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Comparative Geodemographic Analysis of Tuberculosis Patients of Malakand Region

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Abstract

Tuberculosis is still a health treat in underdeveloped countries. A report shows that 10 million people suffered and 1.6 million died from TB in 2017. Pakistan is ranked 5th in high TB burden countries worldwide. Khyber Pakhtun khwa is the populated province of Pakistan in repot 3rd for high Incidence of TB. Malakand region, the populated region of KPK, comprises seven administrative districts. Various studies are carried out on the prevalence of TB. The purpose of the present study is to investigate the geodemographic analysis of TB incidence in Malakand region. Spatial analysis is done to show the geographic distribution of TB incidence in Malakand region. Our result shows that a high rate of male and female cases is present in Swat, Shangla and Dir-lower district as compared to the rest of district. Our study helps the provincial TB control program to focuse on the eradication of TB from high cases districts of Malakand region.

Keywords: geodemographic, TB, Malakand region

1. INTRODUCTION

Tuberculosis (TB) is still serious infectious disease in underdeveloped countries and one of the highest death causing infection worldwide.

Thought that 10 million people has suffered and 1.6 million is died from TB in 2017 [4] [12]. TB is airborne disease mostly affect youngsters and major cause of illness in deprived peoples [1] [6]. Most of deaths cause in middle income countries, especially in South East-Asia [4]. Pakistan is ranked 5th in 30 high TB burden country in the world [8] it is responsible for 1.5 % of disease burden. While 61 % of TB cases in Mediterranean countries is in Pakistan. It is also accounts 4th for multi drug resistance cases worldwide. A report of World Health Organization (WHO) shows that 1.5 million new and 15 thousand Multidrug resistant cases occur annually in Pakistan [6].

Khyber Pakhtun khwa (KPK) province is 3rd in Pakistan for TB cases in 2018[7].

Malakand region is the most populated area of KPK located in northern area. It is economic hub of Pakistan and play vital role in tourism of Pakistan. It comprises of seven districts Buner, Chitral, Dir Upper, Dir-lower Malakand, Shangla and Swat. Previously a high number of TB is reported in the study area [2] [3]. They mostly focused on prevalence, institutional base study of TB and retrospective study on TB incidence. More ever comparative geodemographic study is seems to be lacking, it might be helpful to determine spatial pattern of high disease incidence area of TB. It will introduce more area specific public health intervention, control and prevention of TB [10].

Thus, we conduct the comparative geodemographic analysis in the region of Malakand to evaluate the spatial and statistical analysis in Malakand region to point out geographic distribution for TB incidence in malakand region of KPK. It may help to introduce such policies and programs to overcome the incidence rate of TB in the study area. It may attract the provincial TB control program to give more focus on the eradication of TB from the high risk area in Malakand region.

2. METHODOLOGY

2.1 Study Area

A cohort study conducted in malakand region by the reported Tuberculosis cases from June 2016 to June 2018. Malakand is the populated Of KPK province, located at northern areas of Pakistan plain at 35° 30' 00" N and 72° 00' 00" E surrounded by mountains. A total

area of Malakand region as 32007 km^2 and consists of 7 administrative districts. All the districts are covered in this study [10].

2.2 Data Collection

Data of all the reported TB cases including age, sex and address with clinical record (from January 2016 to December 2018) was collected from all the Districts TB control office (DTCO) TB 03 Register [10].

The TB cases is entered into Microsoft Excel 2007 (Microsoft, Redwoods, WA, USA) for further analysis of TB incidence and Geographic Information System (GIS) spatial analysis.

2.3 Ethical Review

Ethical Approval for the analysis of patient's secondary data is taken from all the TB control offices in entire study districts.

2.4 Data Analysis

Spatial analysis on the distribution of TB incidence, the District level polygon Map of Malakand region is used to evaluate the burden of TB cases in study region by Arc-GIS V 10.1. [10].The demographic analysis is done Microsoft Excel (Microsoft, Redwoods, WA, USA).

3. RESULTS

3.1. Basic characteristics

A total of 30182 patients were reported in Malakand region from 2016 to 2018. The annual incidence rate from 2016 and 2017 is 9813 and 9899 patients, but in 2018 the incident rate is raise as compared to other years 10470 patients (Fig 1). Likewise high number of TB incidence is found in highly populated area of malakand region (Fig 2). Swat district have the highest rate of patients 10174 cases followed by lower-Dir Shangla and Malakand 5635, 4672 and 3930 cases. While Buner, Chitral and Dir-lower have low rate of patients as compared to high burden TB districts.

