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# The Social Determinants and Co-morbidities of Tuberculosis Patients in Ernakulam General Hospital TB Unit.

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## ABSTRACT

**Background:** Tuberculosis remains as a major public health problem over many years. India is the country with the highest TB burden in the world. About a quarter of the MultiDrug Resistant TB are reported from India alone. Even though we are implementing a TB control programme, the number of TB cases especially MDR- TB cases are increasing every year.

**Objectives:** The main objectives of the study were to assess social determinants and Comorbidities of TB patients in Ernakulam General Hospital TB Unit

**Methods:** The study was conducted in General Hospital TB Unit, Ernakulam District. Study design selected was descriptive cross-sectional study. Among the TB patients who had attended the OPD during the study period 120 TB patients were selected. Data was collected using an interview and structured questionnaire.

**Results and discussion:** Calculated Chi square value revealed that Social determinants have an influence among TB cases. This is significant, in light of WHO- TB elimination strategy. Regarding smoking habit of patients the results were very similar to Study conducted by Bibha Marak, Prabhdeep Kaur , Sudha R Rao and Sriram Selvaraju (2016) conducted a study on Non-communicable disease comorbidities and risk factors among tuberculosis patients, Meghalaya, India. A cross-sectional study showed prevalence of ever smoking was 74.5% and 55.4%; alcohol consumption 31.0%.

**Conclusion:** The complete success of TB treatment depends on identifying one's social – economical issues and other diseases which they have and taking appropriate remedial measures to bring forth their ideal health. As health defines the complete mental, physical and social wellbeing of an individual, we health workers have a greater responsibility to focus on their (Patients) quality of life as well as treatment for TB.

**KEY WORDS:** Social Determinants; Comorbidities; TB patients; TB Unit.

## LIST OF ABBREVIATIONS USED

AIDS : Acquired Immunodeficiency Syndrome BCG: Bacillus Calmette Guarine

DOTS: Directly Observed Treatment Short course DS -TB: Drug Sensitive Tuberculosis FDC: Fixed Dose Combination

HIV: Human Immunodeficiency Virus

MDR - TB: Multi - drug Resistant Tuberculosis NHM: National Health Mission

NSP: National Strategic Plan

NTP: National Tuberculosis Programme OPD: Outpatient Department

RNTCP: Revised National Tuberculosis Control Programme RR - TB: Rifampicin Resistant Tuberculosis SPSS: Statistical Package for Social

Sciences TB: Tuberculosis TU: Tuberculosis Unit

WHO: World Health Organization

X- DR TB: Extensively Drug Resistant Tuberculosis

## CHAPTER – I INTRODUCTION

Tuberculosis is a public health threat for thousands of years. It is the first infectious disease which was declared as a global health emergency by the World Health Organization (WHO) in 1993. [1] Tuberculosis remains a leading

cause of morbidity and mortality especially in developing countries. Tuberculosis is a disease of major public health importance in India since India is the country having highest TB burden in the world.[2]

Tuberculosis (TB) is caused by Mycobacterium tuberculosis bacteria that most often affect the lungs. Tuberculosis spreads from one individual to another through tiny droplets released into air. When people with lung tuberculosis infection cough, sneeze or spit, they release bacteria into the air. According to WHO about one-quarter of the world's population has latent TB and people infected with TB bacteria have a 5–15% lifetime risk of falling ill with TB. Persons with compromised immune systems, such as people living with HIV, malnutrition or diabetes, or people who use tobacco, have a much higher risk of getting infected.[3]

When a person develops active tuberculosis disease, the symptoms may be very mild for many months. Which can cause delay in seeking care, and results in transmission of bacteria to others. People with active TB can infect 10-15 other people through close contact over the course of a year. 45% of HIV -negative people with TB on average and nearly all HIV -positive people with TB die due to lack of proper treatment.[3]

All age groups are at the risk of getting tuberculosis infection. Tuberculosis mostly affects adults in their most productive years. Over 95% of cases and deaths occur in developing countries. It is found that use of tobacco greatly increases the risk of TB disease and death. 7.9% of TB cases worldwide are attributable to smoking.[4]

