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Estimation of the Incidence of Pulmonary Tuberculosis in Northwestern Libya

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Abstract

Aim: To estimate the burden of pulmonary tuberculosis (TB) in Libya. Methods: This is a retrospective and descriptive study of pulmonary TB cases gathered from the TB National Center in Tripoli. Results: Pulmonary TB cases represented (50.9%) of total TB cases. The majority of pulmonary TB cases (86.8%) were from five out of twenty one TB Sub-centers distributed all over the country, namely (Tripoli, Benghazi, Sebha, Misurata, and Zawia Sub-centers). Estimated incidence & prevalence of total (Libyans and non-Libyans) pulmonary TB cases per 100,000 of total population were (0.08) & (0.09) respectively. Estimated incidence & prevalence of pulmonary TB among Libyans were (0.06 Libyan pulmonary TB cases/100,000 of Libyan population), and (0.08 Libyan Pulmonary TB cases/100,000 of Libyan population) respectively. Libyans represented (66.6%) of the total number of pulmonary TB cases. Among Libyans the most frequent age group affected was between 25-34 years old (35%) followed by 15-24 years old (21%) and most gender affected was males 70.3% versus females 29.7% (P<0.0001). Immigrant males represented (92%) of non-Libyan cases. The most frequent nationalities among immigrant cases were Sudanese (38%), Chadian (17.6%) and Nigerian (15.3%). Among immigrants; most age group affected was between 25-34 years old (45%) followed by 35-44 years old (32%). Total treatment success rate of pulmonary TB cases was (61.1%), with Libyans exhibiting a higher treatment success rate than their immigrant counterparts (68.1% and 48.6% respectively, P<0.009).

Key words: Estimated incidence- Estimated prevalence, TB and case notification

Introduction

Tuberculosis was declared a global emergency in 1993 by the World Health Organization (WHO) due to emergence of the AIDS pandemic (1). Ten years later, nearly one third of the global population (approximately 2 billion people)
were infected with tuberculosis and are at risk of developing the disease (1). More than eight million of which will eventually develop active disease and about two million it may prove to be fatal (2). WHO estimated that there were 8.8 million new cases of TB in 2003 (140/100,000 world population), including 3.6 million smear positive cases (62/100,000 world population). African, South Eastern Asia & Western Pacific regions collectively accounted for 82% of all notified cases (3). Many Countries (199) have reported to WHO (2003) of 4.4 million new and relapsed cases of which 1.9 million (44%) were new sputum smear positive. Among these notifications; 3.7 million were from Directly Observed Treatment Strategy (DOTS) areas (4). More than 90% of cases occurred in developing countries, seventy five percent of which affecting age groups between 15-45. Tuberculosis led to loss of work time (3-4 months/ year) and loss of 20–30% of household income annually (5). WHO estimated that between years of 2000 & 2020, nearly one billion people may be newly infected with TB, about 200 million people may become sick from TB, and at least 35 million people may die from TB (4). In Africa TB prevalence is higher than other developing countries because of the high incidence of HIV/AIDS cases. Females in the 15-24 age group are more likely to be affected and sputum smear positive cases have declined among TB/AIDS cases (6). No WHO region had reached 70% detection by the year 2004 (7). The proportion of estimated new smear positive pulmonary TB according to the six regions of WHO are: Western Pacific Region 23%, African Region 26%, South Eastern Asian Region 36%, European Region 5%, Eastern Mediterranean Region (EMR) 4% & Americas Region 6% (4).

Many surveys were done to assess the prevalence of TB in Libya. The first study to determine the prevalence was carried out in 1959 in the Eastern Regions of the country where the prevalence of TB infection was 1.19-2.47% (8). In 1977, the survey was done on 51,114 people and showed an incidence of 33 /100,000 of population (9). It also showed a downward trend of TB in comparison with other adjacent countries (10) with most being over the age of 20. This study was conducted to estimate the health burden of pulmonary tuberculosis in Libya taking the more populated northwestern region as an example.

We aimed firstly, to estimate the incidence and prevalence rates of pulmonary tuberculosis in Libya, from annual notification reports of national TB center in Tripoli. Secondly, to ascertain the gender and age groups affected by pulmonary tuberculosis. Thirdly, to estimate the incidence and prevalence of pulmonary TB cases among non-Libyans in Libya. Fourthly, to ascertain the geographic distribution of pulmonary tuberculosis cases and lastly to evaluate the success rates of currently used therapy among Libyans and non-Libyans.

