
Mohamed Yousif Mohamed Saeed Holly  
MBBS., Kassala University, (2007)

A Dissertation  
Submitted to the University of Gezira in Partial Fulfillment of the Requirements For the Award of the Degree of Master of Science

in

Family Medicine

Department of Community and Family Medicine

Faculty of Medicine

August, 2013
Prevalence of Mycetoma in Goaz Alnaga, El Hassaheisa vicinity, Gezira State, Sudan, (March 2013 – May 2013)

Mohamed Yousif Mohamed Saeed Holly

**Supervision Committee:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. Samira Hamid Abdulrhman</td>
<td>Main Supervisor</td>
<td></td>
</tr>
<tr>
<td>Dr. Ibitisam Ahmed El-basheer</td>
<td>Co-supervisor</td>
<td></td>
</tr>
</tbody>
</table>

Date: August, 2013

Mohamed Yousif Mohamed Saeed Holly

**Examination Committee:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. Samira Hamid Abdulrahman</td>
<td>Chair Person</td>
<td></td>
</tr>
<tr>
<td>Dr. Imad Eldin Eljakeh Suliman</td>
<td>External Examiner</td>
<td></td>
</tr>
<tr>
<td>Dr. Ibtisam Ahmed Elbashir</td>
<td>Internal Examiner</td>
<td></td>
</tr>
</tbody>
</table>

Date of Examination 13, August, 2013
DEDICATION

I am dedicating this work to soul of my colleague dr. Mardi Elamin Almardi,

To my dear mother Madina Almardi Mohammed, soul of my father, my brothers and my sisters.

To my lovely wife Marahib Mohammed Mustafa Salih and my sons Yousif and Yamin

To my brother and friend Elsadig Yousif Holly
ACKNOWLEDGMENT

I would like to thank firstly my supervisor Prof. Samira Hamid Abdelrahman about all exerted effort to success my research in beauty contents and design. I thank all staff of family medicine project and all staff of family medicine in Gezira University.

Special thanks to kindly Ahmed Yassin family in Goaz alnaga and his sons and daughters.

Also I would like to thank those whom cooperated with me to enter every home of the village and collected data Amar Abdallah Amari, Elteeb Abdelgadir Abdelbasit, Hamadnallah, Amin Moawia, Bakri Mohammed Masaad and Eltegani Mohammed.

Finally kindly thanks to my wife Marahib Mohammed Mustafa Salih to strong support till this work was finished.
Prevalence of Mycetoma in Goaz Alnaga, El Hassaheisa Locality, Gezira State, Sudan, (March 2013 – May 2013)

Mohamed Yousif Mohamed Saeed Holly

Abstract

Cross sectional study was carried out in Goaz Alnaga, Abu goata Directorate, Elhassahisa locality, Gezira State in Sudan. Conducted during the period between March 2013 to May 2013. The aim of this study to detect the magnitude of Mycetoma infection among the population and discover undiagnosed patients, study done by general survey to all people in village in their homes, questionnaire were given to all patients were found and fully history and examination had been done, study shows the majority of patients are males, more common ages between 20 – 50 years, the most of them were farmer had been history of trauma to affected part (thorn prick), with grain discharge, black in the majority of the patients, about the wearing shoes habits' study shows many patients were not always wearing shoes. Most of the patients were received surgical treatment in Khartoum in Soba Mycetoma center, study shows prevalence of Mycetoma is 3.2 from general population 3104, so health education and implementation of health program is really needed, periodic regular Mycetoma screening of all patients attended to the health center for early detection of disease.
معدل حدوث النبت في منطقة قوز الناقة، محلية الحصاحيصا، ولاية الجزيرة، السودان (مارس 2013 وحتى مايو 2013م)
محمد يوسف محمد سعيد

ملخص الدراسة
دراسة مقطعية أجريت في منطقة قوز الناقة وحدة أبوقوتة محلية الحصاحيصا، ولاية الجزيرة، في الفترة من مارس 2013م وحتى مايو 2013م. تهدف الدراسة إلى تحديد حجم الإصابة بالنبت وسط سكان القرية واكتشاف المرضى الغير معروفين. الدراسة أجريت بمسح عام لكل سكان القرية في منازلهم عبر استبيان وتاريخ مرضى وكشف سريري كامل لكل المرضى الذين وجدوا. أظهرت الدراسة أن معظم المصابين من الذكور في الفئة العمرية بين 20 سنة و 50 سنة أغلبهم مزارعين لهم تاريخ اصابة قديمة للمنطقة المصابة (طعنة شوكة) والتي تفرز في معظم الأحيان حبيبات سوداء اللون. كذلك أوضحت أن كثير من المصابين لا يتعلمون الأحذية في بعض الأحيان، معظم المصابين تلقوا علاج جراحي في الخرطوم في مركز سوبا للنبت. وكذلك أوضحت الدراسة أن معدل انتشار النبت بين السكان 3.2 من عامة السكان 3104. لذلك توصى الدراسة بالإرشاد الصحي لطلبة المدارس وخلق نظام دراسي صحي وكذلك الفحص المنتظم لكل المرضى الذين يقصدون المركز الصحي للإكتشاف المبكر للإصابة.
List of contents

