

Survey of tuberculosis patients cases in Quefia Chest Hospital in Benghazi, Libya between 2010-2018

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Abstract

Tuberculosis (TB) is a serious disease and caused by *Mycobacterium tuberculosis*. Although this disease is almost rare in developed countries, many developing countries, including Libya, still suffer from it. The main purpose of this study is to highlight the riskiness of the disease, and to identify it to improve the early diagnosis and prevention methods. In addition to seeking cooperate with the World Health Organization to assist reduce, and even eliminate the disease. In this research, data for patients with TB were collected in the period between 2010 and 2018 from the Department of Statistics of Quefia Chest Hospital in Benghazi. These data were analyzed statistically according to several factors include gender, age, nationality, region and hospitalization period. Total number of TB patients is 1778 cases. The recorded cases of TB are varied between the lung and other parts of the body, for instance, lymph nodes, bones and the brain. A number of cases have been identified with various diseases associated with TB such as Acquired immunodeficiency syndrome (AIDS), diabetes and the hepatitis. There are signs that emerged from this research regarding the influence of depression on some TB patients, which appeared in the proportion of the injured, whether, fleeing the hospital or who left it on their personal responsibility.

Key Words: Tuberculosis, *Mycobacterium tuberculosis*, Acquired immunodeficiency syndrome, Hepatitis, Multi-drug resistant tuberculosis, Diabetes, Depression, Escape.

Introduction

Tuberculosis (TB) is a disease that is transmitted by mycobacteria and affects the peripheral airways of human lungs by inhalation of infectious aerosol droplets. Consequently, the infection occurs precisely after bacterial attack in the persons with weakened body immunity (Murray *et al.*, 1998). The pathogens within the lungs, form nodules or tubercles, then destroy the tissues, and disseminate the infection in the body (Schlegel, 1993). TB is characterized as a chronic granulomatous disease transmitted by any of three members of the *Mycobacterium tuberculosis* complex—*Mycobacterium tuberculosis*, an asporogenous and non-motile bacillus, and in some very rare cases by *Mycobacterium africanum*, or *Mycobacterium bovis* (Heemskerk *et al.*, 2015).

Mycobacteria are aerobic, irregularly and slightly branched, gram-positive, and acid fast bacteria. The Mycobacterial cell wall is strongly hydrophobic due to the presence of high levels of waxlike mycolic acid, therefore, the carbol fuchsin stained bacteria can be decolorized with acid (HCl) - alcohol, but not with aqueous HCl (Schlegel, 1993). Genus *Mycobacterium* is classified within the Mycobacteriaceae family, belonging to the Actinomycetales order (EPA, 1999 & Rastogi, Legrand and Sola, 2001).

Globally, TB is one of the serious infectious diseases, that causes death over the past 200 years, when compared with other infectious diseases (Paulson, 2013). TB bacteria in the lungs cause several symptoms such as serious cough for a period of 3 weeks or more, coughing up with blood, and in some cases accompanied by chest pain and fever. Thus, sputum testing enables detection and identification of the cause of these symptoms (Rieder *et al.*, 2009). *M. tuberculosis* are usually isolated within 3 to 8 weeks (Schlegel, 1993). By using treatments such as streptomycin (SM), isonicotinic acid hydrazide (INH), pyrazinamide (PZA) and rifampicin (RIF), this disease has been almost eliminated in industrialized countries (Heemskerk *et al.*, 2015).

Similar to other developing countries in the world, Libya, is suffering from TB, especially in the period following 2011 due to disruption of the health system which is caused by political changes and the war in the country (WHO, 2011). In 2013, this disease caused 8.7 deaths per 100,000 inhabitants. Among 1412 TB cases, 641 sputum smear-positive new cases were recorded in the same year. Furthermore, 60% of new cases were successfully treated in 2012. Moreover, the proportion of drug-resistant TB was 3.7% for new cases and about 20% for previously treated cases (WHO, 2017 cited on WHO

global tuberculosis database, 2015). The aim of this research is to highlight the prevalence rate of TB in Libya in general, despite the development of early diagnosis methods and successful treatments in developed countries. The main focus of the study is to determine the TB incidence rates which were registered at the Quefia Chest Hospital in Benghazi from 2010 to 2018.