TB is a treatable and curable disease. Active, drug-susceptible TB disease is treated with a standard 6months course of 4 antimicrobial drugs that are provided with information, supervision and support to the patient by a health worker or trained volunteer.[4] Support during treatment is a key factor affecting treatment compliance. Compliance to tuberculosis treatment by the patients is very important in reducing the spread of tuberculosis. The vast majority of TB cases can be cured when medicines are provided and taken properly. Between 2000 and 2017, an estimated 54 million lives were saved through TB diagnosis and treatment.[4]

**Global impact of TB**

Worldwide, TB is one of the top 10 causes of death and the leading cause from a single infectious agent (above HIV/AIDS).[3] Millions of people continue to fall sick with TB each year. TB occurs in every part of the world. According to WHO's Global TB report 2018, the largest number of new TB cases occurred in the South-East Asia and Western Pacific regions, with 62% of new cases, followed by the African region, with 25% of new cases. Only 6% of cases were in the WHO European Region and the WHO Region of the Americas, each of which has 3% of cases. In 2017, 87% of new TB cases occurred in the 30 high TB burden countries.[5]

In 2017, there were an estimated 10 million new cases of TB disease (also known as active TB). TB affects all

countries and age groups but overall the best estimates for 2017 were that ninety per cent were adults (aged > or = 15), 64% were male, 9% were people living with HIV (72% of them in Africa). Two thirds were in eight countries India (27%), China (9%), Indonesia (8%), the Philippines (6%),
Pakistan (5%), Nigeria (4%) and South Africa (3%).[5]

TB is a leading killer of HIV-positive people. Multidrug-resistant tuberculosis (MDR-TB) remains a public health crisis and a health security threat. WHO estimates that there were 558 000 new cases with resistance torifampicin – the most effective first-line drug, of which - 82% had MDR-TB. Three countries accounted for almost half of the world's cases of MDR/RR-TB are India (24%), China (13%) and the Russian Federation (10%).[5]

Globally, TB incidence is falling at about 2% per year. This needs to accelerate to a 4–5% annual decline to reach the 2020 milestones of the End TB Strategy.

**TB burden in INDIA**

New tuberculosis (TB) cases may be coming down, but India accounted for 27% of the total new infections in 2017, which is the highest among the top 30 high TB burden countries in the world.[5] TB statistics of India from WHO's Global TB report 2018 is given below.

| **ESTIMATES OF TB BURDEN** | | |
|---|---|---|
| | NUMBER(THOUSAN DS) | RATE(PER100000POPUL ATION) |
| Mortality(excludes HIV+TB) | 410 (381–441) | 31 (28–33) |
| Mortality (HIV+TB only) | 11 (6.5–16) | 0.79 (0.48–1.2) |
| Incidence (includes HIV+TB) | 2 740 (1 870–3 770) | 204 (140–281) |
| Incidence (HIV+TB only) | 86 (57–120) | 6.4 (4.3–9) |
| Incidence (MDR/RR-TB) | 135 (78–208) | 10 (5.8–16) |
| **TB CASE NOTIFICATIONS** | | |
| Total cases notified | | 1908 371 |

| | |
|---|---|
| Total new and relapse | 1786 681 |

| UNIVERSAL HEALTH COVERAGE AND SOCIAL PROTECTION | |
|---|---|
| TB treatment coverage (notified/estimated incidence) | 65% (47–96) |
| TB case fatality ratio (estimated mortality/estimated incidence) | 0.16 (0.11–0.22) |
| **DRUG-RESISTANT TB CARE** | |
| Estimated MDR/RR-TB cases among notified pulmonary TB cases | 65 000 (54 000–76 000) |
| MDR/RR-TB cases tested for resistance to second-line drugs | 26832 |
| Laboratory-confirmed cases | MDR/RR-TB:39009, XDR-TB:2650 |
| Patients started on treatment | MDR/RR-TB:35950, XDR-TB:2838 |