Dedication........................................................................................................ III
Acknowledgment............................................................................................. IV
Abstract........................................................................................................ V
Arabic Abstract.............................................................................................. VI
List of contents............................................................................................... VII
List of tables and figures................................................................................ IX
List of abbreviations...................................................................................... X

Chapter (1)

1. Introduction ............................................................................................... 1
   1.2 Back round of mycetoma around world............................................ 2
   1.3 Justification of study.......................................................................... 4
   1.4 Objectives............................................................................................ 4
       1.4.1 General objectives................................................................. 4
       1.4.2 Specific objectives............................................................... 5

Chapter (2)

2. Literature Review..................................................................................... 6
   2.1 pathophysiology............................................................................... 7
       2.1.1 pathogenesis......................................................................... 8
       2.1.2 Diagnosis............................................................................. 11
   2.2 Differential diagnosis....................................................................... 11
   2.3 Treatment.......................................................................................... 12
       2.3.1 Epidemiology....................................................................... 12
Chapter (3)
3. Methodology................................................................. 20
  3.1 study design................................................................. 20
  3.1.1 study area................................................................. 21
  3.1.2 study population....................................................... 23

Chapter(4) 4. Results............................................................... 25

Chapter (5)
5. Discussion................................................................. 39

Chapter (6)
6. Recommendations......................................................... 50
  6.1 conclusion................................................................. 51
References........................................................................... 52
List of tables

<table>
<thead>
<tr>
<th>T.N</th>
<th>Tables show</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>table shows averages ages of the mycetoma patients</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>table shows sex of mycetoma patients</td>
<td>26</td>
</tr>
<tr>
<td>3</td>
<td>Diagram shows occupations of the mycetoma pts</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>Diagram shows common symptoms of mycetoma</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>table shows patients Initial site of lesion</td>
<td>27</td>
</tr>
<tr>
<td>6</td>
<td>Diagram shows size of mycetoma in cm ,mm</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>table shows Shape of the lesion of mycetoma</td>
<td>28</td>
</tr>
<tr>
<td>8</td>
<td>Diagram shows consistency of mycetoma among pts</td>
<td>29</td>
</tr>
<tr>
<td>9</td>
<td>table shows relevant history of trauma to affected part of mycetoma</td>
<td>29</td>
</tr>
<tr>
<td>10</td>
<td>Diagram shows past history of trauma among mycetoma pts</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>a. table shows grain discharge from the lesion of mycetoma</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>b. table shows color of discharge secreted by mycetoma</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. table shows past history of mycetoma among the pts of mycetoma</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>13</td>
<td>table shows association of other infection to mycetoma</td>
<td>31</td>
</tr>
<tr>
<td>14</td>
<td>. Diagram shows the family history among the mycetoma pts</td>
<td>33</td>
</tr>
<tr>
<td>15</td>
<td>animal kept in the houses of the mycetoma pts</td>
<td>34</td>
</tr>
<tr>
<td>16</td>
<td>Diagram shows type of trees in houses of the mycetoma pts</td>
<td>35</td>
</tr>
<tr>
<td>17</td>
<td>Diagrams shows wearing shoes habit</td>
<td>35</td>
</tr>
<tr>
<td>18</td>
<td>Diagram shows types of treatment received by mycetoma pts</td>
<td>37</td>
</tr>
<tr>
<td>19</td>
<td>Diagram shows where the mycetoma pts were received treatment</td>
<td>37</td>
</tr>
<tr>
<td>20</td>
<td>in which places pts of mycetoma were received treatment</td>
<td>38</td>
</tr>
</tbody>
</table>
Abbreviations

Ass    Association
Cm     cent meter
F      Female
H      History
HW     Housewife
i.e    this mean
M      Male
MM     Mel meter
Pts    patient
Pts .n patient number
Y      year
<      Less than
>      more than
Chapter (1)

INTRODUCTION

Background of mycetoma around the world

Mycetoma is endemic in Africa, from Sudan and Somalia through Mauritania and Senegal. Other endemic countries include Mexico and India. Mycetoma can also be found in natives of areas of Central and South America and the Middle or Far East between latitudes 15°S and 30°N.

Eumycetoma is more common in areas where the average rainfall is scarce (ie, < 350 mm), while actinomycetoma tends to appear in areas with abundant rainfall (ie, >600 mm).

In Sudanese hospitals, at least 300 bacterial infection or bone expansion may cause pain. In advanced cases, deformities or ankylosis and their corresponding disabilities can appear. Patients who are immunocompromised or who have undergone transplantation can develop invasive infection.

