bearest minimum and complications from athlete's foot infection will be eliminated.

Furthermore, the field worker may perceive the benefits of adjusting the behaviour, but be constrained by perceived barriers to taking action. The perceived benefits from the action must outweigh the perceived barriers. Perceived barriers can include physical deterrents such as distance, money, time, convenience and physical inability or accessibility. Also included are psychological barriers to this dimension, as including embarrassment, comprehension, and lack of belief in the validity of a particular threat or the personal acceptability of the recommended behaviour. Here, the field workers could be assisted by the management by providing for them more than one safety shoes to use so that they are not restricted to the usage of just one safety shoes. The researcher could also provide towels for the field workers so that they start using it to dry their feet and in between their toes properly. They can now subsequently get towels for themselves to use on their feet.

**Self-efficacy:** The concept of self-efficacy is seen as the conviction that an individual can successfully execute the behaviour required to produce the desired outcomes. Field workers confidence in their ability to perform the recommended foot hygiene/preventive practices (such as washing their feet properly and drying in between their toes, changing their socks regularly and avoiding the usage of synthetic socks, alternating the use of safety shoes and drying it after each day's work, avoid going into the shower barefooted, putting on open palm slippers after each day's work to allow for proper ventilation on the feet etc.) towards avoiding the occurrence of athlete's foot (tinea pedis) can be a vital factor to them actually implementing behaviour change and/or compliance with a recommended preventive behaviour. According to Bandura (2002), self-efficacy beliefs "also determine how obstacles and impediments are viewed". Those who have "low efficacy are easily convinced of the futility of effort in the face of difficulties," while those "of high efficacy" will persevere in the face of deterrents.

**Cues to action:** Cues to action can include physical events such as pain or illness onset, a family member or colleague who contracted severe tinea pedis (athlete's foot), media coverage of the health condition or health care professionals providing educational information of tinea pedis at the workplace. Each of these examples could result in improved compliance with a recommended foot hygiene and preventive practices by the field workers in the study. Therefore, constant

reminders will be given to the workers on athlete's foot at the safety and toolbox meetings and also the posters on athlete's foot posted at the lodge areas and at the field will serve as a constant reminder to them to practice proper foot hygiene/ preventive measures.

**Overview of athlete's foot infection**

Athlete's foot, also called tinea pedis, is the single most common dermatophyte infection (Waterson, 2017). Dermatophytes are a scientific label that refers to a group of three genera (Microsporum, Epidermophyton and Trichophyton) of fungus that causes skin diseases in humans and animals. Tinea pedis may lead to onychomycosis (a fungal nail infection that commonly affects toe nails more than fingernails), and is associated with onychomycosis in 30–59% of cases (Khaled, Golah, Khalel, Alharbi & Mothana, 2015). The prevalence of tinea pedis generally rises with increasing age and it is more common in males than in females. It is most often prevalent in men that are aged between 31 and 60 years (Bereznicki, 2013). It is characterised by white, macerated skin, fissuring and scaling, usually in the interdigital spaces of the feet (i.e. between the toes). In most cases, it occurs between the third, fourth and the fifth toes. The condition may also

present itself in the form of scaling plaques and slight erythema on the soles, heels and lateral aspect of one foot, or both feet. Markings on the skin may look exaggerated and white. The dorsal surface of the foot is generally clear of any signs (Waterson, 2017).

According to Ilkit and Durdu (2015) athlete's foot is a skin infection caused by a type of fungus called a dermatophyte. There are four presentations of tinea pedis, namely interdigital tinea pedis, frequently referred to as athlete's foot, moccasin (chronic hyperkeratotic) tinea pedis, inflammatory or vesicular tinea pedis, and ulcerative tinea pedis (Waterson, 2017). Patients who have tinea pedis usually present with itching and small blisters on one or on both feet. Fungal infections grow well in humid and warm conditions, and hence tend to be more predominant in countries that generally have a warm climate. It is even more contagious in environments that are warm and moist, such as hot tubs or locker rooms and showers. The fungal spores are able to survive for very long periods (months or even years), anywhere from bathrooms, changing rooms and even around swimming pools (Kutlubay, Yardımcı, Kantarcıoğlu & Serdaroğlu, 2017). It occurs in persons who use occlusive footwear. It can occur due to bare foot walking. T. rubrum, E. Floccosum and T. Mentagrophytes are the most common causes of tinea. The acute form of the infection presents with erythema and maceration between the toes, sometimes accompanied by painful vesicles. The

more common chronic form is characterized by scaling, peeling, and erythema between the toes; however, it can spread to other areas of the foot. Involvement of the plantar and lateral aspects of the foot with erythema and hyperkeratosis is referred to as the “moccasin pattern” of tinea pedis (Moriarty et al, 2014).

The dermatophytes that cause tinea pedis grow best in a moist, damp environment. The fungal spores can survive for extended periods (months or even years) in bathrooms, changing rooms and around swimming pools. Some practical advice that clinicians can give to patients to help reduce both the risk of contracting tinea pedis and re-infection includes: wearing less occlusive shoes and changing shoes and socks on a daily basis, and if they become wet; thoroughly drying feet after showering or swimming; not sharing towels; wearing sandals in communal showers and changing rooms. People who are more at risk of tinea pedis include those who are immunocompromised, who sweat excessively (hyperhidrosis), and those who have poor peripheral circulation or diabetes (DermNet, 2013). There are a number of disorders which can mimic the signs and symptoms of tinea pedis. These include psoriasis, pitted keratolysis, candida intertrigo, and dyshidrosis.

**Etiology of athlete’s foot**

Athlete's foot is a clinical condition that manifests as a superficial fungal infection of the skin (Kutlubay, Yardımcı, Kantarcıoğlu & Serdaroğlu, 2017). The risk in attaining the infection is increased in people who have contact with swimming pools, communal showers, athletic shoes, sports equipment and locker rooms. The presence of diseases such as psoriasis or atopic dermatitis has a tendency of increasing the incidence of contracting tinea pedis (Kutlubay et al, 2017). Tinea pedis is the most common fungal infection of the skin that is transmitted via dermatophytes (Achterman & White, 2012). Examinations of 600 keratinised tissues, conducted by the mycology laboratory of the National Institute of Health in Portugal during 2006, reported that dermatophytes caused 48.0% of tinea pedis and the remaining 52.0% were caused by yeasts and non-dermatophyte moulds. The most commonly detected dermatophyte in patients with tinea pedis is T rubrum; it is the most commonly isolated organism in adult populations, whilst T tonsurans is the most common causative organism in children with tinea pedis. In addition to these dermatophytes, non-dermatophyte moulds, such as Neoscytalidium dimidiatum, which is endemic in Africa, Asia, the Caribbean, Central and South America, and several states in the United States, can result in treatment-resistant tinea infections of the feet (Achterman & White, 2012).

Tinea pedis is most commonly caused by Trichophyton rubrum (60) %, Trichophyton mentagrophytes (20) % and Epidermophyton floceosum (10) %

(Joseph, 2004). Trichophyton rubrum is the most common pathogen cases of tinea pedis throughout the world. The zoophilic species most commonly produce more inflammatory type of tinea pedis. Trichophyton violaceum, however, is probably the most prevalent of the zoophilic dermatophytes that causes tinea pedis and this infection is considered a resistant for treatment (Joseph, 2004).

**Signs and symptoms according to the type of athlete's foot**

People with tinea pedis typically present with itching, erythema and small blisters on one or both feet. Malodour is more likely to be due to bacterial infection. More specific signs and symptoms depend on the subtype of tinea pedis.