Of the 10 million new cases reported in 2017, 2.74 million were from India, a marginal decrease from the 2.79 million that the country reported in WHO's 2017 report. In January-August 2018, as many as 3,32,149 patients have been notified to the government from the private sector as compared to the total number of patients (3,83,784) notified in 2017. [5,6]

Drug-resistant tuberculosis continues to be a public health crisis worldwide and in India, with a quarter of the world's multi drug resistant-tuberculosis (MDR-TB) being reported from India alone. An estimated 558,000 people worldwide in 2017 were resistant to Rifampicin, the most effective first-line TB drug, and of these, 82% had MDR-TB that is resistant to more than one drug. [5,7]

**TB Statistics in Kerala**

Kerala's TB incidence rate is just 67/100000 members of the population as against all India rate of 138/100000 members of population.[8] According to

India TB report 2018 by Ministry of health and family welfare, 14,520 TB cases were reported from public sector and 8231 cases were reported from private sector of Kerala with total of 22,751 TB patients.[9]Across India,5.62% TB patients were detected with drug resistant tuberculosis in 2017, while Kerala had 3.05% as per RNTCP figures.[8]

**TB statistics in Ernakulam district**

According to statistics given by District TB centre Ernakulam there 1705 cases were registered in 2018 and 1890 cases were registered in 2019. Multi drug resistant (MDR) TB cases reported in 2018 were 46 in number, where in 2019 MDR TB cases increased to 57.

**TB treatment**

The main aims of TB treatment are: cure the patient and restore quality of life and productivity, prevent death from active TB or its late effects, prevent relapse of TB, reduce transmission of TB to others, prevent the development and transmission of drug resistance. [10,11]

Standard TB treatment requires patients to take a complex combination of drugs for 2 months in intensive phase and 4 months in continuation phase for new patients. In the treatment of patients with MDR-TB, an intensive phase of at least 8 months and a total treatment duration of at least 24 months is recommended. There are more than twenty drugs available for TB treatment. They are used in different combinations in different circumstances.[11]

**Social Determinants and TB-**

Poverty is a powerful determinant of tuberculosis. Crowded and poorly ventilated living and working environments often associated with poverty constitute direct risk factors for tuberculosis transmission. Undernutrition is an important risk factor for developing active disease.

Key structural determinants of TB epidemiology include global socioeconomic inequalities, high levels of population mobility, and rapid urbanization and population growth. These conditions give rise to unequal distributions of key social determinants of TB, including food insecurity and malnutrition, poor housing and environmental conditions, and financial, geographic, and cultural barriers to health care access. In turn, the population distribution of TB reflects the distribution of these social determinants, which influence the 4 stages of TB pathogenesis: exposure to infection, progression to disease, late or inappropriate diagnosis and treatment, and poor treatment adherence and success.

**Comorbidities and TB-**

TB and HIV

People living with HIV are from 15-22 times more likely to develop TB than persons without HIV. TB is the most common presenting illness among people living with HIV, including among those taking antiretroviral treatment and it is the major cause of HIV-related death. In 2018, there were an estimated 251 000 deaths from HIV-associated TB.

TB and diabetes

The risk of TB among people with diabetes is 2-3 times higher than among those without diabetes. Diabetes can worsen the clinical course of TB, and TB can worsen glycaemic control in people with diabetes. Individuals with both conditions thus require careful clinical management. Strategies are needed to ensure that optimal care is provided to patients with both diseases.

TB and nutrition

Malnutrition increases the risk of TB and TB can lead to malnutrition. Malnutrition is therefore often highly prevalent among people with TB. While appropriate TB treatment often helps normalize nutritional status, many TB patients are still malnourished at the end of TB treatment.

TB - Tobacco smoking and Alcohol use

Tobacco smoking increases the risk of TB 2-3 fold, and is associated with poor TB treatment results. Smoking prevalence is often high among people with TB, and prevalence of other smoking-related conditions can be high as well.