Race
Mycetoma has no apparent racial predilection.

Sex
Mycetoma has a male-to-female ratio of 183:81.

Age
Mycetoma is most common in persons aged 20-50 years in mycetoma research center in Sudan there was study done to 722 pts between May 1991 to March 2009 the result that found. There were 531 males (73.5%) and 191 females (26.5%) between 6 months and 14 years (mean 2.27 +/- 2.12 years). Most of the patients had eumycetoma (79.1%). The clinical course was typical in the majority of the patients. Family history of mycetoma was reported in 15% of patients. The foot was affected most, followed by knee, hand, head and neck, chest wall and buttocks. In the foot, the metatarsal bones and calcaneum
were affected most. Cytological and ultrasonic examinations of the lesions and histological examination of the surgical biopsies were the cornerstone in the diagnosis of mycetoma. Combined medical treatment and surgical excision was the standard treatment. Disease recurrence after surgical excision was reported in 17.9% of patients. The morbidity rate in this study was high, and it had led to high school dropout and many socioeconomic impacts on patients, families and community. Children with mycetoma need psychological support to identify and to treat their psychosocial problems.

other study done in mycetoma research center in sudan of Khartoum university between december1996 to december 2004 retrospective study of516pts. All cases were confirmed by clinical examination, initial pretreatment radiographs, and histopathology.

RESULTS:
The most common abnormalities in these 516 patients were soft tissue swelling (93%), bone sclerosis (56%), bone cavities (32%), and periosteal reaction (27%). The incidence of bone expansion (22%), extrinsic cortical scalloping (22%), and fanning of the rays in 10% were reported. Osteoporosis was seen in 19%. Only 3% of the patients had normal radiographs.

CONCLUSION:
Maximal scrutiny of radiographs alone by experienced radiologists is vital, as other imaging techniques are not available where mycetoma is prevalent.

Justification of study

This study had been done in Goaz alnaga and its catchment area which are state of complex cases and abundant number of cases and due the danger of this disease which can I named it silent disability to whom neglect fearable complication so study done to avoid more victims of this terrible health problem in our community.
**Objectives:**

General objectives

This study done to detect the magnitude of the mycetoma among the goaz alnaga population and to study of prevalence of infection among them and discover the hidden cases that not reach health center or consult any medical member.

**Specific Objectives**

1. To detect the magnitude of myctoma
2. To find out other risk factors and complications
3. Health education to the population and how to deal with any swelling in their body especially in the foot
4/ to show population the complication of mycetoma
5/ The patient pathway from diagnosis and assessment to treatment, follow-up and referral
Chapter (2)

Literature Review

The word "mycetoma" may be taken literally to mean "fungus tumor." In its broadest sense the term is used to describe "all growths and granulations which produce enlargements, deformities or destruction in any portion of the tissues of man or animals, which are caused by the invasion of varying dimensions, color and shape, composed of hyphae and sometimes chlamydospires, or other types of spores" [italicized words are our own] embedded in a matrix." Thus this term, coined by Carter to describe the peculiar fungus foot of India, known locally as "Madura foot," has been categorically stretched to include actinomycosis as well as maduromycosis.

The disease now known as "mycetoma" was undoubtedly observed by the ancient Indian surgeons, for the Sanscrit work "Vawdea" describes a disease of the foot characterized by swelling.

Mycetoma also can be defined as a chronic subcutaneous infection caused by actinomycetes or fungi. This infection results in a granulomatous inflammatory response in the deep dermis and subcutaneous tissue, which can extend to the underlying bone. Mycetoma is characterized by the formation of grains containing aggregates of the causative organisms that may be discharged onto the skin surface through multiple sinuses. Mycetoma was first described in the mid 1800s and initially named Madura foot, after the region of Madura in India where the disease was first identified.

Mycetoma caused by microaerophilic actinomycetes is termed actinomycetoma, and mycetoma caused by true fungi is called eumycetoma.

These conditions are to be differentiated from actinomycosis, which is an endogenous suppurative infection caused by Actinomyces israelii or other species of Actinomyces or related bacteria, affecting the cervical-facial, thoracic, and pelvic sites (the latter is usually associated with the use of intrauterine devices). The branching bacteria that cause actinomycosis are non–acid-fast anaerobic or microaerophilic bacteria. These bacteria are smaller than 1 µm in diameter, smaller than eumycotic agents. On the other hand, the
agents that cause actinomycetoma are always aerobic and are sometimes weakly acid-fast.

The term mycetoma can also be found incorrectly referring to a fungus ball in a preexisting cavity in the lung or within a paranasal sinus, most often caused by *Aspergillus* species.

More than 20 species of fungi and bacteria can cause mycetoma. The ratio of mycetoma cases caused by bacteria (actinomycetoma) to those caused by true fungi (eumycetoma) is 197:67.