Interdigital tinea pedis (often referred to as athlete's foot) is the most common form and is predominantly caused by T. rubrum. It is characterised by macerated skin with fissures between the toes (usually between the fourth and fifth toes) and frequently erythema. Patients often complain of itching and burning sensations on the feet accompanied by malodour. There are generally two types of interdigital tinea pedis. The first is a scaly, dry type called dermatophytosis simplex. The skin of the interdigital space is dry with low-grade peeling. This form is usually asymptomatic except for occasional pruritus. The second type is symptomatic and presents with wet, macerated interdigital spaces. Dermatophytosis complex, as it is called, may have fissuring of the interspace along with hyperkeratosis,

leukokeratosis, or erosions. Wet conditions along with fungal invasion increases the incidence of bacterial infection in these patients by breaching cutaneous integrity (Ilkit & Durdu, 2014).

Moccasin (chronic hyperkeratotic) tinea pedis is also predominantly caused by T. rubrum and is associated with scaling plaques and mild erythema on the heels, soles and lateral aspects of one foot, or less often, both feet . Skin markings appear exaggerated and white. The dorsal surface of the foot is usually clear (Ilkit & Durdu, 2014). This type is usually bilateral with patchy or diffuse involvement. Unilateral tinea manuum commonly occurs in association with this variety resulting in ‘‘two feet-one hand syndrome”. Subungual onychomycosis coexisting with moccasin type dermatophytosis is most often caused by Trichophyton rubrum as well. The differential diagnosis to be considered here are psoriasis; dyshidrotic, atopic, or allergic eczematous dermatitis; pitted keratolysis; and various keratodermas.

Inflammatory or vesicular tinea pedis is predominantly caused by T. interdigitale and is associated with clusters of vesicles and pustules on the instep or mid-anterior plantar surface. This type comprises pustules or vesicles on the instep and adjacent plantar surfaces of the feet and is less common (Hirschmann & Raugi, 2000). Bacterial infection needs to be considered in the differential diagnosis and ruled out by microscopy and culture. This form of tinea pedis may be associated

with dermatophytide or "Ide" reaction. KOH preparations of the aspirate should be examined for presence of hyphae. Bullous impetigo, allergic contact dermatitis, dyshidrotic eczema, and bullous disease all need to be considered in the differential diagnosis. This form is typically caused by Trichophyton mentagrophytes var interdigitale. Sometimes this infection can go for spontaneous cure but tends to recur under hot humid conditions.

Ulcerative tinea pedis is predominantly caused by T. interdigitale and is associated with the rapid spread of vesiculopustular lesions, ulcers and erosions. The lesions are macerated with scaling borders and typically start in between the fourth and fifth toes before spreading to the lateral dorsal and plantar surfaces over a few days. The ulcerative form is often associated with secondary bacterial infection. Bacterial co-infection with Gram negative organisms along with Trichophyton mentagrophytes var interdigitale produces this ulcerative variety. This form is complicated by fever, cellulitis, lymphangitis and lymphadenopathy (Hirschmann & Raugi, 2000).

Ide eruption: The vesiculobullous and ulcerative types of tinea pedis produces this vesicular type of hypersensitivity reaction (Hirschmann & Raugi, 2000). A pompholyx like ide affecting the web spaces and palmar surfaces of the fingers, palms and sometimes the dorsal surface of hands is characteristically associated with above types of tinea pedis. They can arise spontaneously or as a result of

inappropriate treatment. Other types of ide eruptions are widespread eruption of small follicular papules and very rarely erythema nodosum like, erythema multiforme like, erythema annulare like and urticarial eruptions (Hirschmann & Raugi, 2000).

**Diagnosis of tinea pedis**

Tinea pedis can be diagnosed through different clinical methods (Kutlubay et al, 2012). One method is through physical examination, which usually refers to the presentation of the scaling and maceration of the most lateral interdigital spaces, extending medially. The infection presents with a dry-type pattern, which is seen and inclusive of hyperkeratosis of the plantar and lateral part of the foot. These are the most common physical presentation patterns of a tinea pedis infection (Moriarty, Hay & Morris-Jones, 2012). The less common patterns are observed as minute vesicles and blisters that are present on an erythematous base on the plantar surface of the feet. The other methods of diagnosis include examination with a Wood's light, direct microscopic examination, and fungal culture (Ilkit & Durdu, 2015). Even though a Wood's light may be used, it is not necessarily sensitive in detecting dermatophytes, because they do not fluoresce. Kutlubay et al, (2012) stated that the primary reason for using this test may be to distinguish the tinea from erythrasma (a superficial skin infection that causes brown, scaly skin patches) caused by Corynebacterium minutissimum. The other method may be collection

of keratinised tissue for mycological examination. The samples are cultured on agar and results can be expected after two weeks. Even if the results from the microscopic examination may be negative, the clinician can still prescribe treatment for tinea pedis, if the physical presentation of the disease is obvious or convincing. Identifying tinea pedis, using techniques other than clinical diagnosis, requires a scraped-off sample from an active area where the lesion is suspected of being tinea pedis. Skin scrapings should ideally be collected from the peripheral raised border. Direct microscopic examination is one of the techniques that can be performed. The test is easy and quick, and is highly specific and sensitive for dermatophyte identification. Alternative methods of identification include the use of dermatophyte test strips and performing a fungal culture (Moriarty et al, 2012).

The diagnosis of tinea pedis is usually based on the patient's symptoms and the clinical appearance. There are, however, a number of other conditions that should be considered when a patient presents with suspected tinea pedis, including:

Onychomycosis (fungal nail infection) – approximately one-third of patients with tinea pedis have a concomitant nail infection which can result in recurrent tinea pedis infections (Ilkit & Durdu, 2014)

Dermatophytide (ide or id) reaction – an allergic rash (secondary eczematisation) caused by an inflammatory fungal infection (Bristow, 2008).

Non-dermatophyte associated podopompholyx – a type of eczema which can affect the feet and may resemble a vesicular form of tinea pedis. It is more likely to be bilateral and symmetrical; mycology is negative.

Palmoplantar pustulosis (see opposite) – typically characterised by scaly, partially or completely red, dry and thickened skin on the plantar surface of both feet, that is similar in appearance to psoriasis on other parts of the body (DermNet, 2014). Note that psoriatic nail dystrophy often closely resembles onychomycosis.

Juvenile plantar dermatosis – characterised by dry, shiny, glazed skin on the sole of the foot due primarily to friction. It is most commonly seen in children who are atopic, particularly boys aged four to eight years.

Contact dermatitis – sweat, friction and home-remedies can cause irritant contact dermatitis; contact allergy may be due to accelerants (from rubber), chrome (leather tanning agent), glues and dyes in footwear.

Atopic dermatitis – usually diagnosed because of its presence on other body sites (DermNet, 2014).

Bacterial foot infections, e.g. pitted keratolysis (associated with very malodorous feet) and bacterial web infections secondary to tinea pedis infection. Skin scrapings for fungal microscopy should be undertaken when initial topical treatment has been ineffective, whenever considering oral treatment, or in patients with an atypical

presentation. Skin scrapings should be taken from the leading edge of the lesion using a blunt scalpel blade or curette. Nail clippings should be collected from abnormal toenails. If there is clinical evidence of a secondary bacterial infection, e.g. malodour or maceration, swabs for bacterial microscopy and culture should also be collected.