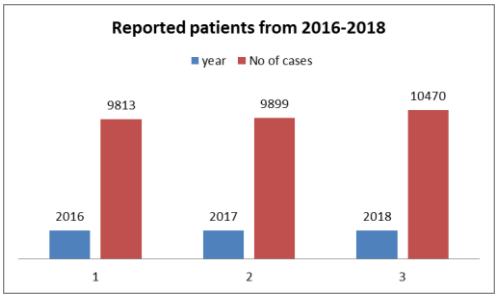

Fig 1. Rate of reported cases 2016-2018

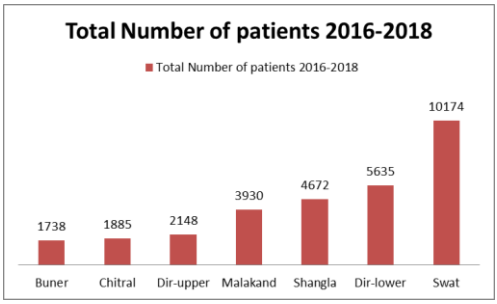

Fig 2. Incidence of TB patients in malakand region districts (2016-2018).

3.2 Gender wise TB incidence

Table 1 displays that district swat have a high rate of male and female patients. In 2016 1704 Male and 1536 Female cases is reported. The number of male and female cases is increases in 2017 and 2018. Dir-lower and Shangla also have a high burden of male and female cases. While the remaining districts almost have the same ratio of male and female TB patients in each year 2016-2018 (Table1).

Table 1. Incidence of TB patients Gender wise 2016 to 2018

District	2016		2017		2018	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Buner	217	361	232	329	275	324
Chitral	283	359	289	327	279	348
Dir-lower	1141	846	964	878	925	881
Dir-upper	359	345	302	358	418	366
Malakand	641	644	694	673	664	614
Shangla	705	672	770	725	937	863
Swat	1704	1536	1737	1621	1810	1766

3.3 Spatial analysis

Figure 4 let out the spatial analysis of TB in Malakand region from 2016 to 2018. Insight into spatial analysis of 2016 find out that high incidence of TB is found in District Swat, Dir-lower, Shangla and malakand ranging from 1285-3240 cases. Buner, Chitral and Dir-upper had cases between1-500 cases. In 2017 high incidence is found in swat, Dir-lower Shangla and Malakand ranging from 1367 to 3356 cases and the reaming district is below 670 cases. In 2018 highest numbers of cases were found in district swat (1807-3576). Dir –lower had the second highest range i.e., between 1701 to 1806 cases. Shangla and malakand had the third highest range i.e. 1207- 1700 cases. While the remaining district had below 600 cases. Our study determines the high burden TB district in the study region which had increasing TB cases from 2016 to 2018. So the provincial TB control program should pay attention to the high burden area of TB cases. They also take some solid steps to make policy to control the increasing number of cases from year to year.

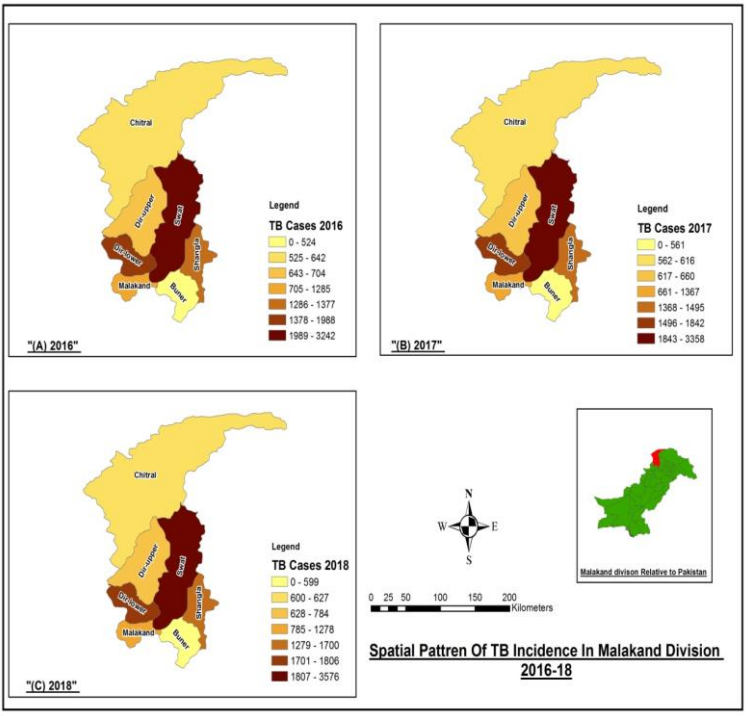

Fig 3. Spatial analysis of TB incidence in Malakand region- 2016-2018.