**Pathophysiology**

The body parts affected most commonly in persons with mycetoma include the foot or lower leg, with infection of the dorsal aspect of the forefoot being typical. The hand is the next most common location; however, mycetoma lesions can occur anywhere on the body. Lesions on the chest and back are frequently caused by *Nocardia* species, whereas lesions on the head and neck are usually caused by *Streptomyces somaliensis*.

The causative organism enters through sites of local trauma (eg, cut on the hand, foot splinter, local trauma related to carrying soil-contaminated material). A neutrophilic response initially occurs, which may be followed by a granulomatous reaction. Spread occurs through skin facial planes and can involve the bone. Hematogenous or lymphatic spread is uncommon.

**Pathogenesis**

The disease is usually acquired while performing agricultural work, and it generally afflicts men between 20 and 40 years old. The disease is acquired by contacting grains of fungal spores that have been discharged onto the soil. Infection usually involves an open area or break in the skin. *Pseudoallescheria boydii* is one of many fungi spp. that causes the fungal form of madura foot (see below). The disease is characterized by a yogurt-like discharge upon maturation of the infection. Hematogenous or lymphatic spread is uncommon. Infections normally start in the foot or hand and travel up the leg or arm.
Eumycetoma may be one of several varieties, depending upon color of the granulous discharge:

- **red**
  - *Actinomadura* pelletieri

- **white or yellow**
  - *Acremonium strictum*
  - *Actinomadura* madurae
  - *Aspergillus nidulans*
  - *Noetestudina* rosatii
  - *Phaeoacremonium* krajdeni
  - *Pseudallescheria* boydii

- **black**
  - *Aspergillus* terreus
  - *Curvularia* lunata
  - *Cladophialophora* bantiana
  - *Exophiala jeanselmei*[^6]
  - *Leptosphaeria* senegalensis
  - *Leptosphaeria* tompkinsii
  - *Madurella* grisea[^7]
  - *Madurella* mycetomatis[^8]
  - *Pyrenochaeta* romeroi

The bacterial mycetoma species *Nocardia* (including *Nocardia asteroides* and *Nocardia brasiliensis*) produces yellow discharge, and *Streptomyces* (including *Streptomyces somaliensis*) produce yellow or red discharge. These are not causes of Eumycetoma.

The further course of the sinuses differs according to the mycetoma present. In the black variety, the infection spreads mainly subcutaneously. In the red and yellow varieties deep
spread occurs early, and muscle and underlying bones become infiltrated, but unexpectedly, nerves and tendons are highly resistant to invasion.

**Diagnosis**

Diagnosis of mycetoma is usually accomplished by radiology, ultrasound or by fine needle aspiration of the fluid within an afflicted area of the body. It depends upon isolating the causative organism along with a knowledge of local endemic infection.

**Differential diagnosis**

Following is the differential diagnosis:

1. **Tuberculous ulcer**
2. **Kaposi's sarcoma**
3. **Tropical ulcer**[^3]

**Treatment**

There are several clinical treatments available for this disease. They include surgery, ketoconazole[^1], voriconazole[^10], itraconazole and amputation of the affected limb. There is no vaccine for mycetoma. Scientists at such institutions as The Mycetoma Research Center, The University of Khartoum in Sudan are working on a cure.

**Epidemiology.**

The true incidence and the geographical distribution of mycetoma throughout the world is not exactly known due to the nature of the disease which is usually painless, slowly progressive which may lead to the late presentation of the majority of patients. Mycetoma has a worldwide distribution but this is extremely uneven. It is endemic in tropical and subtropical regions. The African continent seems to have the highest prevalence. It is found in what is known as the mycetoma belt stretching between the latitudes of 15 south and 30 north. The belt includes Sudan, Somalia, Senegal, India, Yemen, Mexico, Venezuela, Colombia, Argentina and others.
Mycetoma infection, Madura foot or maduromycosis, was originally described in Sanskrit in the Vedic texts from India. The first English language accounts occurred much later in the area of Madras (aka Chennai).

The geographical distribution of the individual mycetoma organism shows considerable variations, which can be convincingly explained on an environmental basis. Areas where mycetoma prevails are relatively arid zones with a short rainy season with a relative humidity.

The organisms are usually present in the soil in the form of grains. The infecting agent is implanted into the host tissue through a breach in the skin produced by trauma caused by sharp objects such as thorn pricks, stone or splinters.

Mortality/Morbidity

400 patients are diagnosed with mycetoma every year. fatal in the absence of skull involvement. The lesions are painless and slowly progressive; however, secondary Epidemiology: United states Frequency

Mycetoma is rare in the United States. Some cases are due to increasing international travel. Rarely, mycetoma is acquired on US soil. *Pseudallescheria boydii (Scedosporium apiospermum)* is the most common cause of this condition
Chapter (3)

Methodology

Area study

Goozalnaga is an area in Elhasahissa locality Abu gouta direct unit, Northwest part of Gezira state surrounded from all direction by agricultural lands which is mudy in nature there are a lot of trees and grass all over the detention of village, many village surrounding it from north Elfaki Hamid ,Alkhahli and Cambo Alsidig ,from south Alri forests ,from the east Alri Abdalmagid and from limited with Wad zalam ,the connection among these villages primitive transport donkeys the most one near developed town is Abu osher about 40 km suffer hardly in autumn there are no transports due the rain and the soil is so mudy which make very difficult movement from area to other.