Materials and methods

Data collection

Tuberculosis patients' data were collected in the period between 2010 and 2018 from the Department of Statistics of Quefia Chest Hospital in Benghazi. The several factors included in the data are - gender, age categories, region, nationality and the period of treatment in the hospital and the success of treatment (duration groups). In addition, TB associated diseases such as AIDS and hepatitis were recorded in some cases. Further, impacts of TB in the psychological state of patients, leading to escape cases were briefed.

Statistical analysis

Data collected were analyzed using SPSS Statistics, Version 23, the International Business Machines Corporation (IBM). The total number of patients admitted during the period of nine years (2010-2018) was determined. The probability of association

between the diagnosis and all tested factors, and also between the regional factor and the other factors was estimated by applying the Chi-Square test. The total number of cases and their annual percentage were estimated based on gender, age categories, nationality, region and hospitalization period (duration groups).

Results

Analysis of the data that were obtained from the Statistics Department of the Quefia Chest Hospital in Benghazi showed that the total number of patients during the last nine years (2010 - 2018) is 1870, Among of this number, TB and associated diseases recorded 1778 cases. The diagnosis included TB alone, which registered the highest percentage (76.6%), followed by TB with AIDS at a rate of 3.5%, then TB with diabetes at a rate of 3.0%.

It is noted that the proportion of patients increased in 2010 where it was 16.4%, accompanied by the years 2012, 2014 and 2011, which taped 11.9%, 11.6% and 11.0%, respectively. The reduced infection rates were cataloged in 2015 and 2018 at 8.0% and 9.4%, one by one.

During this specific period mentioned above, the incidence rate among males

was 69.5% compared with females who had an infection rate of 30.5%. The most infected age groups were 20-29 and 30-39, which are written at 30,5% and 26.7%, on an individual basis. While the least infected age group is 0-20, which is estimated at 8,0% subsequently 50-59 which is approximated at 8.5%.

Naturally, the study found that the incidence of infection within the Libyan nationality is a huge (82.1%) succeeded by the Arabic nationality (10.7%), while the most decline percentage of infection was in the nationalities of Southeast Asian (1%) and African (6.2%).

According to the region, it is concluded that the highest infection rate was to Benghazi patients (59.8%), come next the suburbs of Benghazi (11.5%) then Ajdabiya (9.4%), whilst the most decrease rate was to Gharyan, Musaid, Zliten, Surman, Brak and Ras Lanuf patients (0.1%).

A period of less than a month is the most period which was spent by patients in the hospital for treatment, where their rate is 72.55%, afterwards the period of a month to three months which inscribed at 25.76%, whereas the period of more than six months demonstrate the most reducible ratio for cases (0.79%), then the period of 4-6 months (0.9%).

The results display that a number of cases left the hospital on their own responsibility or one of the family members, at a rate of 3.9% (69 cases). As well as, escape cases of some patients were documented at a rate of 2.8% (49 cases). In addition, the mortality cases due to the disease were listed by 2.8% (49 cases).

The results of Chi-Square test exhibit a massive significant association between the diagnosis and all of gender, age categories, nationality and region at $\alpha = 0.01$. Depending on the accompanied between the diagnosis and the year, there is a significant relatedness at $\alpha = 0.05$. On the contrary, the results of Chi-Square test found out that there is no significant accompaniment between the diagnosis and both hospitalization duration groups and remarks.

Chi-Square test reported a significant relation between the region and age categories at $\alpha = 0.05$. Moreover, there is a major significant relevance between the region and year at $\alpha = 0.001$. On the other hand, there is no significant rapport between the region and any other factors of gender, nationality, duration groups and remarks.

