

Assessment of Childhood TB in Public practice; a difference between Rural and Urban practice, Southern Punjab, Pakistan

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ABSTRACT

Objective: Tuberculosis is the most severe and complicated infectious disease and responsible for morbidity and mortality globally. Objective of this study was to evaluate the status of MTB infection in children under age of 15.

Background knowledge: MTB infection had taken an estimated 10.4 million population and 1.6 million of them were expired according to the report in 2016. TB infection in children is a neglected aspect of this epidemic globally, it comprises of 20% reported positive cases and it is more than 15% percent in low income countries. Though, it was 09% of reported cases in 1989.

Material & method: Our research represents a retrospective cohort study that includes all of positively reported TB children from Jan, 2019 to Sept, 2019 at Tehsil headquarter (THQ) hospital Alipur and Rural health center (RHC) Rohilanwali. Demographic data, clinical and diagnostic characteristics were compared with results and outcomes of infected individuals.

Result & discussion: in comprehensive research of 09 months 4739 patients (2425 patients at THQ Alipur & 2314 patients at RHC Rohilanwali) with chronic bronchitis visited the health facility as TB suspects. After precise diagnosis and on basis of clinical characteristics 1006 patients (557 at RHC Rohilanwali & 449 at THQ Alipur) were confirmed TB positive patients. We precisely concluded that only 3% (181 of 1006 confirmed patients) of them were children up to age of 14 years and none of mortality reported in children. While mostly children belong to purely rural sides while number of girls were higher from city side.

Conclusion: It's observed that prevalence of infection is higher in less developed areas due to limited facilities, low literacy rate and more importantly their norms while cases of bronchitis are higher in developed side of territory while prevalence of TB infection is lower. Awareness of healthcare education and role of individual in management of lethal infection may lower this increasing trend of infection

KEY WORDs: MTB (Mycobacterium Tuberculosis), Morbidity, Mortality, Management, Diagnosis.

BACKGROUND KNOWLEDGE:

Mycobacterium tuberculosis is responsible for Tuberculosis (TB) Infection that is causative agent of morbidity and mortality throughout the world. According to the study, an estimated population of 2.3 billion of human is infected by mycobacterium tuberculosis. 10.4 million Of new cases and 1.6 million of deaths are reported in 2016 (1). Compassionate use of anti-tuberculosis drugs (new molecular entities NME) had taken 700 patients from 40 different countries, in a study from 2011 to 2015 (2). Childhood TB is scruffy aspect of Tuberculosis Infection, it comprises of 20% or more of total TB infections globally, this fraction may vary from country to country. This miserable epidemic disease was nourishing under adult TB infections, a significant child health problem and neglected because it is usually smear negative. Though, it has relatively little contribution in spreading TB epidemically (3). New amplification and serological tests have been introduced that are more accurate and sensitive as compare to conventional diagnostic tools (3). Due to this reason bacteriological confirmed cases are limited; tuberculin skin test (TST), chest radiography, clinical symptoms, patients and contact history are the parameters to diagnose TB in children. For assistance national TB control program has changed diagnostic algorithm by develop [ping a special checklist to detect TB in pediatric population (4, 5).

In 1989, according to the WHO there were 1.3 million TB cases of children below 15 annually and 450000 deaths. While 7500000 TB cases were reported and 650000 were children below 15, it was 9% of reported cases annually in 1994 worldwide (4). According to a research report of 22 TB high-burden countries in children Pakistan was 14th while Afghanistan as on top of the list (4). There were estimated 61985 TB patients under 15, 25.3% chances of occurring TB in children that is more than average of 15% in low income countries and estimated TB cases of 103 per 100000 in Pakistan(4). Recent reports reveal that there are 207million inhabitants in Pakistan with 66.4 years of life expectancy at birth, 35% of population under 15 and 60%

population spanning rural areas (6, 5). Like other south Asian countries Pakistan has adequate facilities of health and sanitation in urban areas but poor in rural areas. Pakistan health care system includes provincial and district health authorities including others government sector organizations, armed forces, NGOs and private public health providers (5, 7). An estimated two third population is facilitated by private health sector initially; provincial health authorities are striving for better provision of health facilities to the population even in rural areas (7).

TB is a communicable disease and special CDC (communicable disease control) program has been launched to tackle the disseminated diseases throughout country involving provincial and district health authorities and public health providers (5). TB control program was piloted in 1995 in Pakistan. However, significant progress was made after revival of National TB control program NTP in 2001, when TB was declared national public health emergency according to the “ISLAMABAD Declaration” and steady progress has been made for TB detection as well. Though prevalence and incident rate of TB is increasing in Pakistan, 525000 new cases are being reported each year (5, 8). 4million of patients are treated with quality medicine and more 90% success rate regarding quality treatment (8).