It with in 1.5x2 square km.

The electricity and save water supply are available.

Educational activities is so week and iletracy widely spread among them.

population study:

The number of population is about 3104. The population pyramid shows that large number of population are middle aged. Most of the population are kawahla tribe more than99% about 60% work in agriculture majority of the youth are unemploiment there are 2 primary schools and 2 high secondary schools. The community very helpful and community participation is obvious in Gooz elnaga Health Center.

We have done this study in Goaz alnaga because the problem is wide spread among population and it Affected sadly more active people the younger one the students and ages between20_50years disease work age distribute among them many years back some of them became disable to do his work or dialy normal activities and some of them loss part or some of part as complication result of disease and no any care from the direct health responsibility.
So we do this study to detect the magnitude of this dangerous disease which can killed silently and consider as real huge health problem in this area and to direct the attention of responsibiler to investigate more and find help and solution of this which I consider disaster Health center of study.

Goaz alnaga health center attended with many different pts with seven big rooms used as doctor clinic room ,pharmacy ,immunization room ,labotory room, minor theater ,short stage word and kitchen .

With tow toilets and wide reception area when pts wait all peoples in the health center are cooperate to help each other and help the patients so they play very big role in stablisation of the work, there are a doctor, lab technique ,immunization technique and nutritional worker ,tow cleaning women and tow guarders .

It located in far northwestern side of village in site of connection of many other villages with water supply from general net of water and with electricity .

All essential investigation can be done in it (BF, Urine general ,RBG ,Stool general ,Twbc , Hb ,urine for HCG ,ESR and RFT).

There is follow up of pregnancy women antenatal care and post partum care and child weight chart every month .

Other program done is home visiting to handicaped  and disable patients .

There is follow up of chronic diseases monthly (diabetes ,hypertension, thyroid diseases and chronic renal.

Heath center also participate in republic immunization and community study.

Also it participates in health education of community by general medical lectures and first aid .
Study design

It is descriptive cross sectional study done in goaz alnaga health center in duration between October 2010 to may 2013. Data collected by survey of all homes of village with some volunteers help .all patients had been found were discussed with full history and examination we entered any house in the village and met and asked any one of any swelling in his body investigated or not we found many patients with infection and neglect what is it , we found 100 patient with varying in ages ,sex, development of disease and habits.

Statistical analysis used sp and excel
Chapter (4)

Results

1/ table shows average ages of mycetoma patients:

<table>
<thead>
<tr>
<th>average Ages</th>
<th>Pts .n</th>
<th>male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 &lt; 20y</td>
<td>24</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>20 &lt; 50y</td>
<td>73</td>
<td>48</td>
<td>25</td>
</tr>
<tr>
<td>&gt;50y</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

2/table shows sex of mycetoma patients:

<table>
<thead>
<tr>
<th>Sex</th>
<th>total Pts. Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>65%</td>
</tr>
<tr>
<td>Female</td>
<td>35%</td>
</tr>
</tbody>
</table>
3/diagram shows occupations of mycetoma patients:

4/diagram shows common symptoms of mycetoma:
5/table shows Initial site of lesion of mycetoma patients:

<table>
<thead>
<tr>
<th>Site</th>
<th>Total Pts. n</th>
<th>male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot</td>
<td>90%</td>
<td>71%</td>
<td>29%</td>
</tr>
<tr>
<td>Hand</td>
<td>5%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Leg</td>
<td>3%</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>Back</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>head</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

6/diagram shows size of mycetoma in mm and cm:
Table shows Shape of the mycetoma lesion:

<table>
<thead>
<tr>
<th>Shape</th>
<th>Total Pts. %</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular</td>
<td>72%</td>
<td>44%</td>
<td>28%</td>
</tr>
<tr>
<td>Oval</td>
<td>13%</td>
<td>8%</td>
<td>5%</td>
</tr>
<tr>
<td>Triangular</td>
<td>8%</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>Not regular</td>
<td>7%</td>
<td>5%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Diagram shows consistency of lesion among mycetoma patients:
9/table shows relevant history of trauma to affected part of mycetoma:

<table>
<thead>
<tr>
<th>trauma</th>
<th>Total Pts . n</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thorn prick</td>
<td>46%</td>
<td>30%</td>
<td>16%</td>
</tr>
<tr>
<td>Hard subj.</td>
<td>29%</td>
<td>22%</td>
<td>7%</td>
</tr>
<tr>
<td>No obvious cause</td>
<td>25%</td>
<td>13%</td>
<td>12%</td>
</tr>
</tbody>
</table>

