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Leprosy Survey in the Republic of Yemen: A Field Study

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Leprosy is a chronic infectious and communicable disease caused by "*Mycobacterium leprae*" an acid -fast rod shaped bacillus. Situation of leprosy in the republic of Yemen between 1999 and 2004 was investigated. At the beginning of the study, the number of leprosy patients who had medical treatment and had been registered in the whole country was 607. In our retrospective study for leprosy patients that attended leprosy clinic of Yemen between 2004 and 2009, we observed gradual decline to only 560 cases in the prevalence rate which is very slightly attributed to the effectiveness of multidrug treatment and–_more awareness by the patients. To justify this situation a field study of the most prominent leprosy loci (Al- Hodaeidah and Taiz) was conducted. Out of 560 newly recorded cases attended the clinics, 300 cases that could be reached easily were chosen to be followed. Skin smear samples were collected from the leprosy lesions of 150 cases from Taiz and 150 cases from Al-Hodaeidah, Clinical and bacteriological study was done. Age distribution of the disease was studied and skin smear leprosy samples were stained using Ziehl- Neelsen technique. The classifications of the 300 cases were as follows: 74 polar lebromatous patients and 76 borderlines tuberculoid patients from Al- Hodaeidah; 68 borderlines and 82 borderline tuberculoid patients from Taiz. This survey has discovered quite a lot of untreated new cases localized in Al- Zuhra, justifying the slightly decrease of the disease and thus, the unsuccessful elimination of leprosy in Yemen. The patients of Al-Zuhra governorate were the leprosy loci. As these patients were not attending the clinic for treatment and thus became source of infection. These results showed that the Yemen Republic was among the misfortunate countries, which did not successfully, eliminated leprosy even having shown efforts and struggle with inherited and persist of health hazard of leprosy.

Key words: *Mycobacterium leprae*, Al-Hudaeidah, communicable, Yemen Taiz, Al-Zuhra.

Leprosy is a chronic infectious and communicable disease caused by "*Mycobacterium leprae*" an acid fast rod-shaped bacillus (Letter to the Editor, 2007). Most individuals who are exposed to *the infection of this microorganism are* resistant tore infection and do not develop clinical leprosy. Only susceptible individuals develop the disease and progress to the different clinical manifestations that range from localized to severe and systemic disease, depending on the host response. The disease mainly affects the skin, the peripheral nerves, mucosa of the upper respiratory tract, the eyes and other structures. (Dennis Montoy *et al*; 2009). At one pole of this spectrum is the lepromatous form, which is the most severe manifestation, characterized by the absence of specific cellular immunity leading to widely disseminated disease and extended multi-bacillary lesions. The causative organism is no-toxic and may occur in tissues in large amounts almost without clinical symptoms. Most symptoms and complications are due to immune reaction against

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antigenic constituents liberated from the bacilli. (Barry G. *et al* ; 2010). At the other extreme, the tuberculoid form presents a vigorous cellular response to *M. leprae,* which results in a few localized paucibacillary lesions. Characteristic deformities and disabilities, due to damage to peripheral nerves and skin in untreated patients, still remain a cause of social stigma and discrimination of patients and their family (L. Pereira-Ferrari, *et al*;2006).Most individuals exposed to *M. leprae* are resistant to infection and do not develop clinical leprosy. At one pole of this spectrum is the lepromatous form, which is the most severe manifestation, characterized by the absence of specific cellular immunity leading to widely disseminated disease and extended multi-bacillary lesions. (Maria L. F. *et al*; 2007). Leprosy survey in Yemen has reviled quite a lot of new cases and has still a social stigma. In Somalia, the people think that leppers are dangerous and that they will eat little children. Before the civil war in Somalia all the leprosy patients got collected and the police brought them to Labadaad, a leprosy island in the South of Somalia (personal communication).The great reduction in the prevalence of the disease occurred due to the implementation of multidrug therapy (MDT) in 1982 and the world health assembly resolution in 1991(Samuel, L. *et al;* 2004). We have made a field visit for Al- Zuhra region which was considered one of the leprosy foci in Yemen. Al-Hodeida and Taiz were chosen as leprosy foci in the region. Out of 415 Leprosy patients from Al-Hodeida and Taiz, 300 were selected. 150 cases were from Taiz and 150 cases from Al-Hodeida. The clinical diagnosis of leprosy continues to be based on patients having one or more of the three cardinal signs: hypopigmented or reddish anesthetic skin lesion involvement of the peripheral nerves, as demonstrated by definite thickening with loss of sensation in the area of distribution; and a positive skin smear for acid fast bacilli (Virendra N. *et al*; 2008). Previous studies indicated the importance of follow up patients for several years after completion of multidrug therapy (MDT) in order to detect possible leprae reactions and relapses (Kyawk, *et al;* 2008). Leprosy exhibits a wide spectrum of presentation, varying from the tuberculoid to the lepromatous pole, with the immunologically unstable borderline forms in-between, depending upon the immune status of the individual(Bishwa, R .Sapkota *et a l*; 2009). In spite of decaling trends in the prevalence of leprosy the incidence of new case detection rate have not shown any significant decline during the last several years in Yemen. Our main objective of this epidemiological study of *M. leprae* infection in Yemen community was to contribute to a better understanding of the disease; to identify the reason for not declining the infection in Yemen; even though using an effective multidrug. Identify populations who have a higher risk of developing leprosy and design of intervention strategies in the future and thus, will have significantly lowered the prevalence of the disease. Such studies provide also guidance to successfully institute chemoprophylaxis in Saudi Arabia and Yemen as the two countries share one border