Harmful use of alcohol increases the risk of TB threefold, and is also a strong risk factor for poor TB treatment adherence. In countries with high prevalence of alcohol use disorders, and especially in intermediate- and low-incidence countries where TB has become highly concentrated to certain vulnerable groups, harmful alcohol use can be an important population level risk factor for TB, and is often a common co-morbidity among TB patients.

In this study, the Kuppuswamy scale is used to assess the Social determinants.

## SIGNIFICANCE OF THE STUDY

TB shares underlying social determinants with many of these conditions. Addressing the social determinants of health is a shared responsibility across disease programmes and other stakeholders within and beyond the health sector.

When these conditions are highly prevalent in the general population they can be important contributors to the TB burden. Consequently, reducing the prevalence of these conditions can help prevent TB.

This study aims to find out Social determinants and Co morbidities of TB Patients and to recommend measures to improve the services under TB control programme. Moreover, there are only very few studies conducted in Kerala particularly in Ernakulam district for identifying TB- Social determinants and co morbidities. Hence this study

assumes significance.

## CHAPTER – II OBJECTIVES

The present study aims to find out the Social determinants and Co morbidities of TB patients in Ernakulam General Hospital TB Unit

? To study the Social determinants among TB patients (Both Pulmonary and Extra Pulmonary TB Patients)

? To study Socio economic factors of TB patients using Kuppuswamy Scale

? To study the Co morbidities of TB patients

## CHAPTER – III

## REVIEW OF LITERATURE AND BACKGROUND

In keeping with the aim of this study, to identify Social determinants and co morbidities of TB patients and how to improve the treatment , this chapter reviews relevant literature on the topic under study. This literature review synthesizes information obtained from textbooks, publications, newspaper, scientific reports and other sources of scientific work done globally, mainly on Social determinants and co morbidities of TB.

### TUBERCULOSIS

**Definition**

Tuberculosis is a specific infectious disease caused by *Mycobacterium tuberculosis.* The disease primarily affects lungs and causes pulmonary tuberculosis. It can also affect intestine, meninges, bones and joints, lymph glands, skin and other tissues of the body. The disease also affects animals and is known as "bovine tuberculosis". Pulmonary tuberculosis, the most important form of tuberculosis which affects man.[16]

**Natural history of tuberculosis**

**? Agent factors**

(a) AGENT: Mycobacterium tuberculosis which is a facultative intracellular parasite.[16]

(b) SOURCE OF INFECTION: The two sources of infection are human and bovine.

(i) *Human* source: The most common source of infection is the person whose sputum is positive for tubercle bacilli and who has either received no treatment or has not been treated fully.[16]

(ii) *Bovine source:* The bovine source of infection is usually infected milk.[16]

(c) COMMUNICABILITY: Patients are infectious as long as they remain untreated. Effective anti-microbial treatment reduces infectivity by 90 per cent within 48 hours.[16]

**Host factors**

(a) AGE: Tuberculosis affects all ages. A sharp rise in infection rates from childhood to adolescence was noted in developing countries. In India, an average of 2 % TB cases were in the "0-14 years age group", the infection rate climbs toabout20 % at age 15-24 years. In the developed countries, the disease is now more common in the elderly.[16]

(b) SEX: More prevalent in males than in females. [16]

(c) HEREDITY: Tuberculosis is not a hereditary disease.[16]

(d) NUTRITION: Malnutrition is widely believed to predispose to tuberculosis.[16]

(e) IMMUNITY: Man has no inherited immunity against tuberculosis. It is acquired as a result of natural infection or BCG vaccination. Past infection with atypical mycobacteria also credited with certain amount of naturally acquired immunity.[16]

**Social factors**

Tuberculosis is a social disease with medical aspects. The social factors include many non-medical factors such as poor quality of life, poor housing, and overcrowding, population explosion, undernutrition, smoking, alcohol abuse, lack of education, large families, early marriages, lack of awareness of causes of illness, etc..[16]

**Mode of transmission**

Tuberculosis is transmitted mainly by droplet infection and droplet nuclei generated by sputum-positive patients with pulmonary tuberculosis.[16]