Table 1. Tuberculosis and various associated diseases.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Left pleural effusion due to TB	10	.6	.6	.6
TB	1362	76.6	76.6	77.2
TB & various diseases in 0.1%	69	3.9	3.9	81.0
TB & various diseases in 0.2%	42	2.4	2.4	83.4
TB negative sputum	10	.6	.6	84.0
TB+AIDS	63	3.5	3.5	87.5
TB & various diseases in 0.3-0.4%	50	2.8	2.8	90.3
TB+Diabetes	54	3.0	3.0	93.4
TB+Pleural effusion	38	2.1	2.1	95.5
TB+Bronchial asthma	11	.6	.6	96.1
TB+Hepatitis C	10	.6	.6	96.7
TB+Diabetes+Blood pressure	11	.6	.6	97.3
Old TB+AIDS+Hepatitis	13	.7	.7	98.0
TB Lymphadenitis	15	.8	.8	98.9
TB Pleurisy	20	1.1	1.1	100.0
Total	1778	100.0	100.0	

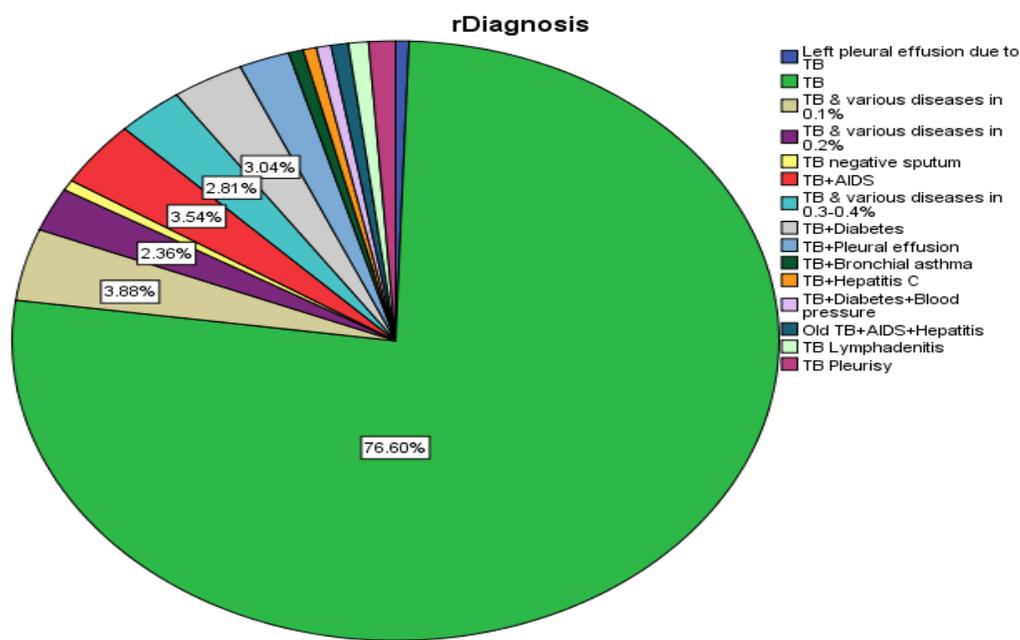


Figure 1. Tuberculosis and various associated diseases.

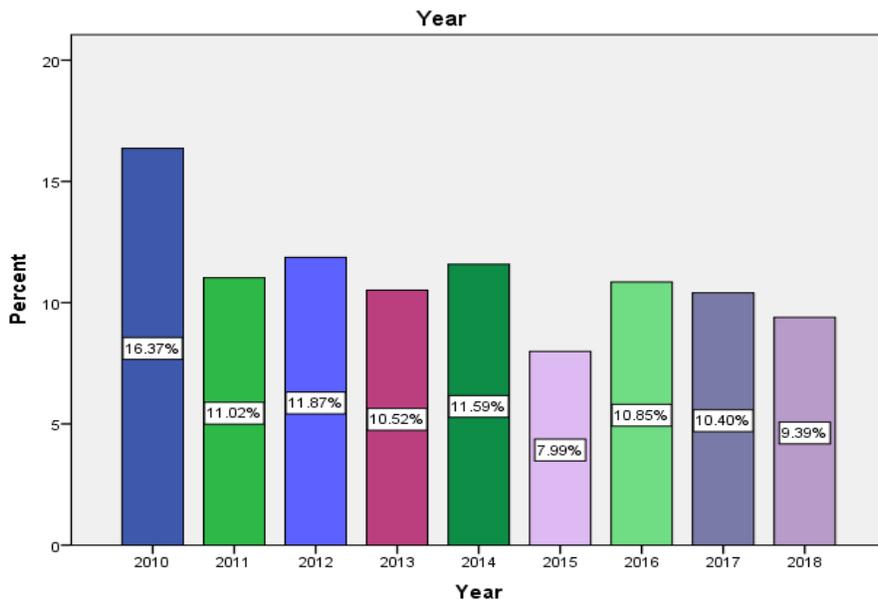


Figure 2. The rate of TB cases according to the years.