MATERIAL AND METHODS

Field visit

Out of 415 Leprosy patients from Al-Hodaeida and Taiz, 300 were selected. The attended patients at the leprosy outpatient clinic, 150 cases were from Taiz and 150 cases from Al-Hodaeidah.

History

In the history, inquire specifically about Incidence rate, age group, and occupation, residence, educational level, the presence and duration data were collected. The presence and duration of lesions, nerve pain- , numbness and tingling, weakness ulcers, eye pain, worsening vision and ascertain of previous possible exposure to leprosy history were recorded.

Clinical examination: Full clinical

Investigation include: Examination of skin lesions all over the body, state of muscles, weakness, limbs and the eyes to determine the degree of disability the upper part of both arms for BCG vaccination. -Peripheral nerves, these nerves include ulnar, common peroneal posterior tibia and great auricular.

Examination of superficial sensation

Light touch by cotton wool, temperature; by using test tube (45- 55c) and cold water, Pain; by pin prick.

Skin smear

For skin smear of *M. leprae*, from every patient three skin smears were taken after

clinical Examination. The sites sampled were the edge of the leprosy lesions. An examination of the procedure was given to the patients or parents if the patient is child. Using aseptic and safe technique, a new scalpel sterilized by wiping it with a piece of absorbent cotton wool soaked in alcohol and flaming it for 2-3 seconds on a flame of spirit lamp. The area from where the smear is to be taken was cleaned with cotton swab moistened with alcohol and allowed to dry. Small cut was made through the skin surface about 5mm long deep enough into the dermis (2-3mm). Blood was blotted away from the site of cut with a dry piece of cotton wool. A sample of tissue were collected by using the blunt edge of the blade and transferred to slide, small circular smear 5-7cm in diameter was made. The slide was labeled with patient's name, dried and was heated fixed gently, smear uppermost over the flame of spirit lamp for few seconds and then was stained by using Zeihl- Neelsen technique:

The smear was covered with filtered carbol fuchsin stain, heated until vapor just begins to rise; the heated stain was allowed to remain on the slide for 10-15 minutes. The stain was washed off with clean water. Decolorized with 1% acid alcohol washed with water and covered with malachite green stain for 1-2 minutes. The stain was washed with water, air dried then the stained smear was examined microscopically with 40 X objectives and with oil immersion lens for acid fast bacilli.

Staining requirement Zeihl- Neelsen technique
Carbol fuchsin stain
Bsic fuchsin ……10gram,
Ethanol absolute …….. 100ml
Phenol ……50 gram
Distilled water…….. Liter

Acid alcohol

1% v/v hydrochloric acid solution in 70% v/v alcohol.

Malachite green…… 5 gram / liter

RESULTS

Out of the 300 leprosy patients examined, 260 cases found to have no disability due to leprosy, 30 showed grade one and 10 cases showed grade two disabilities. 70 out of 150 cases from Taiz, 50 were female who sought medical care within the first six months after they noticed the manifestation, twenty out of 30 cases, were female who sought the medical care within seven to twelve months after the appearance of symptoms; while 30 out of 50 were female who sought the medical care after more than one year from the appearance of the symptoms of the disease. Fifty five out of 150 cases from Al- Hudaidah, 30 were female who sought medical care one year after the appearance of the symptoms of the disease, 35 out of 45 cases, were female who sought medical care within eight to twelve months after the appearance of symptoms; while 25 patients out of 50 were female who sought medical care after more than four year from the appearance of the symptoms of the