**Management and control of tinea pedis infections**

Tinea pedis can infect by contact with tainted scales on shower or pool floors; therefore, wearing protective footwear in communal facilities (public areas) may help diminish the probability of contamination. Since contaminated scales can be present on attire, regular washing of laundry would be a beneficial preventative measure to take (Moriarty et al, 2012). Occlusive footwear advances disease by creating warm, muggy, macerating situations where dermatophytes flourish. Accordingly, patients should endeavour to limit foot dampness by restricting the utilization of occlusive footwear, and dry their feet thoroughly and in between the toes after showering, bathing, or swimming. Do not put on socks when feet or socks are wet (Achterman & White, 2012). Other measures to help prevent infection include wearing shoes that are roomy or ventilated and that would allow

some air to circulate; try to avoid the sharing of nail tools, like clippers and scissors, and avoid sharing shoes and towels. Also use hot water and bleach to increase the chance of killing fungi when washing some clothing.

Medical therapy is the main treatment for tinea pedis; surgical care is usually not indicated in these patients. Tinea pedis is treated with topical antifungal agents; however, depending on patient's response to topical agents and the severity of the infection, both topical and oral (i.e. systemic) agents may be used. Medications used to treat tinea pedis work by disrupting the synthesis of ergosterol, which is a crucial component of fungal cell membrane.

The area affected, causative organism of the infection, source of infection play a major role in control of infection. Sharing of towels, soaps, clothing, razors, foot wear etc. should be avoided. Scalp ringworm spreads via contaminated combs, brushes, hats, and pillows. All items should be disinfected after use as dermatophytes can be transmitted from one person to another by them (Shi, Zhang, Zhang, Yu, Tang & Yu, 2014). The chances of people getting fungal infections can be minimized by making sure that they practice good hygiene. Dermatophytes are common in people handling animals (dog, cat). Protective clothing's such as gloves are recommended as these infections can be sub-clinical (Jain, Jain & Rawat, 2010). Proper foot care (washing feet, drying to avoid moisture, avoiding occlusive foot wear, not to share towels, shoes, socks) is essential to prevent tinea

pedis. It is mandatory to educate them not to go bare footed to places like swimming pools. People should be towel-dried after bathing to prevent any tinea infections. In tinea capitis, hair should be screened with woods lamp for fluorescence. In other non-fluorescence type of tinea capitis, scalp is examined carefully for any lesions or any loss of hair and areas suspected to have these infections are cultured. The hairbrush technique may be helpful in detecting and culturing subclinical infections (Jain, Jain & Rawat, 2010). However, tinea pedis is generally responsive to topical creams such as terbinafine (Lamisil) and butenafine (Lotrimin), but oral antifungal agents may be indicated for extensive disease, failed topical treatment, immunocompromised patients, or severe moccasin-type tinea pedis. Patients with chronic or recurrent tinea pedis \may benefit from wide shoes, drying between the toes after bathing, and placing lamb's wool between the toes. Patients with tinea gladiatorum, a generalized form of tinea corporis seen in wrestlers, should be treated with topical therapy for 72 hours before return to wrestling (Moriarty et al, 2012).

**Prevention of tinea pedis infections**

Tinea pedis (athlete's foot) is one of the most common superficial fungal infection of the skin in all regions of the world. Mycotic infections of the foot are common in adult males and uncommon in women and children. It is more common in close communities such as army barracks, boarding

schools and among those frequenting swimming pools, when the feet are occluded with nonporous shoes. The incidence of this infection is higher in warm humid climates which are known to promote the growth of fungi.

Tinea pedis or Athlete's foot is one of the most common of all foot ailments. Good patient education, with simple instructions as to the importance of foot hygiene, can help prevent and minimize the progression of tinea pedis. Good education consists of proper hygiene instructions, emphasizing the importance of drying the feet, practicing good nail care, and wearing properly fitting shoes with clean dry socks. It is important to promote preventive measures, thereby avoiding possible infections through interpersonal contact as well as using common sport spaces. The use of antifungal foot powders is controversial but may be helpful for persons susceptible to tinea pedis who have frequent exposures to areas where the fungus is suspected. Proper diagnosis and treatment of persons having underlying conditions like diabetes mellitus, HIV, organ transplantation, peripheral vascular disease, alcoholism etc. is an essential part of prevention of tinea pedis infection.

**Prevalence of tinea infections**

Various studies have been conducted on the prevalence of tinea infections around the world. For instance, Ndako, Osemwegie, Spencer, Yunnusa and Banada (2012) conducted a study about the prevalence of dermatophytes and other

associated fungi among school children. In above study children aged 3-13 years old were screened between March-August 2008 for fungal infection consistent with dermatophytosis on the skin, scalp, hands, feet, trunk, legs from five selected Islamiyya nursery and primary schools scattered across Nassarawa Local Government Area of Kano metropolis after due clearance from school heads, parents, and students. In this study, a total of 100 samples were collected and positive growth was seen in 91(91%) from which 66(72.5%) were males, 25(27.5%) were females. Dermatophytes was observed in 53(58.2%) of patients out of which 39(73.5%) were males and 14(26.5%) were females. The causative organism of dermatophytes observed in this study in descending order of prevalence are Tinea pedis (15.4%), M. canis(15.4%), M. audounii(9.9%), Trichophyton concentricum(5.5%), Trichophyton verrucosum(3.3%), Trichophyton rubrum(3.3%), Trichophyton mentagrophyte(2.2%), Trichophyton tonsorans(1.1%), Trichophyton schoenleini (1.1%). In the above study they concluded that dermatophytes occurred in higher frequency in children who play outdoor, who had contact with domestic animals and who lack the luxury of school seats during class room learning. Jain, Sharma, Sharma and Saxena (2014) conducted a study between April 2006-September 2006 regarding spectrum of dermatophytosis in outpatient department of skin, SMS hospital, Jaipur. 196 cases were included in the study. KOH positivity was seen in 148 cases and culture

positivity was seen in 160 cases. In the above study they concluded that in all age groups Tinea corporis had the highest incidence. Tinea cruris was the second most common followed by Tinea capitis, Tinea manuum, Tinea unguium. In the above study these infections were more frequent in the age group of 21-30 years (26%)>31-40 years (18.8%)>11-20 years (16.3%). Males (75.5%) were more affected than females (24.5%). They concluded in this study that in 53 cases T. rubrum was isolated.

Surendran, Bhat, Nandakishore and Sukumar (2014) conducted a clinical and mycological study of dermatophytic infection in 100 patients in Father Muller Medical College Hospital, Mangalore. In this study 100 patients (62 males and 38 females) clinically suspected as having dermatophytosis were enrolled and was it was conducted between August 2005 - July 2006 in randomly selected patients from Dermatology outpatient department, Father Muller Hospital, Mangalore. Both sexes of age group 1-60 years were included in the above study and they concluded that the most common clinical presentation was Tinea corporis(44.3%)> Tinea cruris(38.2%)> Tinea pedis(2.7%)> Tinea manuum(3.3%)> Tinea ungiuum(8.1%)>Tinea barbae(2.1%)>Tinea faciei (1.3%), Trichophyton rubrum was the most common isolate.