10/table shows the interval between trauma and appearance of symptoms of mycetoma:

<table>
<thead>
<tr>
<th>Interval</th>
<th>Total Pts . n</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Months</td>
<td>34</td>
<td>27</td>
<td>7</td>
</tr>
<tr>
<td>Years</td>
<td>62</td>
<td>36</td>
<td>26</td>
</tr>
</tbody>
</table>
11/a. table shows grain discharge of the mycetoma lesion:

<table>
<thead>
<tr>
<th></th>
<th>Total Pts . n</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>With g.dis</td>
<td>44%</td>
<td>30%</td>
<td>14%</td>
</tr>
<tr>
<td>No g.dis</td>
<td>56%</td>
<td>35%</td>
<td>21%</td>
</tr>
</tbody>
</table>

b. table shows colour of mycetoma discharge:

<table>
<thead>
<tr>
<th>colour</th>
<th>Total Pts . n</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>23%</td>
<td>14%</td>
<td>11%</td>
</tr>
<tr>
<td>White</td>
<td>13%</td>
<td>10%</td>
<td>3%</td>
</tr>
<tr>
<td>Yellow</td>
<td>8%</td>
<td>6%</td>
<td>2%</td>
</tr>
</tbody>
</table>

12/ diagram shows past history of mycetoma among the patients:
13/ The table shows the association of other infection to mycetoma:

<table>
<thead>
<tr>
<th>Association</th>
<th>Total Pts .n</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>No</td>
<td>94%</td>
<td>60%</td>
<td>34%</td>
</tr>
</tbody>
</table>

14/ A diagram shows family history association to mycetoma lesion:

<table>
<thead>
<tr>
<th>Family. H</th>
<th>Total Pts .n</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>22%</td>
<td>16%</td>
<td>6%</td>
</tr>
<tr>
<td>No</td>
<td>78%</td>
<td>49%</td>
<td>29%</td>
</tr>
</tbody>
</table>

b. Whom

<table>
<thead>
<tr>
<th>Who</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father</td>
<td>1</td>
</tr>
<tr>
<td>Mother</td>
<td>6</td>
</tr>
<tr>
<td>Brother</td>
<td>8</td>
</tr>
<tr>
<td>Son</td>
<td>4</td>
</tr>
<tr>
<td>Sister</td>
<td>3</td>
</tr>
</tbody>
</table>

c. When they get disease

<table>
<thead>
<tr>
<th>When</th>
<th>Total Pts .n</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 y</td>
<td>10</td>
</tr>
<tr>
<td>5–10 y</td>
<td>9</td>
</tr>
<tr>
<td>&gt;10 y</td>
<td>3</td>
</tr>
</tbody>
</table>
15/diagram shows association of mycetoma to the animal kept in the houses:

![Bar chart showing association of mycetoma to animals kept in the houses.]

16/diagram shows types of trees in the mycetoma patients' houses:

![Bar chart showing types of trees in the mycetoma patients' houses.]
17/) the table shows wearing shoes habit among mycetoma patients:

a. during working

b. during playing
c. always wearing shoes

18/table shows treatment received by mycetoma patients:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>total Pts .n</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical</td>
<td>52%</td>
<td>33%</td>
<td>19%</td>
</tr>
<tr>
<td>Medical</td>
<td>19%</td>
<td>12%</td>
<td>7%</td>
</tr>
<tr>
<td>Traditional</td>
<td>7%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Not received</td>
<td>22%</td>
<td>16%</td>
<td>6%</td>
</tr>
</tbody>
</table>
19/tables shows:

a. where was treatment received

<table>
<thead>
<tr>
<th>Where</th>
<th>Total pts .n</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>56%</td>
<td>36%</td>
<td>20%</td>
</tr>
<tr>
<td>Health .c</td>
<td>8%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Private .c</td>
<td>7%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>At home</td>
<td>7%</td>
<td>4%</td>
<td>3%</td>
</tr>
</tbody>
</table>

b. in which places

<table>
<thead>
<tr>
<th>Place</th>
<th>Total Pts .n</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khartoum</td>
<td>54%</td>
<td>31%</td>
<td>23%</td>
</tr>
<tr>
<td>Madani</td>
<td>7%</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>Abu goata</td>
<td>14%</td>
<td>10%</td>
<td>4%</td>
</tr>
<tr>
<td>Goaz alnaga</td>
<td>3%</td>
<td>2%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Chapter (5)

Discussion

According to the age the study show that the more affected ages in the young people between 20__50 years old which are 73% among the collected pts 48% male and 25% female and justification of that because the male work in agricultural field and play without shoes  and can do hard work which increase the chance of infection(table1).

The percentages according to the sex the males 65% and the females 35% because the most of the women in sudan stay in home so the men more exposed to disease risk factors(table2).