MATERIALS AND METHODS:

The core objective of this study was to evaluate the prevalence, to assess the relationship between outcomes of pediatric TB and clinical features. All of children diagnosed with TB at Tehsil headquarter (THQ) hospital Alipur and rural health centers (RHC) Rohilanwali, between January 2019 and September 2019, were included in this retrospective cohort study. We compared demographic, clinical, local and diagnostic data on admission and clinical outcomes of patients after treatments of 6 and 12 months.

Demographic data include Sex, race and Age, HIV co-infection, Bacilli Calmette Guerin (BCG) immunization, and possible tuberculosis contact. We used the health cards for data collection. This is a record of immunization and growth rate widely used in primary, secondary and tertiary healthcare centers in Pakistan to monitor the development of child until child is 5 years old (5, 11).

A definite diagnosis is made on the isolation of acid fast bacterium from sputum or finding of mycobacterium genes via gene x-pert analysis. Such patients who confirmed by AFB staining/ZN staining are termed as bacteriologically confirmed. **ZN Staining;** AFB staining or

Zeal nelson (ZN) hot staining is traditionally used widely trusted clinically test for the diagnosis of mycobacterium tuberculosis(16). Prepared smear from sputum or lungs exudates is heat fixed with primary dye then fixation and washing of unnecessary colors. Finally secondary dye is added for coloration of mycobacterium suspect, this facility is available at secondary and tertiary healthcare centers (5, 10, and 11).

Patients who are not confirmed bacteriologically specifically in pediatric population but through clinical sign symptoms are termed as clinically confirmed cases. In addition, two or more of the following criteria have to be present Acute or chronic bronchitis, sudden weight loss, night sweating, elevated protein, reduced glucose, computed tomography (CT) scan compatible with TB, house hold contacts with AFB positive tuberculosis, chest radiography compatible with primary tuberculosis and tuberculin skin test were enlisted for core consideration for clinically diagnosed individual (5, 11).

C reactive protein (CRP) and elevated erythrocyte sedimentation rate (ESR) is the commonly used accessory test for individuals infected with mycobacterium tuberculosis. While radiography is very helpful in diagnosis of TB as white shadowed patches on lungs in chest X-ray reveals the severity of damage to the lungs due to MTB while CT scan and magnetic resonance imaging (MRI) can be helpful if Chest X-ray is not productive in diagnosis (12, 13 and 14).

National TB control program (NTP) is working in Pakistan following DOTs (Directly Observed Treatment short course) guideline. WHO has recommended 1-5 different standards to categories and diagnose TB while WHO standard 2 ask to for evaluation of people were living with Pulmonary TB patients, patients who have developed sign and symptoms suggestive of TB, patients with immune-compromised condition like HIV(5, 9). NTP is providing free drugs (Myrin-P & Myrin-P forte) and collation to provide tools for better diagnosis of TB infected individuals, that includes; ZN staining, radiography and CBC while CT scan and MRI is available on tertiary care level hospitals only (5). While NTP team's representatives are organizing continuous medical camps for the facility of treatment and diagnosis reached out to every individual even from remote rural areas, while gene x-pert is another facility provided to tertiary and secondary level of health care (5, 15).

After treatment of 6 and 12 months (in case of resistant cases) outcomes were calculated and efficacy of provided treatment is measured via statistical analysis and success of treatments in considered TB cases (either bacteriologically confirmed or clinically confirmed). Corn stones of

tuberculosis treatments are antimicrobial drugs, immunomodulation and management of hydrocephalus. Major focus of treatment is individual cure of infected individual and management of disseminating infection in the community, thus tuberculosis treatment is not only beneficial for individual patient but for whole community, in which patient resides. The main objective of tuberculosis therapy is to reduce the rapidly growing number of bacilli in patient, thus managing the severity of disease, halting the transmission of pathogen from one infected individual to other. Tuberculosis therapy is to eradicate the populations persisting bacilli in order to achieve durable cure (prevent relapse) after completion of cure and preventing death. The initial four antimicrobial are provided to all TB patients who are confirmed drug sensitive Tb (DSTB) cases, otherwise drug resistant cases like MDR after being tested according to the WHO standard where first line treatment regimen is ineffective and results in unfavorable treatment outcomes. (5, 16)

RESULTS:

We have collected sputum from 4739 patients who were tuberculosis suspects on the basis of above given criteria for diagnosing TB. Patients with acute or chronic >2 weeks cough, sudden weight loss, blood stained pulmonary exudates, night fever and sweating were the parameters of study in the duration of last 9 month in OPD of thousands of patients from an area with population of more than one million individuals, patients who were infected with mycobacterium and visiting any other private or public clinic other than these two (THQ hospital ALIPUR & Rural health center Rohilanwali) were not part of the study though they were confirmed cases.