Shukla, Yaqoor, Shukla, Garg, Dar and Haider (2013) conducted a study among 400 patients attending outpatient department at Eras Lucknow Medical

College and Hospital between January 2012-2013 who were clinically suspected to have superficial mycosis regarding the prevalence of superficial fungal mycosis among out patients in a tertiary care hospital to describe the prevailing spectrum and frequency of various fungal infections among the dermatophytosis. 400 cases were included in this study. In 326(81.5%) of cases evidence of fungal elements on microscopy was seen and 74 cases (18.5%) were KOH negative on microscopy. Culture growth was seen in 292(73%) cases and 66(16.5%) were culture negative. In 22(5.5%) cases, both microscopy and in culture reports came negative. Out of the total cases included in the study, 316(79%) cases were diagnosed as Dermatophytoses followed by 42(10.5%) cases of Pityriasis versicolor and 42(10.5%) cases of superficial candidiasis. Among the age group of 0-10 years (11%) tinea capitis was reported maximum. Tineacorporis was the most common in the age group of 21-30 years (5%). Tinea corproris was the most common presentation and Tinea pedis was the most common in 31-40 years (2%), Tinea mannum was the most common in the age groups of 21-30 years and 51-60 years (1.5%). In this study, they concluded that the most common clinical presentation was Tinea capitis and most common isolate was Trichophyton mentagrophytes and male and female ratio (1:1) was equal in Tinea capitis. In this study in all other clinical types males were affected more than females. It was observed that 21-30

years was the most common age group affected. The least common affected group was 71-80 years (2.5%).

Hanif, Ikram, Abbasi & Malik (2012) conducted a study regarding the prevalence of superficial fungal infection in the rural areas of Bangladesh from January 2008- December 2008. There were 3438 patients who visited the outpatient department. 601 patients (310 males & 291 females) who were diagnosed to have superficial fungal infection aged between birth-90 years were included in the study. In this study Tinea corporis (22.63%) was the most common clinical presentation followed by Pityriasis versicolor(12.81%), oral thrush (12.48%), Tinea capitis(10.32%), Tinea pedis(9.82%), Tinea cruris(8.32%), candida intertrigo(6.49%), onychomycosis(4.33%), chronic paronychia(3.49%), Tinea faciei(3%), Tinea manuum(1.83%), Tinea incognito(1.66%), Tinea barbae(1%) and they concluded that superficial fungal infections are of concern in both sexes and in all age groups. The pattern and distribution was very high particularly in rural areas of Bangladesh. In the above study tinea capitis and tinea corporis were seen in higher frequency in children while common clinical presentation in adults were Tinea corporis (17.40%), Pityriasis versicolor, Tinea cruris. It was found in this study that the frequency of Tinea corporis, Tinea pedis, onychomycosis were most common in elderly patients.

**Predisposing factors of tinea pedis**

The dermal layers of the foot along with the nail possess properties that make it vulnerable to infection. The regular use of footwear which maintains a moist environment can provide opportunistic infections to occur. Also, the regular contact stress endured by the foot, particularly during sports, can cause abrasions that can harbour organisms. This is why tinea pedis is commonly known as athlete's foot. Some of the various predisposing factors of tinea pedis include:

Occlusion: Occlusion of infected site appears to increase the susceptibility to experimental infection because it increases hydration of the underlying skin and emission of $CO_2$, helping dermatophyte growth (Johnson, 2000). Tight fitting footwear or ill-fitting footwear and usage of non-absorbable socks are the main factors predisposing to chronic and recurrent foot infection. Thus the use of macerating occlusive footwear has made tinea pedis and onychomycosis much more common in industrialized nations (Johnson, 2000).

Hyperhidrosis: People with increased sweating especially of palmoplantar hyperhidrosis have increased incidence of fungal infections (Hautarzt, 2005).

Immunosuppression: Chronic infection has been noted in a number of patient groups such as in those with chronic mucocutaneous candidosis, ichthyosis, AIDS (Johnson, 2000), patients on corticosteroid therapy or with endogenous Cushing's syndrome. Patients with AIDS though do not show increased incidence of infection

can have atypical and extensive forms of presentations. Thus in HIV where the cell mediated immunity is affected drastically, it is interesting that only the severity of dermatophytosis is increased and not the prevalence (Johnson, 2000).

Diabetes: There is no reliable evidence that diabetic patients are especially susceptible to dermatophyte infection even though diabetes may affect the course of infection. Recently studies have shown that diabetic patients are more prone to chronic infection and also the incidence of onychomycosis is increased among the patients with tinea pedis and diabetes. The dry moccasin type tinea pedis is often underestimated by diabetics as dry skin. Recurrent Trichophyton rubrum infection are common in diabetes mellitus patients (Hautarzt, 2005).

Climate: In tropical country like ours, warm, humid climate is another predisposing factor which when combined with occlusive factors compound the clinical picture.

Fungal infections are contagious and therefore can be transmitted to other people, usually via direct skin-to-skin contact, although shedding of infected dead skin cells on clothing, bedding and towelling are other ways they can be transmitted (Hautarzt, 2005). Less commonly, infection from animals or soil can occur. Many patients are unaware of the risk of spreading the infection to other parts of their own body. In one study, around 71% of patients were unaware they had tinea pedis and 46% were unaware they had onychomycosis (Kelly, 2012).

Infected fingernails and toenails can often be a primary site of infection which can spread to other areas of the body later on. Tinea of the foot is also commonly associated with cross-infection of the toe nails. The toenails can be a reservoir of infection, which can precipitate recurrent tinea of the feet (Hautarzt, 2005). Infection is often spread by scratching the infected area, such as the feet, and then touching another body area, such as the groin. In a study of 2761 patients with onychomycosis, around 43% of patients had a concomitant fungal infection, including tinea capitis, tinea corporis, tinea manuum, or tinea pedis. Because fungal disease can spread from one infected body area to another on and many patients may be unaware this has occurred to them, pharmacists should inquire whether itching, scaling or other symptoms of fungal infection are present elsewhere on the body so that they may be provided with effective treatments (Hautarzt, 2005).

**Treating fungal infections of the skin**

In general, patients with interdigital tinea pedis can be treated with a topical antifungal. Patients with moccasin, vesicular or ulcerative tinea pedis, or persistent tinea pedis may require oral antifungal treatment. When assisting a patient with tinea, it's important to understand what kinds of treatment are most appropriate. Dermatophytes found in hair follicles and thickened skin are not easily accessible by topical treatment. Therefore, oral systemic therapy is recommended for tinea in

hair bearing areas and on the palms and soles of the feet (Kelly, 2012). It is also recommended for tinea that is widespread or recurrent, tinea that is unresponsive to topical therapy, or tinea that has been previously treated with corticosteroids. Topical therapy may be used in localised tinea infections of the body, face, limbs or interdigital areas. For some patients, adjunctive topical therapy may help to decrease the risks of transmissibility and improve the mycological cure rate. Preparations containing a topical corticosteroid are commonly used in combination with antifungal treatment during the early stages of tinea infection to suppress any inflammation and provide symptomatic relief (Del Rosso, 2008). Because of the possibility of fungal proliferation, they should not be used in alone in the treatment of tinea infections.