**Patients and Methods**

**Setting and Data Collection**

The study is a descriptive and retrospective review study. The study period was one year (2003). The studied population was all pulmonary TB cases (Libyans & expatriates) who were registered from the Annual Reports of National Center of Monitoring Tuberculosis and Chest Diseases during 2003. The data were collected from the annual notification reports of the National Center of Tuberculosis & Chest diseases monitoring in Tripoli city, by a checklist. The annual reports of the National Center of TB & Chest diseases monitoring include the activities of the twenty-one TB sub-centers and the four major Tripoli hospitals of chest diseases during 2003. Due to the fact that there were no comprehensive prevalence surveys done since 1977 on TB infection in Libya; the investigators chose the indirect way for estimation of the pulmonary TB incidence and prevalence which was proven by WHO (2, 4) (due to its epidemiological importance in transmission of the disease) to estimate the health burden of the disease in Libya depending on the notifications from National Center of TB & Chest Diseases Monitoring using the equations in Table 1.

The investigators used the average duration of illness (new pulmonary TB cases) estimated by the WHO irrespective of the DOTS status of the countries, which equals to 1.35 years (11). The calculated incidence and prevalence of pulmonary TB were compared to the estimations of WHO for Libya of the same years, and by the estimations of some regional & international countries.

**Results**

The total number of TB cases, which were reported during 2003 was 1559 cases. Of these 795 (51.0%) cases were pulmonary TB cases (all cases discovered by sputum smear test) & the remaining 764 (49.01%) cases were extra-pulmonary TB cases. Eighty six percent (690 pulmonary TB cases) estimated by the WHO irrespective of the DOTS status of the countries, which equals to 1.35 years (11). The calculated incidence and prevalence of pulmonary TB were compared to the estimations of WHO for Libya of the same years, and by the estimations of some regional & international countries.
Table 1: The equations used to assess the burden of the disease in Libya based on the notifications from National Center of TB & Chest Diseases Monitoring.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Description</th>
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| Notifications of total pulmonary TB cases per 100000 Libyan population | \( \text{Total pulmonary TB cases (2003)} \times \frac{100000}{\text{Estimated total population number (2003)}} \)  

<table>
<thead>
<tr>
<th>Notification of pulmonary TB cases/100000 population during 2003</th>
<th>( \text{Libyan pulmonary TB cases in 2003} \times \frac{100000}{\text{Estimated total Libyan population number (2003)}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated incidence of pulmonary TB cases in total population (4,6)</td>
<td>( \frac{\text{case notification of total pulmonary TB cases / 100,000 pop. 2003}}{\text{estimated proportion of new TB cases (case detection rate) in 2003}} )</td>
</tr>
<tr>
<td>Incidence of Libyan pulmonary TB cases (4,6)</td>
<td>( \frac{\text{case notification of Libyan pulmonary TB cases/100,000 Libyan 2003}}{\text{estimated proportion of new TB cases (case detection rate) of 2003}} )</td>
</tr>
<tr>
<td>The case detection rate was calculated by WHO as following: (11)</td>
<td>( \frac{\text{notified pulmonary TB cases in notification report(2003)}}{\text{estimated number of pulmonary TB cases by WHO of 2003}} )</td>
</tr>
<tr>
<td>Estimated prevalence of total pulmonary TB cases (4,6)</td>
<td>( \text{incidence of Libyan pulmonary TB cases/ 100,000 persons/ year}\times(\text{average duration of illness / year}) )</td>
</tr>
<tr>
<td>Prevalence of Libyan pulmonary TB cases (4,6)</td>
<td>( \text{incidence of Libyan pulmonary TB cases/ 100,000 persons(2003)}\times(\text{average duration of illness / year}) )</td>
</tr>
<tr>
<td>Treatment success rate calculated by the following equation (2,4)</td>
<td>( \frac{\text{Cured cases + Completed treatment cases}}{\text{Total treated and followed cases}} \times 100 )</td>
</tr>
</tbody>
</table>

Table 2: Distribution of pulmonary TB cases per Sub-center, Libya (2003)