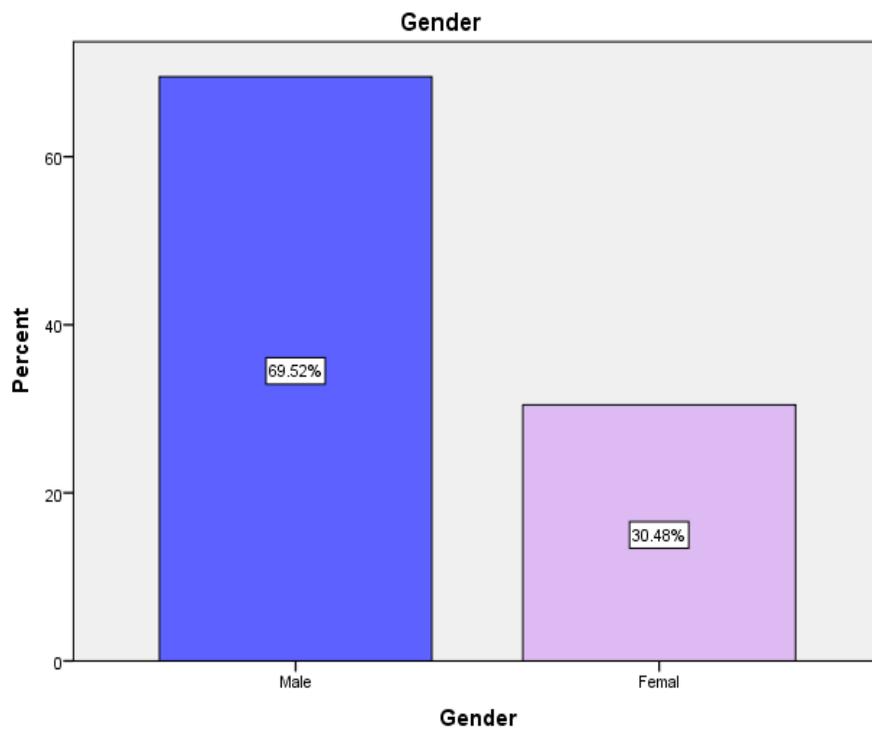


Figure 3. The rate of TB cases according to the gender.