Topical antifungals are used for most localised tinea infections of the skin that are hair-free and not heavily keratinized (Kelly, 2000). A number of over-the-counter (OTC) treatments are available which contain either an azole compound or the active ingredient terbinafine. Topical azoles such as bifonazole, clotrimazole, econazole, ketoconazole and miconazole are commonly used to treat patients with tinea (Del Rosso, 2008). They are broad spectrum agents, with activity against dermatophytes, yeasts, including Candida albicans. The benefit of a broad spectrum agent is that the causative microorganism is not always known in the pharmacy setting. Topical azoles come in a range of OTC formats, such as cream,

solution, spray or powder. They are usually applied one or more times daily until symptoms resolve and for up to 2 weeks after to avoid recurrence. Topical azoles are generally well tolerated, although burning, itch, erythema and stinging have been reported. Clotrimazole, econazole and miconazole are suitable for use during pregnancy and breastfeeding (Hainer, 2003). Bifonazole and ketoconazole should be avoided. Patients should be advised to clean and dry the affected area thoroughly before applying a thin layer, paying attention to skin folds. The combination of clotrimazole with hydrocortisone 1% offers the benefits of a broad spectrum anti-fungal to clear (Kelly, 2000).

When to consider an oral antifungal treatment: Although most people with a localised tinea pedis infection can be successfully treated with a topical antifungal medicine, some patients may require an oral antifungal medicine, including: patients with a more treatment-resistant subtype of tinea pedis, e.g. moccasin, vesicular or ulcerative; patients with interdigital tinea pedis that is severe and involves multiple interdigital spaces or has spread to the plantar aspect of the foot; patients with a co-existing fungal nail infection If topical treatment has been unsuccessful.

**Knowledge about the prevention of athlete's foot**

The researcher observed that various empirical studies have been done on the knowledge towards the prevention of athlete's foot. For instance, Armstrong (2011) embarked on a study to determine the knowledge and protection of athlete's foot prevention on adults. Tools used were questionnaire. The result was that the mean knowledge score was 6.5 (S.D 2.1) out of a possible 11. There was a positive correlation between the score and practicing athlete's foot prevention. A study by Berry (2011) which was conducted to assess the level of tinea infections prevention practices. Data was collected using interviewer administered questionnaire which measured their self-reported practices and knowledge. The result revealed that approximately one-third (36.2% and 34.3%) of the students had poor level of knowledge and practice about tinea infections respectively. High monthly income of parents monthly income of parents, diet and exercise were independently and statistically associated with poor preventive practices.

Johnson (2001) conducted a study at Ibadan health center to assess the impact of education to prevent foot infection problems in diabetic patients. The study included 137 adults ranged age from 37 to 75years. 126 of the participants had never received any education on foot care and 11 had received some form of foot care education. 35 (25.5%) know to wash their feed daily and dry in between the toe thoroughly. 31 (22.6%) knew not to go outdoors bare footed, 27 (19.7%) checked their feet daily, 27 (19.7%) checked their feet daily, 27 (19.7%) checked

inside their shoes daily and 4 (2.9%) clipped their toe nails with care. The result of this showed that awareness of food care measures is very poor and this is largely due to lack of education. In another study by Viswanathan (2002) conduced to assess the infection knowledge in adults. The study revealed that food specific patient education is an essential element of health system foot programme. Specific patient education must be individualized because of cognitive deficits in individuals at workplace. The result of the study showed that approximately 80% of the participants were able to respond appropriately to simple questions related to the care of their feet from tinea infection.

**Summary of related literature**

Athlete's foot is also called tinea pedis. It is a contagious fungal infection that affects the skin on the feet. It can also spread to the toenails and the hands. The fungal infection is called athlete's foot because it's commonly seen in athletes. In view of this, the literature review was done based on an overview of athlete's foot, aetiology of athlete's foot, signs and symptoms vary according to the type of tinea pedis, diagnosis of tinea pedis, management and control of tinea infections, prevention of athlete's foot, prevalence of tinea infections, predisposing factors of tinea pedis, treating fungal infections of the skin, knowledge towards the prevention of athlete's foot. The Health Belief model was adopted to guide this study. As with other theories exploring behavior modification or change, the HBM

includes a belief component, an attitude component and a behavior component. The belief component pertains to what the individual assesses as the true situation, while the attitude component pertains to how the individual feels about the situation. Anyone can get athlete's foot, but certain behaviors increase your risk. Factors that increase your risk of getting athlete's foot include: visiting public places barefoot, especially locker rooms, showers, and swimming pools; sharing socks, shoes, or towels with an infected person; wearing tight, closed-toe shoes; keeping your feet wet for long periods of time; having sweaty feet; having a minor skin or nail injury on your foot. It was also observed in the literature that Athlete's foot can lead to complications in some cases. Mild complications include an allergic reaction to the fungus, which can lead to blistering on the feet or hands. It's also possible for the fungal infection to return after treatment. There can be more severe complications if a secondary bacterial infection develops. In this case, your foot might be swollen, painful, and hot. Pus, drainage, and fever are additional signs of a bacterial infection.

# PART FOUR

# PROGRAMME OFINTERVENTION

## The intervention process and procedures

The knowledge of foot hygiene and preventive practices of workers in NPDC Oredo Flow station OML 111 on athlete's foot infection was evaluated by conducting a survey amongst them. In this study, the level of knowledge of foot

hygiene and their preventive practices were assessed in terms of how well the workers know the causes, signs & symptoms, practice foot hygiene, treatments and the effects of athlete's foot infection on them. A structured interview was used in assessing their level of knowledge of foot hygiene and preventive practices.

**Content of survey form and itsadministration**

The survey instrument had two parts - the first part contained demographic questions and the other part contained questions on signs & symptoms, causes, treatment, and effect of athlete's foot and whether they have been educated on athlete's foot since they started their working on the field and if they practice proper foot hygiene. A total of 15 questions were asked and the workers were interviewed.

**TABLE 1: Personal characteristics of the workers**

| Characteristics | | Frequency | Percentage |
|---|---|---|---|
| Workers status | Permanent Staff | 15 | 42.86% |
| | Contract Staff | 20 | 57.14% |
| Age | 20-29 | 4 | 11.43% |
| | 30-39 | 14 | 40% |

| | | | |
|---|---|---|---|
| | 40 and above | 17 | 48.57% |
| Educational level | Primary | 2 | 5.71% |
| | Secondary | 5 | 14.29% |
| | Post-secondary | 28 | 80% |

Table 1 summarizes the personal characteristics of the respondents. The permanent staffs constitute 42.86 percent while the contract staffs constitute 57.14 percent of the research. The age distribution showed that very few of the workers were within the age of 20-29 years which was 11.43 percent, 40 percent were between the age of 30-39 while most of them were 40 years and above which was 48.57 percent. Most of the workers have post-secondary education which constitute 80 percent, 14.29 percent have secondary education while only 5.71 percent of them have only primary education.

**TABLE 2: Workers years of working experience**

| Years of working experience | Frequency | Percentage |
|---|---|---|
| 0-5 years | 7 | 20% |
| 6-10 years | 12 | 34.29% |

| | | |
|---|---|---|
| 11 years and above | 16 | 45.71% |

Table 2 summarizes the years of working experience of the workers, majority of the workers have been working for 11 years and above (45.71percent), 34.29 percent for 6-10 years while 20 percent have been working for just between 0-5 years.

**TABLE 3: Workers knowledge about the causes of athlete's foot**

| Question | Response | Frequency | Percentage |
|---|---|---|---|
| Do you know what causes athlete's foot infection among field workers? | No | 14 | 40% |
| | Fungal infection | 4 | 11.43% |
| | Visiting public places barefoot and nail injury | 1 | 2.86% |
| | Damp and dirty feet, shoes and socks | 16 | 45.71% |

Table 3 shows the result on knowledge on the causes of athlete's foot. Majority of the workers attributed it to damp and dirty feet, socks and shoes (45.71%), a large number of the workers also do not know what causes it (40%), 11.43% attributed it to fungal infections, while one of the workers attributed it to visiting public places barefoot and also as a result of nail injury (20%).