Table 1. Duration of the disease before medication

Duration of disease	Number of patients from Taiz	Percentages
1- 6 months	70	46.7%
7-12 months	50	33.3%
More than one year s	30	20%
Total	150	100
Duration of disease	Number of patients from Al- Hudaidah	Percentages
One year	55	36.7%
8- 12 months	45	30%
More than four years	50	33.3%
Total	150	100

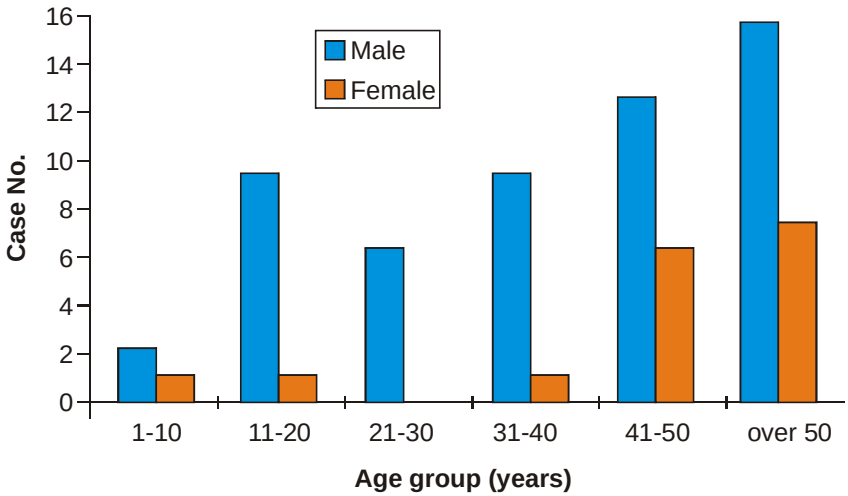

Fig. 1. Age and sex distribution of leprosy samlpe cases

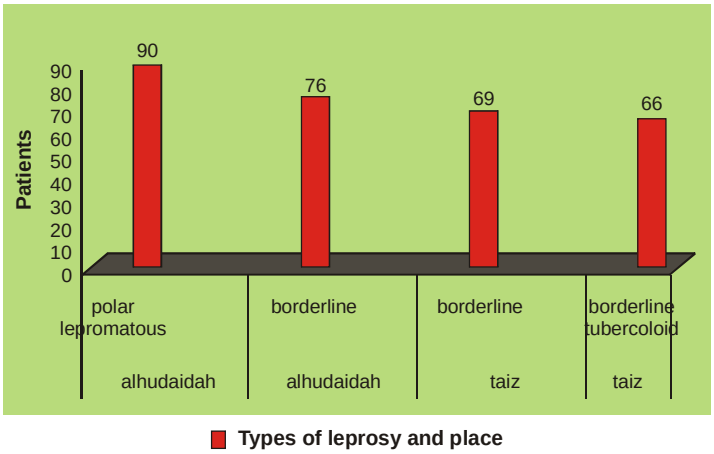

Fig. 2. Types of leprosy of the infected patients

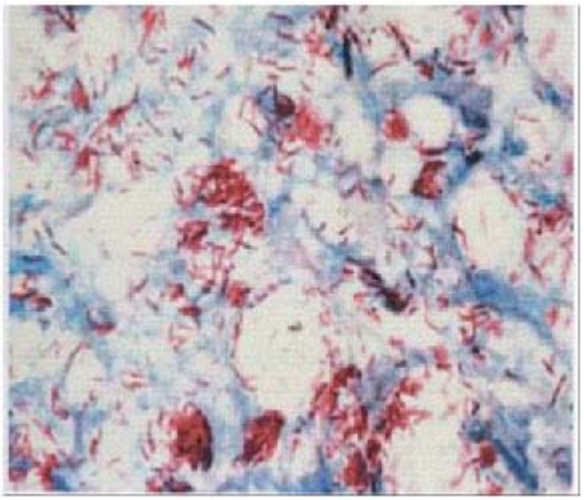

Fig. 3. Skin smear of leprosy patient shows *M. leprae*

disease. The delay in seeking medical care was more obvious in females than in males. The duration of the disease before medication is summarized in the table (1). Age and sex distribution of leprosy samlpe cases fromTaiz anf Al- Hudaidah were studied The disase affected all age groups . Age ditribution of the patients were as follows: 20 cases 1-10 years, 50 casese 11-20 yeasrs, 30 cases 21-30 years, 40 casese 31-40 years , 70 cases 41-50 years, 90 cases over 50 years.The cases age and sex incidence of the disease, elder females were more sensitive than young and males were found to be more sensitive than females. May be, due to more exposure and excessive fatigue than fimale and are presented in (Fig 1). Numbers of leprosy patients according to Ridley and Jopling system of classification; subclasses found to be in the following order; 90 Out of 150 patients from Al- Hudaidah were positive of polar lepromatous , 68 out of 150 patients from Taiz were positive of borderline , 76 out of 150 patients from Al- Hudaidah were positive of bordline tubercoloid ,66 out of 150 patients from Taiz were positive of borderline tubercoloid . Types of leprosy found in in Taiz and Al-hudaidah see (Fig. 2). Skin smear samples of leprosy patients, stained using Ziehl- Neelsen technique showed *M. leprae* (Fig.3). In both; Taiz and Al – Hudaidah most of the detected leprosy patients lived in areas where other leprosy cases were previously detected and according to the history obtained from the diseased patients or their neighbors, forty two cases (14%) had history of contact with leprosy cases and twenty two (7.3 %) were having at least a case of leprosy in their family.

In Taiz no one of the 150 cases was examined leprosy before. In Al-Hodaidah there were three patients known to had leprosy about five years ago and had received medical treatments but they did not remembered how long they had taken the multi-drug therapy.

DISCUSSION

In our study we observed that untreated Multi-Bacillary (MB) patients excrete large quantities of *M. leprae* from the nose and mouth. However, other studies have suggested that untreated Multi- Bacillary patients don't represent the sole source of infection. Household contacts of pauci- Bacillary (PB) patients have also been shown to be source of infection and the development of the disease. A serological diagnostic test capable of identifying and allowing treatment of leprosy could reduce transmission, prevent functional disabilities and stigmatizing deformities, and facilitate leprosy eradication (Malcolm S.