Spatial analysis is utilized to detect the distribution of communicable diseases by using GIS application, Arc GIS, SaT Scan and other relevant software. The can analyze the distribution through spatial analysis.

4. DISCUSSION

We investigate the geodemographic distribution of TB patients in Malakand region and highlight the high burden area from 2016-2018. This study estimated that swat district followed by Dir-lower had a high TB incidence during the study period between 1900 and 3600 cases each year. It is also present that swat have a high no of cases in 2018 up to 3576 and lower-Dir have relatively high cases 1987 in 2016 and number of cases decreases up to 1806 cases followed by Shangla which have a total of 1377 and 1495 cases in 2016-2017. The no of cases in Shangla is increase to 1800 cases in 2018 (Fig 3). Previously a study reported 1385 cases in district lower –Dir which is low as compared to our study period. Most of them were female patients as compared to male [2]. Basically this is the dense populated districts of Malakand region as compared to the rest of districts [10].

Our study also reveals male/female ratio in malakand region. It determine that swat have a male/female ration of 1704/1536 in 2016, a total of 1737/1621 male/female cases was reported in 2017 and a no of 1810/1766 male/female cases in 2018. The no of cases of male is high as compared to female in swat which increases from year 2016-2018. It may be due to the lack of awareness and lack of interest of patients in TB treatment. The no of male cases is high at Dir-lower in 2016 which is decrease in 2017and 2018. It may be due to the improvement in the treatment of TB in district Dir-lower. The ratio of male/female in Shangla is increase each year from 2016-2018 which is sign of danger they need an attention to provide such strategy to control spread of TB in community of Shangla. The no of cases in the remaining district is under 300 cases. Previously a study conduct in malakand district reveal high rate of female cases 53.26 % of the total cases in their study period while rate of male cases is low as compared to female which is 46.74 % of the total reported cases[11]. Another study in swat reported that in swat ratio of male is low about 21 % in 2009 but increase upto 31 % in 2010[14]. (Table 1)

Spatial pattern of TB patients in Malakand region from 2016 to 2018 show number of cases in different districts. Insight into spatial analysis of 2016 find out that high incidence of TB is found in District Swat, Dir-lower, Shangla and malakand ranging from 1285-3242 cases. Buner, Chitral and Dir-upper had cases between1-500 cases. In 2017 high incidence is found in swat, Dir-lower Shangla and Malakand ranging from 1367 to 3356 cases and the reaming district is below 670 cases. In 2018 highest numbers of cases were found in district swat (1807-3576). Dir –lower had the second highest range i.e., between 1701 to 1806 cases. Shangla and malakand had the third highest range i.e. 1207-1700 cases. While the remaining district had below 600 cases. Spatial analysis is widely utilized to detect the incidence of communicable diseases and non communicable diseaese. Our study demonstrate the usefulness of spatial analysis in malakand region but have some limitation , first the estimated risk of TB might be underestimated in some areas because of cases may not be reported in health care centre. Second the potential risk factor that could be related to patient's socioeconomic factors, poor living condition and low economic condition is not evaluated in our study. Our study demonstrates the high burden area of TB cases which need more attention to control the spreading of TB. Because in some area the no of reported cases is increasing from 2016 to 2018.The provincial TB control program should pay attention to the high burden area of TB cases. They should apply such strategies to control the high rate of TB incidence.

5. CONCLUSION

We investigate the geodemographic analysis of TB patients and identified high incidence district in the study region. Our results find that male/female rate is very high in some study districts which need more attention to control spread of TB in male/female. Our study is limited to demographic. Further study is needed to evaluate the molecular level pattern of each district patients to provide sufficient. Our study also suggests that provincial TB control program should focus on the eradication of TB from the point out high risk area.

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