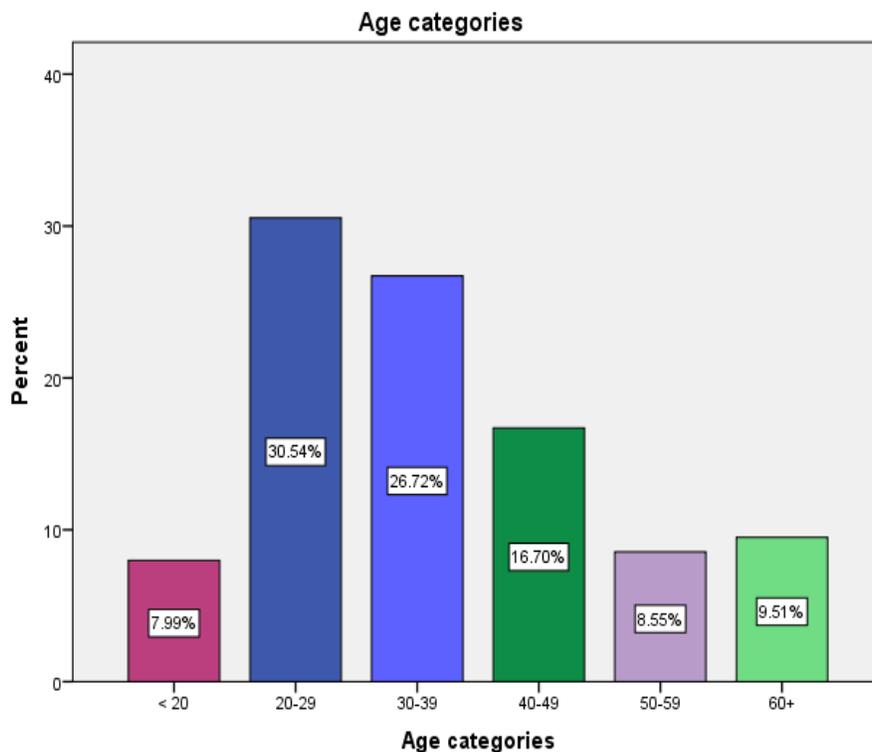


Figure 4. The rate of TB cases according to the age categories.

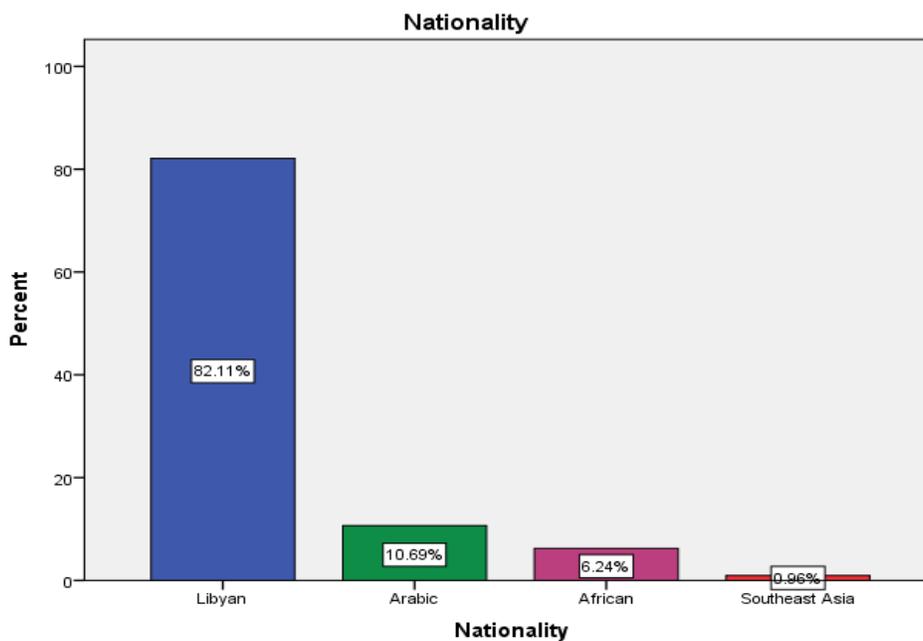


Figure 5. The rate of TB cases according to the nationality.