The farmers the most affected people according to the occupation whom can represent 29% that due the nature of their work  almost among trees and use hard material to help them and as the study show later the most common causes of mycetoma is thorn pick and this found more among fields of agriculture ,irrigation channels  and forests .

Then after students whom represent 25% (14% males and11% female) nearly percent to farmers that due to the many student don’t wearing shoes a lot of time during playing and get pathogen from the soil and the percentage between them is little different due the same life habits according to their ages.

House wife also have great percentages 24% of cases that is due the participation of the women in the work with their family in agriculture.

Other occupations have alittle percentages driver (4%) they almost time press their foot against hard material of their cars ,animal breading represent (5%) and their work nature
similar to farmer at the field of risk factors and the left cases with free work represent (13%) (figure3).

The study shows that symptoms related to mycetoma that painful swelling by percentage of 57% (38% males and 19% females) that because of most cases became with advance of disease and may be bacterial infection or fungal associated with bacterial infection other with painless nodules represent 39% (25% males are and 14% are females) and lesion with ulceration represent 4% (2% are males and 2% are females) (table4).

According to the initial site of mycetoma lesion the study appear that the most initial site of lesion with high percentage is foot by 90% (71% are males and 29% are females) because it is the most area of the body exposed to risk factors of trauma, second area of mycetoma lesion is hand by % of 5% (2% are males and 3% are females), leg site 3% all are females, back site 1% is male and lastly the head which represent 1% is male (table5).

The investigated cases varying in size between many cm and mm cases with mm in size percentage 55% (34% are males and 21% are females) and cases of cm in size represent 44% (30 are males and 14% are females) and 1% is amputated one male according to stage of infection if it early or late (figure6).

The investigated cases varying in size between many cm and mm cases with mm in size percentage 55% (34% are males and 21% are females) and cases of cm in size represent 44% (30 are males and 14% are females) and 1% is amputated one male according to stage of infection if it early or late (table7).

The mycetoma lesion consistency varying between hard, firm and soft the dominant one is firm consistency which represent about half of the patients 49% in percentage (30% are males and 19% are females) secondly hard in consistency 34% (28% are male and 6% are females) lastly soft in consistency which represent 17% (7% are males and 10% are females) (table8).

The study shows that the most cases of mycetoma occur after relevant history of trauma affected the part of the lesion in this geographical area the dominant cause is thorn pick which represent high percentage nearly half of the cases 46% (30% are males and 16% are
females) and this as I mention before why the men are more affected more than other because they work almost time among trees and use hard material to help them and as the study show before the most common causes of mycetoma is thorn pick and this found more among fields of agriculture, irrigation channels and forests.

Another previous trauma of hard subject as press on stone or piece of metal or cut of sharp metal like a knife or other this represent 29% (22% are males and 7% are females)

The left of the cases have not obvious initial previous history of trauma that cause mycetoma they represent 25% (13% are males and 12% are females) and that may be due the hidden unappear causes or the patient not notice the previous trauma (table 9).

The study shows that the common interval between trauma and appearance of symptoms with years by percentages of 62% (36% are males and 26% are females) that mean slowly spread of mycetoma and this consider a dangerous sign of disease due silent development of infection sometimes unnoticed second length of period is months 34% of percentage (27% are males 7% of females) this may indicated that disease more develops in males than females very few cases of short period in days represent 4% (2% are male and 2% are female) that indicate it is less common (table 10).

The study appear that more than half of cases of mycetoma have not grain discharge in percentage 56% (35% are males and 21% are females) and 44% of cases with discharge (30% are males and 14% are females)

The color of the grain discharge of 44 cases has many color black, white and yellow. 23 cases represent 52% of them are black in color (32% are males and 20% are males), 13 cases are white which represent 29% (23% are males and 6% are female) and 8 cases represent 19% are yellow in color (14% are male and 5% are females). These last percentage from 44 cases not 100 cases (table 11, a, b).

From study mycetoma with no past history in 75% of cases (50% are males and 25% are females) but there are 25% of cases have past history of mycetoma (15% are males and 10% are females) and this indicate the recurrence of mycetoma can be occur but not
always so the patient must be careful to any remaining part of mycetoma to avoid recurrency problems (figure12).

Those patient whom have recurrency 25% varying in the periods divided to three periods less than 5 years 16 cases from 25 which represent 64% (48% are males and 16% are females), between 5 to 10 years 6 cases represent 24% (8% are males and 16% are females) and more than 10 years which represent 12% (4% are males and 8% are females). This evidence indicate that mycetoma has short time to recurrent again (table13).

b. the answer yes 6 pts all of them bilharziasis pts 5 male 1 female (table13, figure14).

According to this study mycetoma has no strong association with other infections 94% of cases has no related Infections (60% are males and 34% are females) a few percentage has relation to bilharziasis 6% (5% are males and 1% is female).