During last 9 months there were 1006 positive TB cases among 4739 suspects of tuberculosis (449 positive TB cases among 2425 suspects at THQ hospital Alipur, 557 positive cases among 2314 TB suspects at rural health center Rohilanwali). Each quarter consist of three months and detail of each quarter is as given (1st quarter 136 positive TB cases among 795 suspects, 2nd quarter 171 positive cases among 870 suspects and 3rd quarter 142 positive cases among 760 suspects at THQ hospital Alipur; 1st quarter 223 positive cases among 811 suspects, 2nd quarter 211 positive cases among 781 suspects and 3rd quarter 123 positive cases among 722 suspects at Rural health center Rohilanwali). Bacteriologically confirmed cases, clinically confirmed cases,

pulmonary TB cases and extra pulmonary TB cases are included in positive cases as it is given in the table1.

Quarter	Suspects at RHC RW*	Confirmed TB cases	Suspects at THQ AP**	Confirmed TB cases
1 st	811	223	795	136
2 nd	781	211	870	171
3 rd	722	123	760	142
Total	2314	557	2425	449

Table1: Rural health center Rohilanwali (RHC RW)*, Tehsil head quarter hospital Alipur (THQ AP).** Above given table shows the numeric of TB suspects and confirmed cases at above given two centers in last 9 months.

According to the data summarization after stats and algorithms we have found that prevalence of bronchitis was very high in the vicinity. 4739 patients were suffering with acute or chronic bronchitis, night fever and night sweating or weight loss either. 1006 (21.23%, 1006/4739) of suspects were truly infected through mycobacterium tuberculosis. Majority of male patients were under Mycobacterium tuberculosis attack. When had found that girls were more affected by the infection as compared to the boys. Almost 18 % of positive cases (181/1006) and nearly 4% of suspects (181/4739) were children as it is given in the pie chart 1.

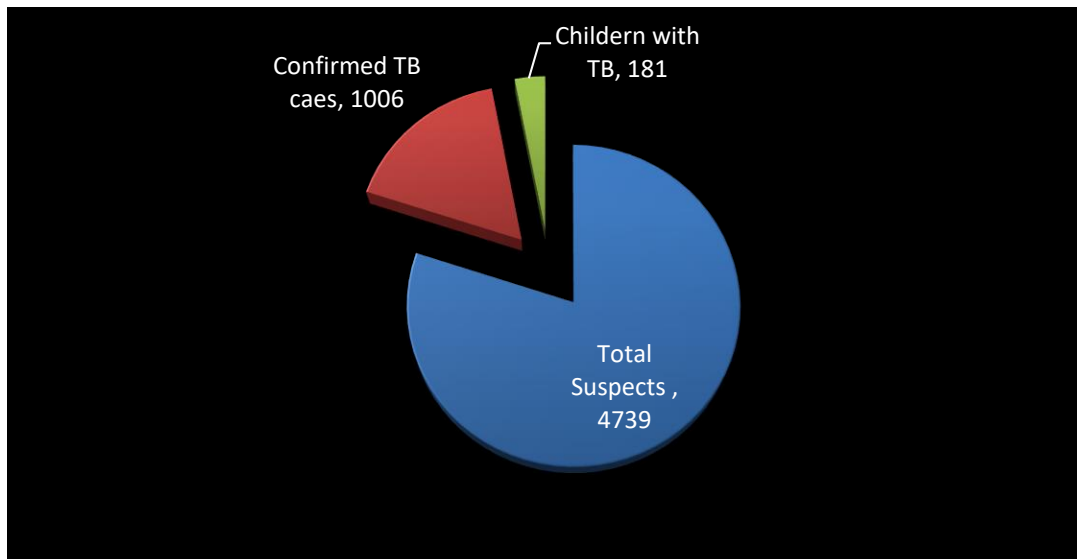


Chart1: illustrate the distribution of TB infected individuals as suspects, positive cases and number of children with TB.