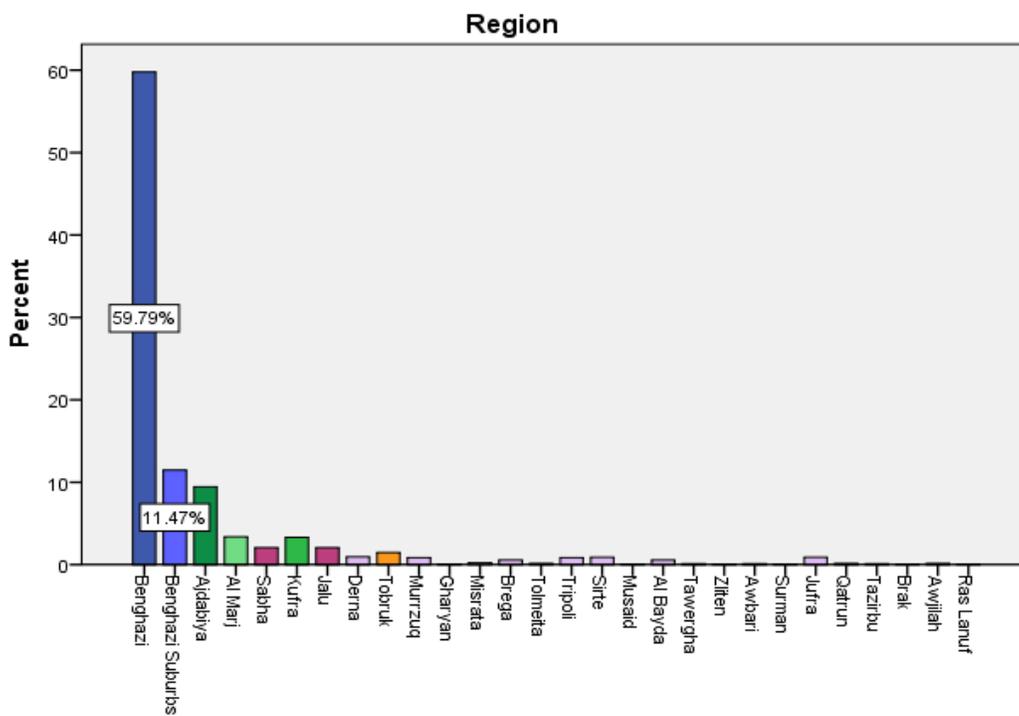


Figure 6. The rate of TB cases according to the region.

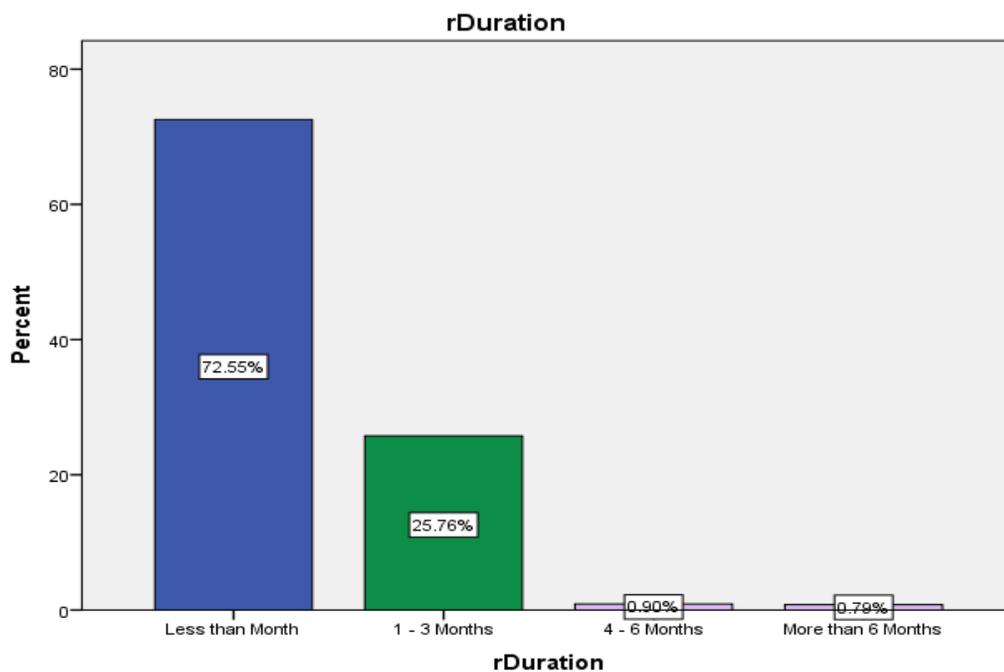


Figure 7. The rate of TB cases according to the hospitalisation period.