<table>
<thead>
<tr>
<th>Sub-center</th>
<th>Frequency</th>
<th>Percentages</th>
</tr>
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<tbody>
<tr>
<td>Tripoli</td>
<td>374</td>
<td>47.04%</td>
</tr>
<tr>
<td>Benghazi</td>
<td>139</td>
<td>17.50%</td>
</tr>
<tr>
<td>Musrata</td>
<td>66</td>
<td>8.30%</td>
</tr>
<tr>
<td>Sabha</td>
<td>74</td>
<td>9.31%</td>
</tr>
<tr>
<td>Zawia</td>
<td>37</td>
<td>4.65%</td>
</tr>
<tr>
<td>Others*</td>
<td>105</td>
<td>13.20%</td>
</tr>
<tr>
<td>Total</td>
<td>795</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Others: The remaining sixteen TB Sub-centers
Libyan pulmonary TB cases/ 100,000. The estimated prevalence of Libyan pulmonary TB cases was calculated as 0.08 Libyan Pulmonary TB cases/100000. Total pulmonary TB cases (Libyan & non-Libyan) per 100,000 Libyan population was calculated as 14 cases/100,000 population. Estimated incidence of pulmonary TB cases among total population was calculated as 0.09 cases/100,000 and estimated prevalence of total
pulmonary TB cases calculated as 0.12 case / 100000. Libyans represented (66.6%, 509 cases from which 36% (358) males and 19.8% females (151) of total pulmonary TB cases, while the immigrants represented (33.4%, 255 cases from which 30.8% (235) males and 2.6% females (20). Libyan Males represented 358 cases (70.3%) of total Libyan pulmonary TB cases, while females only 151 cases (29.7%)(P< 0.0001). Immigrant males represented 92% (235 cases), and Immigrant females 8% (20 cases) of total Immigrant pulmonary cases respectively. The most affected age group was between 25-34 in total cases; with 180 cases (35%) of Libyans 114 cases (45%) of immigrants falling in that category. The second most common age groups affected were ages between 15-24 in Libyans (21%) of cases, and 35-44 in immigrants (32%) as shown in figures 1 and 2.

Treatment success of all pulmonary TB cases was calculated as 60.1%, the rate among Libyan cases was calculated as 68.1% and with much lower treatment success rates achieved in the immigrant population (48.6%)(P<0.0009).

Discussion

Every year Tuberculosis kills 136,000 people and affects 630,000 more in EMR. AIDS is the most significant risk factor for progression of the disease from subclinical infection with Mycobacterium tuberculosis to active TB (12). Majority (80%) of cases occurs among socially & economically productive age groups of the population (15-54) (13). TB disease usually affects more men than women in the region (14). There are three epidemiological categories in the Eastern Mediterranean Region; High burden countries (estimated incidence of 50 or more TB patients / 100,000 population): Afghanistan, Pakistan, Djibouti, Iraq, Morocco, Somalia, Yemen & Qatar (6). Middle Burden countries (estimated incidence of 25-49 TB patients/ 100000 population): Bahrain, Egypt, Iran, Kuwait, Saudi Arabia & Syria (8) and Low Burden Countries (estimated incidence of TB between 0-24 TB /100000 population): Jordan, Libya, Lebanon, Oman, Tunisia, United Arab Emirates, and Palestine’s Gaza Strip & West Bank (15).

According to the WHO final report on TB notifications during 2003; the notification/100,000 population of pulmonary TB of Libya (12) was comparable to the notifications of Iraq and Pakistan (4). It was more than the notifications of Egypt, Tunisia, and Arabia but was less than that of Morocco (5,7).

Estimated incidence of pulmonary TB /100,000 population of Libya was comparable to the incidence rates of Egypt (0.13), Tunisia (0.1) and Saudi Arabia (4). It was less than the estimated incidence of pulmonary TB in Algeria (0.24), Chad (0.98), and Nigeria (1.90) (4). In the East Mediterranean Region; the most frequent age group affected by pulmonary TB was the 15-24 age group by (25%), followed by 25-34 and the 35-44 age groups by (24%) & (17%) respectively (4). The most frequent Libyan age group affected was between 25-34 years of age. The current study was comparable to Egypt (23%) of cases, Iraq (31%) of cases, Kuwait (35%), Jordan (27%) of cases, Morocco (29%) of cases, Saudi Arabia (28%) of cases, Sudan (25%) of cases & Tunisia (25%) of cases (4).

Treatment success rate of pulmonary TB in Libya (60.06%) was not similar to those of other regional countries, it was less than the treatment success rates of WHO DOTS objectives due to the increased number of the transferred out (traveled) and treated immigrant pulmonary TB cases. It was less than those of: Djibouti (82%), Jordan (89%), Egypt (88%), Iraq (91%), Morocco (89%), Pakistan (77%), Sudan (78%), Tunisia (92%) and Yemen (82%) (4).

In conclusion, Pulmonary TB cases represented (50.9%) of the total number of TB cases during the study period wherein Libyan cases made up more than two thirds of all pulmonary TB cases by male sex predominance. Libyan young adults of active productive age group were mainly affected (probably as a result of mandatory pre-employment health checkups including a Chest X-ray). Immigrant cases represented about one third of the total number of notified cases; with a predominance of the male sex of the active productive age group (this is due to that most of the manual labor force are young male immigrants, self selected groups and not females or old people). The most frequent immigrant cases nationalities were from adjoining high burden countries that crossed the borders for employment purposes.

We feel it is time for Libya to update the Libyan TB registration system to comply with WHO standards and requirements, as well as calling for further research on pulmonary TB cases to determine the risk factors, which lead to the development of pulmonary TB among the affected population.

References

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