**TABLE 4: Workers knowledge on signs and symptoms athlete's foot**

| Questions | Response | Frequency | Percentage |
|---|---|---|---|
| Do you know any of the signs and symptoms of athlete's foot infection? | Yes | 21 | 60% |
| | No | 14 | 40**%** |

Table 4 shows that blisters, tears in between the toes, puses, itching, scaling soreness, smelly toes, burning and discomfort were the most common signs of athlete's foot among workers (60%), while 40% indicated that they do not know any symptoms.

**TABLE 5: Workers knowledge on treatment of athlete's foot**

| Question | Response | Frequency | Percentage |
|---|---|---|---|
| What will you do if you have athlete's foot? | Hospital | 31 | 88.56% |
| | Will do nothing | 2 | 5.71% |
| | Warm water and salt | 1 | 2.86% |
| | Leave it to heal naturally | 1 | 2.86% |

Table 5 shows that majority of the workers indicated that they will go to the hospital if they notice any symptoms (88.56%), 5.71% indicated that they will do

nothing about it, one worker said he will use salt and water (2.86%), one worker also said he will leave it to heal naturally (2.86%).

**TABLE 6: Workers knowledge on the effects athlete's foot**

| Question | Response | Frequency | Percentage |
|---|---|---|---|
| Do you know that athlete's foot can lead to fungal nail infection? | Yes | 20 | 57.14% |
| | No | 15 | 42.86% |

Table 6 shows that majority (57.14%) of the workers are aware that athlete's foot can lead to fungal nail infections while 42.86% of them said they do not know.

**TABLE** 7: **Workers knowledge on the effects of athlete's foot**

| Question | Response | Frequency | Percentage |
|---|---|---|---|
| Do you know that athlete's foot can lead to secondary bacterial infections? | Yes | 18 | 51.43% |
| | No | 17 | 48.57% |

Table 7 shows that 51.43 percent of the workers stated that they know that it could lead to secondary bacterial infections while 48.57 percent indicated that they did not know that it could lead to secondary bacterial infections.

**TABLE 8: Workers exposure to information on athlete's foot infection at the health and safety meeting in the field**

| Question | Response | Frequency | Percentage |
|---|---|---|---|
| Have you ever been given talk on athlete's foot infection at the health and safety meeting on the field? | Yes | 19 | 54.29% |
| | No | 16 | 45.71% |

Table 8 shows the workers exposure to information, majority of the workers said they have been given health talk on athlete's foot infection at the health and safety meeting on the field (54.29 percent) while others indicated that they have not been given any health talk (45.71percent).

**TABLE 9: Workers foot hygiene and preventive practices toward athlete's foot**

| Question | Response | Frequency | Percentage |
|---|---|---|---|
| Do you wash and change your socks daily after work? | Yes | 15 | 42.86% |
| | No | 20 | 57.14% |
| Do you dry or air out your safety boots daily after work? | Yes | 13 | 37.14% |
| | No | 22 | 62.86% |
| Do you have more than one safety boot that you interchange for work? | Yes | 11 | 31.43% |
| | No | 24 | 68.57% |
| Do you wash, clean and dry in between your toes and your feet properly after work? | Yes | 16 | 42.86% |
| | No | 19 | 57.14% |
| Do you wear an open palm slippers after each day's work to allow proper ventilation on your feet? | Yes | 13 | 37.14% |
| | No | 22 | 62.86% |
| Do you ensure you do not go into the locker and shower rooms bare footed? | Yes | 16 | 45.71% |
| | No | 19 | 54.29% |

Table 9 shows the foot hygiene and preventive practices undertaken by the field workers. A high number of the workers do not wash and change their socks daily after work (57.14 percent) while 42.86 percent of them said they do. It is also seen that 62.86 percent of the workers do not dry or air out their safety boots after work daily, while 37.14 percent of the workers said they do air or dry out their safety boots daily. In the area of having more than one safety boot that is being interchanged for work, majority of the workers said they do not have more than one safety boot (68.57 percent) while 31.43 percent of the workers said they have more than one. Also 57.14 percent of the workers do not pay proper attention by washing, cleaning and drying in between their toes and feet properly after work while 42.86 percent of the workers claimed they do so. Again, the prevention practice of putting on an open palm slippers after each day's work to allow proper ventilation in the respondents feet, it is seen that majority of the workers (62.86 percent) do not put on an open palm slippers, while 37. 14 percent of the respondents do so. Lastly, 54.29 percent of the workers go into the shower rooms barefooted while 45.71 percent said they do not enter the shower room barefooted.

Conclusively, it is observed that the overall foot hygiene and preventive practices of majority of the workers towards athlete's foot infection are very poor.

**Intervention strategies**

The researcher made hand bills which were given to the workers, posters on athlete's foot which was also pasted at the field to serve as a reminder to them to practice proper foot hygiene and prevention measures and health talk was also delivered to the workers at the NPDC Oredo Flowstation OML 111, located in Ologbo Community, Benin City, Edo State. After all these activities were done with, the researcher in order to measure the impact of the intervention programme, employed the unobtrusive observation method to ascertain if the intervention worked. The researcher observed that there was a great improvement in the foot hygiene and prevention measures undertaken by the workers. Most of the workers' safety boots are now seen being dried out after each day's work and their socks are seen outside too after they have washed them. Another preventive practice that was seen been undertaken by the workers was the majority of them coming to the HSE department to request for an additional safety boot to interchange for work. The workers are also seen putting on open sandals that allows for proper ventilation on their feet after the day's work among other things. Therefore, the workers poor foot hygiene practices were reduced, their level of compliance towards proper foot hygiene practices and prevention was increased and the prevalence of athlete's foot infection reduced.

**Information on Health Talk on Athlete's Foot Infection (Tinea pedis)**

Athlete's foot is a fungal infection that usually begins between the toesespecially between the fourth and fifth toes, and over the foot. It is a skin infection caused by a type of fungus called a dermatophyte.It commonly occurs in people whose feet have become very sweaty while confined within tightfitting shoes or on moist waterlogged skin.

Signs and Symptoms

- Red and itchy skin between toes and sides of the feet.
- Burning, and stinging of the skin.
- Peeling, flaking and scaling of the affected skin.
- White macerated skin and fissuring.
- Blistering that may ooze secretions or bleed.

Causes

- Mould like fungi called dermatophytes.
- Tight fitted shoes, damp socks and shoes.
- Warm and humid conditions of the feet.

Risk factors

You are at higher risk of athlete's foot if you:

- are a male.
- frequently wear damp socks or tightfitting shoes.
- share mats, rugs, bed linens, clothes or shoes with someone who has a fungal infection.
- walk barefoot in public areas where the infection can spread, such as locker rooms, saunas, swimming pools, communal baths and showers.

Complications

If athlete’s foot infection is left untreated for a long time, the following complications may result which include:

- Secondary bacterial infections may occur at the infected areas. This complicates the infection with pain, swelling, bleeding, oozing or formation of pus.
- Thick, discoloured and easily breakable toe nails. This is called onychomycosis, a fungal nail infection and the toenail is an area that is more resistant to treatment.

- Associated fungal infections may occur. These include ringworm on any part of the skin or jock's itch over the groin.
- Sometimes athlete's foot can be spread to the hands. This condition is called tinea manuum. It occurs when a sufferer of Athlete's foot does not wash his or her hands after touching the infected skin on their feet.