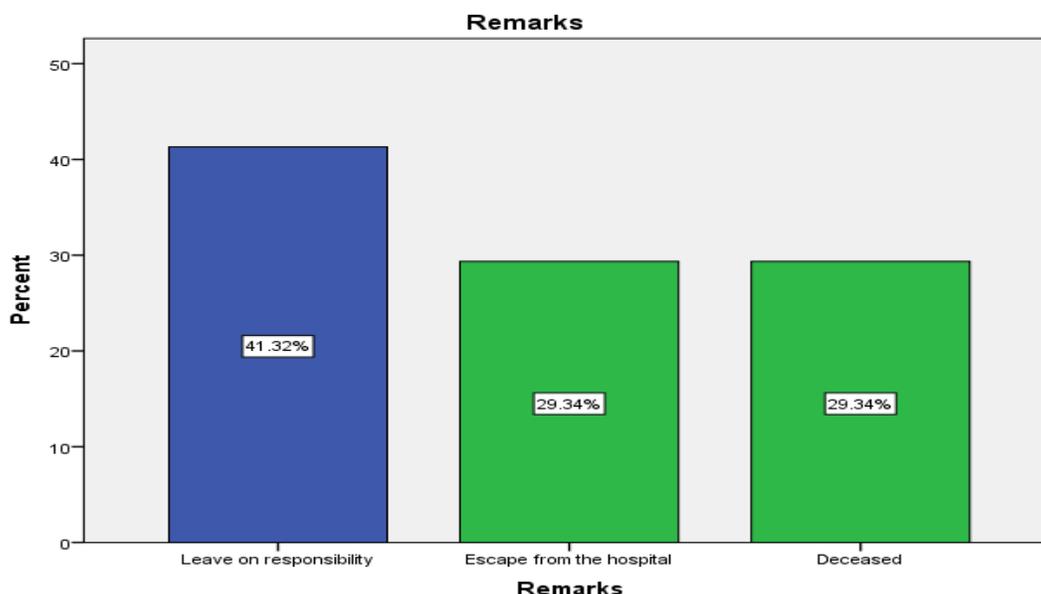


Figure 8. The rate of TB cases according to some remarks.

Discussion

According to the reports of the WHO TB Unit in the Regional Office for the Eastern Mediterranean, an increase in the incidence of TB in Libya from 17 to 40 cases per 100,000 population was reported between 2007 and 2008. This increase became the risk indicator for the re-emergence of the disease in Libya despite Global efforts that almost eliminated it in the industrialized world (Solliman *et al.*, 2012 cited on TB Unit of the WHO Regional Office for Eastern-Mediterranean Region, 2007 & TB Unit of the WHO Regional Office for Eastern-Mediterranean Region, 2008).

This indicator has become a reason for the continuous increase of several researches

in Libya specifically to study this disease from various aspects. This study found that the total number of TB cases from 2010 to 2018 is 1778 cases while a study conducted at the National Center for Tuberculosis and Chest Diseases in Tobruk on data recorded 995 cases in forty years from 1974 to 2014 (Ismail, Farag and Abdul Ilah, 2014). This major difference in the increase in the number of cases, despite the large variation in the number of years, may be due to the divergence population density between Benghazi and Tobruk. Both the studies agree that males have a higher rate of infection than females. In addition, rise in the percentage of cases among the people of Libyan nationality followed by those of Arab nationality then the other nationalities have been observed in both

the studies. The current study recorded an increase in incidence of infection among the age groups 20-29, followed by those in 30-39, which is in partial agreement with the results of the research mentioned above, that shows age group of 15-34 shows the most elevated percentages of nearly half of the total infection rate.

The rise in incidence of TB in males, especially in the 20-39 age group, may be due to the habits of this group such as visiting cafes where hookah is smoked facilitating the transmission of TB bacteria. The decrease in incidence in 2015 may be due to the conditions of war and a decline in patient visitation to the hospitals.

The research of Lo *et al.* 2011 conducted in Taiwan, in which data for TB patients were collected between 2002 and 2008, analysis of the demographics, geographical distribution of TB, and the change in the incidence rates and mortalities were reported. It was noted in the results of the aforementioned study that new cases of TB decreased from 16758 to 14265 and the incidence decrease from 75 per 100,000 populations to 62 per 100,000 populations, as a result of the operations of the National Tuberculosis Program (NTP). Furthermore, the results published by Yun Lo *et al.*, 2011 were consistent with the existing study in terms of the annual rate of infection among men which is about twice

that of women, in addition to the death rate. Moreover, the result also corroborated that the densely populated places are mostly infected by TB. The report also recorded that the age group (≥ 65) were among the most infected, in contrast to our research results that exhibits the highest rate of infection among the age group (29-30).