The family history association of mycetoma infection the study shows there is 78% has no family history relationship (49% are males and 29% are females) and 22% of cases has relationship (16% are males and 6% are females) so there is somewhat family history association (table14).

The relationship between 22 cases varying 1 father 4.5%, 6 mothers 27%, 8 brothers 36%, 4 sons 18% and 3 are sisters 14.5% so the more percentage between brothers (figure14).

The infection to the other member of family study shows more common occur less than 5 years in 10 cases 47%, from 5 to 10 years 9 cases 39% and more than 10 years 3 cases 14% (table14).

According to survey the most common animals have been kept in the house is goats 65 cases then donkeys 24 cases, cows 19 cases, dogs 10 cases, sheep 8 cases and 15 cases have not animals these varying in number because many people have more than animals so there may be relationship between the infection and the animals but not obvious or may be that area is rural area and the animals one of their income resource (figure15).
The more common trees that grow in this area is Neem trees with percentage of 31%, then Zizphus spina 9%, Heglig trees 6%, Mesquite trees 5% and other trees (flower and fruits trees) represent 12%.

Other patients have no trees 37% we notice that trees which have thorn among that trees which represent the first cause of infection of mycetoma has no big number so we suggest the most cases have the infection out of door (figure 1).

As the study shows before the main risk factor of the infection is thorn pick and the most affected part of the body is food so the habit of wearing shoes is very important guide to know the main cause of infection. The most cases during working wearing shoes 85% and 15% not wearing, during playing 95% are wear shoes and 5% are not wearing, always wearing shoes 79% and 21% not wearing.

Those whom not wearing shoes has large chance to get disease (table 17a, b, c).

The study shows that the majority of the cases received surgical treatment in percent of 52% (33% are males and 19% are females) secondly some of them received medical treatment 19% (12% are males and 7% are females) majority of them received ketoconazole, other cases treated traditionally at home like the product of milk, honey and something other in number of 7% (4% are males and 3% are females) and 22% of cases have not received treatment (16% are males and 6% are females) some of them neglect the lesion other have no financial facilities (table 18).

The most cases as we mention before treated surgically so the majority of them received in hospital 56% (36% are males and 20% are females) in healthcare centre 8% (5% are males and 3% are females), at home 7% as traditional treatment (4% are males and 3% are females) and in private clinic 7% (4% are males and 3% are females) (table 19a, b).

According to the in which place the cases received more than half received their treatment in Khartoum 54% (31% are males and 23% are females) most of them in mycetoma center in Soba belong to Khartoum University because it is the nearest specialty unit to the area of study, Abu goata hospital the second place attended the
nearest hospital to the village of study 14% (10% are males and 4% are females) Madani hospital the third place attended 7% (6% are males and 1% are females) lastly the health centre of area and that because the most cases are refer to hospital 3% (2% are males and 1% is female) (table19).
Chapter (6)

RECOMMENDATIONS

This study done in Goaz alnaga village to detect the magnitude of mycetoma infection in this area which I consider it dangerous threatening health problem which killed strengthen of the youth and stopped many active members of community ,so we must cooperated to fight that slowly hidden disaster .

Firstly all peoples of the area must be know magnitude and dangerous of the this health problem through media ,TV ,RADIO ,PAPER ,medical lectures.

Government must be direct attention to this area and its catchment area to develop and increase the health activities and support it for more investigation and treatment.

The social and communicable organizations must be move through local and international direction to help in resolving of problem.

Many people with infection have medical and financial problems must be helped .

Many studies conducted later in continuous and regular manar and known cases must be follow up to observe development of health problem and avoidance of recurrent.

Finally that cases with complication of disability as result of infection must be helped with small project to get his needs .
CONCLUSION

This study was done in Goaz alnaga village in the period between October 2010 to May 2013, a descriptive cross-sectional study conducted in a population of 3104 in number, about prevalence of mycetoma infection. 100 patients were collected about 3.2% of the general population. Data were collected from the patients at their home with questionnaire, full history and examination, then data analysis. The study shows that most cases were males, most cases were between 20-50 years, farmers the most affected workers, foot more affected part of the body some of them had grain discharge. Most of them were black, circular shape, more risk factor is thorn prick, has family history relationship. Majority of the cases were received surgical treatment in hospital, most of them tend to Khartoum in Soba mycetoma center.
REFERENCES


Hemalata M, Prasad S, Venkatesh K, Niveditha SR, Kumar SA. Cytological diagnosis of actinomycosis and eumycetoma

Web site of soba mycetoma center of Khartoum university in sudan ,emedicine web

Servicio de Dermatología, Hospital Universitario "José E. González", Monterrey, Nuevo León, México. luvera_99@yahoo.com

Royal Society of Tropical Medicine and Hygiene. Published by Elsevier Ltd.

Ehab A. M. Elagab,1,2 Maowia M. Mukhtar,2 Ahmed H. Fahal,1,* and Wendy W. J. van de Sande3