*et al*; 2008). There are three main objectives in controlling leprosy, the first is to interrupt transmissions, the second is to cure patients, and the third is to prevent development of deformities (Samuel, L. *et al;* 2004). Classification of leprosy patients for treatment purposes is mostly based on counting the number of lesions (less than 6 skin lesions, PB; 6 pr more lesions MB) but this method is unsatisfactory and subject to error. Diagnosis of a leprosy patient using antibody response to PGL-I can be used for the classification as MB or PB for treatment purpose as high specific antibody levels signify a high bacteria index and the absence of specific antibody signifies a negative bacterial index. Thus, diagnosis of a leprosy patient antibody response to PGL-I can be used for the classification as MB or PB for treatment purpose (Buhrer Sekula *et al*, 2003). Results in study of real-time PCR showed that bacillary of DNA and mRNA in lesions carefully monitored could also help to improve diagnosis of disease progression and the treatment regimen (Nirmala Lini ,*et a*l ; 2009). Recently, diagnostic methods for leprosy based on *M. leprae* DNA sequences have been developed although such methods require expensive machines and materials as well as skilled technicians. Thus, in countries where leprosy is endemic, diagnosis still relies on clinical observations which are easy, inexpensive tests. However, it is advisable for many developing countries to established laboratories for DNA-based diagnosis. (Masanori Kai, *et al;* 2008). In 2004 a cohort of 300 leprosy patients (attended leprosy outpatient clinics in each of Taiz and Al-Hodaeidah), were subjected to diagnosis of leprosy based on microscopic detection of acid-fast bacilli in skin smears or biopsies, along with clinical and morphological evaluation of suspected patients. Most of patients were illiterate rural citizens with primitive unhygienic living condition. In both; Taiz and Al-Hodaeidah most of the detected leprosy patients

lived in areas where other leprosy cases were previously detected. According to the history obtained from the diseased patients or their neighbors, 220 cases, had a history of contact with leprosy case and 80, cases had leprosy in their family. The great efforts to overcome leprosy in Yemen leads to the reduction of the prevalence of leprosy to less in the country as a whole, but till now there are certain areas with a high prevalence rate. The disease is frequent among the lower economic classes who live under unhygienic overcrowded conditions and prolonged under malnourishment. So the main challenges in the eradication of *leprosy* in Yemen are in providing the multidrug therapy services to populations that have not yet received. And improve the detection of the disease and providing patients with high-quality health services and affordable.

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