The results of another research indicating the association of TB with AIDS recorded the highest rate among other diseases associated with TB, wherefore it became necessary to use the antiretroviral therapy (ART) for AIDS patients. This gave satisfactory results in reducing TB infection in patients with HIV as reported by a study conducted in 12 African countries from 2003 to 2016. The treatment has proven effective in all tested countries, with 1.88 million cases of TB in patients with AIDS were prevented from 11.96 million patients with TB (Dye and Williams, 2019). Molaeipoor *et al.*, 2014 also confirmed the existence of a relationship between infection with AIDS and TB.

The research result indicated that the number of cases pertaining to old or recurrent TB may lead to the classification that they are indeed of the multi-drug resistant type (MDR-TB). Abbar *et al.*, 2014 tested the cases of MDR-TB in Benghazi from 1.1.2009 to 1.6.2010. 4

cases among the total 430 with TB were diagnosed with MDR-type. This group of doctors applied the second-line treatment by injecting cycloserine, amikacin, moxifloxacin and pyrazinamide for a period of 6 months, followed by the use of cycloserine, moxifloxacin, and pyrazinamide for a period of 18 months. Radiological, clinical and microbiological improvements could be observed. Albarauni *et al.*, 2014 have determined the susceptibility pattern of isolated Mycobacteria from TB patients at Tripoli Hospital by using a drug sensitivity test (DST) on 261 isolates through BD BACTEC MGIT 960 SIRE system. The medicines used in this study were rifampicin (RIF), isoniazid (INH), streptomycin (SM) and othambutol (EMB). It was confirmed that all isolates were *Mycobacterium tuberculosis*, which showed different patterns of resistance; INH (8.8%), RIF (5.7%), SM (8.8%) and EMB (9.0%). Among the 261 cases, 44 had a recurrent /old TB, although the study also indicated a low rate of drug-resistance in *Mycobacterium tuberculosis* among these patients.

The analysis of 40 cases of escape in this study strongly supports that depression is also associated in some of the TB patients. Accordingly similar statistics were found by Dasa *et al.*, 2019 found, when they searched for the factors of depression and the reason for its prevalence among TB

patients in eastern Ethiopia. They detected from their research that TB incidence was the most among the age group of less than 35 years (61.5%), city dwellers (70.2%), married people (53.6%), males have sex (59.3%), Low level of education (61.3%), number of family members (67%), recently diagnosed TB patients (67%), TB patients receiving treatment for more than three months (70%), patients with both TB and AIDS (13.6%)) and patients with MDR-TB type (24.8%). The prevalence of depression among TB patients for a group of 403 cases was 51.9%, and the highest incidence of depression was observed among age group older than 35 years, in addition to those with low monthly incomes. Sweetland *et al.*, 2017 figured out a correlation between TB and depression, specifically the behaviour and inability to tolerate the disease, which led the scientists to call it "TB syndrome and depression". Depression may raise the threat of TB, as well as TB itself may lead to increase in depression caused by it's self stigma. Poverty, malnutrition, suppression of immunity and unnecessary drug use are among the leading factors that lead to the increase in the threat of TB and rise of death rate. Therefore, the WHO Global TB Control Strategy recommends providing integrated care focused on the TB patient and on the

social and psychological side to avoid depression, for a swift recovery from TB.

Conclusion

TB is still the most serious cause of death worldwide. Through the results of our research, which showed a variation in the incidence of TB during the years of the research study, it is clear that Libya is among the countries in which the conditions for the spread of infection with *Mycobacterium tuberculosis* are available. For instance, the gender factor, which displayed the highest infection rate for males who often practice habits that make them susceptible to infection with *Mycobacterium tuberculosis* such as smoking, especially hookah used from person to another. This study recommends spreading health awareness of the risks of TB among community members. It also advises applying modern diagnostic methods for TB within Libyan hospitals, particularly polymerase chain reaction (PCR), because accurate and rapid diagnosis provides a greater opportunity for treatment.

Acknowledgments

Great thanks to Dr. Najwa Muftah Alfarsy; Lecturer in English Language Department,

Dr. Hadir Gawili; Lecturer at Faculty of Public Health and Dr. Yousef M. T. Elgimati, Associate Professor in Statistics at Benghazi University.

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