DISCUSSION:

There were children of age 0-14 years were considered in research. 181 positive TB cases were resulted after being diagnosed and confirmed (bacteriologically or clinically either) who were suffering from pulmonary and extra pulmonary TB. Distribution of children is as given in the table2 and table3 below. As it is obvious from the collected data, there were 181 positive tuberculosis cases in children among 4739 (2425 cases at THQ AP and 2314 cases at RHC RW) suspects of bronchitis. Among these 181 cases in children 83 (45.85% of positive cases) were boys and 98 (54.15% of positive cases) were girls. Ratio of reported positive cases varies with time. After quantitative analysis of data we have found that maximum cases were reported in second quarter (in months of April, May and June), following these months atmospheric conditions changes dramatically from moderate to high temperature. But high temperature is not enough reason that is responsible for spread of infection but common house practice and life style people following there.

Quarter	Age 0-4 years	Age 5-14 years	Total Positive Cases (percentage)

1 st	02	45	47 (25.96%)
2 nd	11	74	85 (46.96%)
3 rd	06	43	49 (27.00%)
Total;	19	162	181 (100%)

Table2: shows that 46.96% of children cases were reported in second quarter while 25.96% and 27% cases were reported in first and third quarter respectively.

Quarter	Girls (percentage)	Boys (percentage)	Total
1 st	20 (11.0%)	27 (14.9%)	47
2 nd	51 (28.2%)	34 (18.8%)	85
3 rd	27 (14.9%)	22 (12.15%)	49
Total;	98 (54.15%)	83 (45.85%)	181

Table3: reveals that 54.15% of positive reported children were girls and 45.85% of reported positive cases were boys. It shows that girls are more affected by infection.

Above given data shows that nearly half of the cases are reported in second quarter, while ratio of disseminated infection in first and third quarter was almost the same with little factor of variance. Infection spread through children while affected the girls more than boys. The above tables reveal that 181 patients were children that are almost 17.9% of total infected individuals who are infected with MTB. Expectancy of MTB infection in children is 15% in low income countries, while 20% are suffering globally that percentage was 9% in 1994 (3, 4 & 5) and 17.9% children cases were there in our research area, though our research spectrum had not

covered all of patients but it includes mostly of them. None of mortality case was reported due to MTB infection.

Alipur is a developing town with plentiful resources like secondary healthcare center, good sanitary system, and private healthcare provider collaborating with NTP, local & private bodies who are struggling to eradicate quack practice and raise the standard of life by promoting education. Mostly population is educated and livelihood is not associated with agriculture directly but other businesses. Rohilanwali is an under developing area with limited resources. So, as both areas are 40km away, so do their results. It is seen that number of suspects reported in Alipur are higher than number of suspects reported in Rohilanwali, while prevalence of infected individual are higher in Rohilanwali. It shows that infection prevalence higher in Rohilanwali while people are still need to explore importance of public health education, personal healthcare and importance of infection management via individual efforts. Reported suspects in Alipur are higher than Rohilanwali because people in Alipur are more literate and well aware of health importance. Air pollution, traffic, water pollution and problems alike are more prevalent in Alipur, as urbanization is increasing day by day. While Rohilanwali is an area with agricultural sites, clean air and water. Each area has its own drawbacks and benefits

Quarter (Three month each)	RHC RW Boys/Girls	THQ Hosp. AP Boys/Girls	Total Boys/Girls
1 st	23/10	04/10	47 (27/20)
2 nd	21/35	13/16	85 (34/51)
3 rd	10/18	12/09	49 (22/27)
Total;	62/55	26/38	181 (83/98)

Table4: shows that ratio of infected boys is higher than girls in Rohilanwali (RW) while its reverse in case of THQ hospital Alipur (AP).

Above given data reveals reported girls positive cases is lower in Rohilanwali while its higher in Alipur, factors responsible for this varying ratio is literacy rate, availability of facilities and more

importantly their norms and values that are too much strict for females and children even. In other words a male oriented society creating this difference in clinical practice even.

CONCLUSION:

Both of towns are facing somehow same problem, increasing prevalence of MTB infection. Though overall positive cases are high but children are less affected by the infection. As it comprise 17.9% of total reported positive cases. There are several reasons responsible for this little percentage, firstly people are not well aware of infection, secondly public & private health provider are not their priority (in case of illiterate patients) but quacks, lack of facilities to facilitate patients is another major sum to be solved at primary level. Literacy rate, health education awareness, rituals and norms are some of factors that are responsible for increasing prevalence of MTB infection.

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