Treatment Methods

- If the athlete's foot infection is mild, or if it occurs in dry areas such as the heels, the doctor may suggest using an over-the-counter antifungal ointment, cream, powder or spray.
- If the feet are moist or sweaty, the treatment required is slightly different. This requires washing your feet in cold water then patting them dry thoroughly, preferably with a separate towel. A spirit based preparation can help, such as surgical spirit. It cools, soothes the skin and also serves as an antiseptic.
- If the infection is severe or recurs, oral antifungal agents or drugs may be prescribed by the doctor.

Prevention

These tips can help you avoid athlete's foot or ease the symptoms if infection occurs:

- **Keep your feet dry, especially between your toes:** Air out your feet as much as possible when you are at home. Dry between your toes after a bath or shower.
- **Change socks regularly:** If your feet get very sweaty, change your socks twice a day and also adopt using cotton socks rather than synthetic ones.
- **Wear light, well-ventilated shoes.** Avoid shoes made of synthetic material, such as vinyl or rubber and also put on free shoes as much as you could outside the work area.
- **Alternate pairs of shoes.** Do not wear the same pair of shoes every day so that you give your shoes time to dry after each use.
- **Protect your feet in public places.** Wear waterproof sandals or shoes around public pools, showers and lockers rooms.
- **Treat your feet.** Use powder, preferably antifungal, on your feet daily.
- **Do not share shoes.** Sharing of shoes risks spreading a fungal infection.

As individuals and workers who are interested in our holistic health, it is important to engage in proper foot hygiene practices because how healthy we are

totally depends on us, the choices we make and our lifestyle practices. So, therefore, let us protect our health by playing our part as individuals and seeking the necessary medical attention when the need be. Remember that we all can 'BE AT EASE WITHOUT DISEASE.

**Evaluation process**

The intervention programme was a success and the impact was immediately noticeable, which was observed during the question and answer session at the end of the intervention. The level of proper foot hygiene practices was also increased greatly among the workers as they were seen practicing them after the day's work in the lodge areas.

**Follow up**

The researcher made available hand bills and posters which were distributed and posted at the lodge areas and at the field in NPDC Oredo Flowstation OML 111 which will serve as a reminder for workers whenever they are on the field.

# PART FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## Summary

The purpose of this intervention programme was to increase the foot hygiene practices in relation to athlete's foot infection among field workers in NPDC Oredo Flowstation OML 111, in Ologbo Community, Edo State due to its prevalence and sometimes late presentation for medical attention which could have led to other complications.

The initial survey carried out using an interview method showed that there were poor foot hygiene practices amongst the workers in relation to athlete's foot. This then necessitated the need for an intervention programme that is sufficient to increase their foot hygiene practices. The intervention programme was centered on a health talk which was given to the workers and also hand bills were distributed to them. A question and answer session was carried out at the end of the talk and the questions were well answered and they were rewarded by sharing towels to them for their feet because they were expected to use a different towel to dry their feet and in between their toes. This further encouraged the workers. As a follow-up to

the intervention programme, posters were pasted at the field and their lodge areas to help reinforce the information provided during the programme.

## Conclusion

The proper foot hygiene/preventive practices on athlete's foot infection among flow station workers is an important factor in order to reduce its prevalence and avoid the complications that may arise from athlete's foot infection. The result of the programme showed that the foot hygiene/ preventive practices among workers on athlete's foot infection were very low. This could be attributed to the little effort put in encouraging the workers to practice proper foot hygiene and prevention despite the infection being a very common infection among the workers. At the NPDC Oredo Flow station OML 111 in Ologbo community area of Edo State. The researcher observed initially that there were no posters on athlete's foot and also health talks on it were given once in a while despite many cases that are observed from time to time on the field. After the intervention programme, it was observed that there was increase in their foot hygiene practices.

**Recommendations**

The following recommendations are hereby made based on the outcome of the intervention programme:

- More campaigns should be carried out using various forms of public health communication such as radio, television, newspaper etc. by the ministry of health and other stakeholders on athlete's foot infection because anyone can get infected, so that the complications that the infection could lead to can be perceived by the workers and the general public.
- Seminars should be organized for health professionals across all industries for them to have correct up-to-date information on latest research findings on athlete's foot so that they would be able to educate the workers on it.
- There should be follow-up by the health staffs and the HSE personnel on the field to ensure that workers adhere to the stipulated practices on athlete's foot infection.
- Management should ensure that provision of at least two safety shoes are made available to each worker. Also, there should be a ready-made provision on ground in case the safety shoes needs to be replaced.

**Definition of Terms**

- Etiology: the causes of a disease or condition.
- Athlete's foot: a fungal infection that usually begins between the toes.
- Blisters: a painful swelling on the surface of the skin.
- Dermatophytes: a common label for a group of three fungus that commonly causes skin disease in animals and humans.
- Diagnose: identify the nature of an illness by examination of the symptoms.
- Effect: a change produced by an action.
- Erythema: reddening of the skin due to injury, irritation or inflammation.
- Flow station: a facility used to transport crude oil extracted from the oilrig facilities for primary treatment and control.
- Fungus (plural: fungi): any member of the group of eukaryotic organisms that includes microorganisms such as yeasts, molds and mushrooms.
- Genera: a taxonomic rank used in the biological classification of living and fossil organisms, as well as viruses.
- Immunocompromised: having an impaired immune system.
- Interdigital: between the toes or fingers.

- Knowledge: facts, information and skills acquired through experience.
- Maceration: softening and breaking down of skin as a result of prolonged exposure to moisture.
- Malodour: an unpleasant smell.
- Occlusive: obstruct, close or prevention of passage.
- Oncomycosis: a fungal nail infection characterized by thickened, brittle, crumbly or ragged nails.
- Plaques: a small abnormal patch of tissue on a body part or an organ.
- Prevalence: widespread
- Scaling: cracking of the skin in thin pieces.
- Signs: any objective evidence of a disease.
- Superficial: occurring at the surface.
- Symptoms: subjective evidence of a disease.
- Tinea: the name of a group of disease caused by a fungus.
- Topical: relating or applied directly to a part of the body.

## REFERENCES


Achterman, R.R & White T.C. (2012). A foot in the door for dermatophyte research. *PLoS pathogens*. 29 8(3):e1002564.

Armstrong, D.G. (2011). Cooling the foot to prevent foot wounds, a proof of concept trials. *Journal of podiatric medical association* 95(2): 103-107

Bandura, A. (2002). Health promotion by social cognitive means. *Health Education & Behavior*, 31(2), 143-164.

Bereznicki L (2013). Fungal foot infection *Pharmaceutical Society of Australia [Online]*. Available at: http://www.psa.org.au/download/accredited-pharmacists-2/ Fungal%20foot%20infections.pdf [accessed 7 July 2020]

Berry, R.M. (2011). Foot cares in a long-term facility. *Journal of Geriatric Ontology Nursing 9(1)34-38.*

Bristow, I. (2008). Non-ulcerative skin pathologies of the diabetic foot. *Diabetes Metabolic Research and Review* 24 (1)84–9

Carpenter, D. J. (2010). A meta-analysis of the effectiveness of health belief model variables in predicting behavior. *Health Communication*, 25(8), 661-669.

Champion, V.L., & Skinner, C. S. (2008).*The health belief model*. In Glanz, K. (Ed.), Health behavior and health education: theory, research, and practice. San Francisco:

Del Rosso J.Q (2008). Comprehensive management of patients with superficial fungal infections: the role of sertaconazole nitrate. *Cutis* 81(Suppl.):4-18.

DermNet NZ (2013). *Tinea pedis.* Available from: www. dermnetnz.org (Accessed June, 2020).

DermNet NZ (2014). *Juvenile plantar dermatosis*. Available from: www.dermnetnz.org (Accessed Nov, 2014).

Hainer, B.L (2003). Dermatophyte infections. *America Physiology* 67 (1):101-108

Hanif F, Ikram A, Abbasi A.S & Malik N (2012). Pattern of dermatophytes among dermatological specimens at AFIP, Rawalpindi. *Journal of Pakistan Association of Dermatologists* ;22(1):118-21.

Hautarzt J.I (2005). Hyperhidrosis as risk factor for tinea pedis. *Journal of America Dermatology* 56(2):151-5.

Hirschmann, J.V & Raugi G.J. (2000). Pustular tinea pedis. *Journal of America Academia of Dermatology*. 42:132–133. doi: 10.1016/S0190-9622(00)90022-7.

Ilkit M & Durdu M (2014). Tinea pedis: The etiology and global epidemiology of a common fungal infection. *Critical Review of Microbiology* 2(1)23-39.

Jain A., Jain A., & Rawat S. (2010). Emerging fungal infections among children: A review on its clinical manifestations, diagnosis and prevention. *Journal of Pharmacy and Bioallied Science*. 2(4):314-20.

Jain N., Sharma M., Sharma M., & Saxena, V. N. (2014). Spectrum of dermatophytoses in Jaipur, India. African Journal of Microbiology Research, 8(3), 237-243.

Janz, N.K., & Becker, M.H. (1984). The health belief model: A decade later. *Health Education and Behavior,* 11(1), 1-47.

Johnson R.A (2002).Dermatophyte infections in human immune deficiency virus disease. *Journal of America Academic Dermatolog*y 43:S135.

Joseph, J.L. (2004). Oral therapy of common superficial fungal infections of the skin. *Journal of America Academic Dermatology* 40(1):31-4

Kelly B.P (2012). Superficial fungal infections. *Pediatrics Review* 33(4):e22-e37

Khaled J.M., Golah H.A, Khalel A.S, Alharbi N.S., & Mothana R.A (2015). Dermatophyte and non dermatophyte fungi in Riyadh City, Saudi Arabia. *Saudi Journal of Biological Science*. 22(5). PMC 4537868

Kutlubay Z, Yardımcı G, Kantarcıoğlu A.S & Serdaroğlu S. (2017). Acral manifestations of fungal infections. *Clinics in dermatology*. 35(1):28-39.

Moriarty B, Hay R & Morris-Jones R(2012). The diagnosis and management of tinea. *Biomedical Journal* 345:e4380.

Ndako J.A, Osemwegie O.O, Spencer T.H.I, Yunnusa B.K & Banada J (2012). Prevalence of Dermatophytes and other associated Fungi among school children. *Global Advance Research Journal of Medical Science* 1(1):49-56.

Norman, P., & Brain, K. (2005). An application of an extended health belief model to the prediction of breast self-examination among women with a family history of breast cancer. *British Journal of Health Psychology*, 10, 1-16.

Shi T.W, Zhang J.A, Zhang X.W, Yu H.X, Tang Y.B & Yu J.B (2014). Combination treatment of oral terbinafine with topical terbinafine and 10% urea ointment in hyperkeratotic type tinea pedis. *Mycoses* 57(1):560-4.

Shukla P, Yaqoor S, Shukla V, Garg J, Dar Z.P & Haider F (2013). Prevalence of Superficial Mycosis among Outdoor patients in a Tertiary Care Hospital. *National Journal Medicine Science*2 (1):19-26.

Surendran K, Bhat R.M, Nandakishore B & Sukumar D (2014). A clinical and mycological study of dermatophytic infections. *Indian Journal of Dermatology* ;59:262-267.

Vishwanathan, V. (2005). Prevention initiative in south India, positive impact of foot care education. *Diabetes care* 28(5):1019-1021

Waterson L. (2017). Fungal infection. *Australian Journal of Pharmacy [Online]*. Available at: https://ajp.com.au/wp-content/uploads/2017/02/AYP-BayerFungal-infections.pdf (accessed 4 July 2020)

## APPENDIX I

**InterviewQuestions**

Knowledge, foot hygiene/ preventive practices on Athlete's Foot Infection (Tinea pedis) among field workers in Oredo Flowstation OML 111 in Ologbo Community area of Edo State

**Personal Information**

Permanent Staff [ ] Contract Staff [ ]

**Educational Level**

PrimarySchool [ ] Secondary School [ ] Post-Secondary [ ]

**Years of Working Experience**

0-5 years [ ] 6-10 years [ ] 11 and above [ ]

**Age:**

20-29 [ ] 30-39 [ ] 40 and above [ ]

1. Have you ever heard of Athlete's Foot Infection? Yes [ ] No [ ]
2. Do you know what causes it? Yes [ ] No [ ]

3. If “Yes”, Mention some ……
4. Do you know some of the symptoms? Yes [ ] No [ ]
5. If “Yes”, mention some ……
6. If you have Athlete’s Foot, what will you do? Yes [ ] No [ ]
7. Do you know Athlete’s Foot can lead to fungal nail infections (Onychomycosis)? Yes [ ] No [ ]
8. Do you know that Athlete’s Foot Infection can in some rare cases, lead to bacterial infection? Yes [ ] No [ ]
9. Have you ever been given health talk on Athlete’s Foot at the health and safety meeting on the field?

   Yes [ ] No [ ]
10. Do you wash and change your socks daily after work? Yes [ ] No [ ]
11. Do you dry or air out your safety boots daily after work? Yes [ ] No[ ]
12. Do you have more than one safety boot that you interchange for work?

    Yes [ ] No [ ]
13. Do you wash, clean and dry in between toes and your feet properly daily after work?

    Yes [ ] No [ ]
14. Do you wear an open palm or slippers after each day’s work to allow proper ventilation on your feet? Yes [ ] No [ ]

15.Do you ensure you do not go into the locker and shower rooms bare footed?

Yes [ ] No [ ]

## APPENDIX II

### Some signs and symptoms of athlete's foot infection

## APPENDIX III

## Some complications from untreated athlete's foot infection

## APPENDIX IV

## The Reporter giving health talk


14-09-20
ATHLETE'S FOOT
COMPLICATIONS FROM ATHLETE'S FOOT
SEKI


SEKI

# APPENDIX V

## The reporter answering questions from some of the workers


## APPENDIX VI

**The reporter sharing towels to the workers as part of the intervention programme**


B.J.
HSE

# APPENDIX VII

## Handbill on Athlete's Foot distributed by the Reporter

**Do you know that Athlete's Foot can lead to Fungal Nail Infections and Secondary Bacterial Infections?**

## Athlete's foot is a fungal infection that begins between the toes.

# ATHLETE'S FOOT

## SIGNS AND SYMPTONS

- Red and itchy skin between the toes and side of the feet
- Burning and stinging of the skin
- Peeling, flaking and scaling of the affected area
- Blistering that may cause secretions and bleeding

**If you are experiencing any of these symptoms, seek for immediate medical intervention**

## COMPLICATIONS FROM ATHLETE'S FOOT INFECTION

- Fungal nail infection (Oncomycosis)
- Secondary Bacterial Infection
- Hand and groin fungus
- Body skin fungus

**BE AT EASE WITHOUT DISEASE!**

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