**Incubation period**

The development of disease depends upon the weeks, and closeness of contact, extent of the disease and sputum positivity of the source case (dose of infection) and host parasite relationship. The incubation period may be weeks, months or years.[16]

**Symptoms of tuberculosis**

Symptoms of TB depend on the type of TB. Type of TB depends on the part of the body affected. The general symptoms of TB include weakness, loss of weight, lack of appetite, chills, fever and night sweats.[17]

The main symptoms of pulmonary TB include cough lasting longer than 3 weeks, pain in chest, coughing up of blood or phlegm from deep inside the lungs. Extra pulmonary tuberculosis also called as miliary TB. The symptoms of extra pulmonary tuberculosis depends on a particular site infected with TB bacteria. Symptoms of lymph node TB include painless slowly enlarging lymph nodes especially in the neck. Symptoms of skeletal TB include pain, curving of the affected joint, loss of movement of affected joint. Back pain is the commonest symptom of spine TB. TB meningitis begins with general symptoms like pain, fever etc. and proceeds to vomiting, headache, neck stiffness and seizures. Gastro intestinal TB symptoms include abdominal pain, diarrhea, bleeding from rectum or anus.[17]

**Diagnosis of TB**

On physical examination look for enlarged lymph nodes. Most commonly used diagnostic tool is a simple skin test – Mantoux test. PPD tuberculin is injected intradermally and the result is read within 48 to 72 hrs.

There are a number of TB tests currently available for diagnosing TB. Three of these are now recommended in the new National TB Plan to be used for adults in India who might have TB. The three tests are sputum smear microscopy, chest

X -ray, and the CB-NAAT test. The CB-NAAT test is now being made available throughout India. The CB-NAAT test is called Genexpert in most countries outside India. There is also now the True-nat Test which is starting to be used.

Imaging tests like X- ray, CT scan can also be used for diagnosis. Imaging tests may show white spots in lungs developed as a result of infection. Sputum examination is an important diagnostic tool. It can be done not only for diagnosis but also or identifying drug resistant strains of TB.[18]

**Control of tuberculosis**

Tuberculosis control means reduction in the prevalence and incidence of disease in the community. Since tuberculosis is an infectious disease, the basic principles of prevention and control are the same as for any other infectious disease. The control measures consist of acurative component namely case finding and treatment; and a preventive component namely BCG vaccination.[16]

**TB TREATMENT INITIATIVES**

TB control programmes have been implemented in India for more than 50 years. The *National TB Programme* (NTP) was launched in 1962 by Govt. Of India. It used the district TB centre model which mainly focused on BCG vaccination and TB treatment. In 1978, BCG vaccination was shifted under the *Expanded Programme on Immunization*(EPI). In 1993,WHO declared TB as a global emergency and introduced *Directly Observed Treatment Short course* (DOTS) and recommended it by all countries. The Government of India revitalized NTP as a *Revised National Tuberculosis Control Programme* (RNTCP) in the same year. DOTS was officially launched as the RNTCP strategy in 1997 and by the end of 2005 the entire country was covered under the programme

**DOTS**

Directly Observed Treatment Short course(DOTS) is a strategy introduced by RNTCP to improve the compliance among TB patients by directly observing the patient taking medication[20] .Patient takes the medicine in the presence of treatment observer who can be a health worker, friend, relative, ASHA worker, or a lay person who work as treatment supervisor or supporter.[21]

**Revised National Tuberculosis Control Programme (RNTCP)**

RNTCP was launched in 1997 based on WHO recommended DOTS strategy. The main objective was to provide free diagnosis and treatment. The diagnosis is made primarily by sputum microscopy provided through microscopy centers freely. Treatment is provided using DOTS strategy. Tuberculosis Unit and sub district level unit comprising specialized staff were established for supervision. The programme has detailed guidelines for

programme management, programmatic management of drug resistant tuberculosis, TB-HIV, paediatric TB, supervision and monitoring, public private mix, air borne infection control.[22]

Recently RNTCP has released *National Strategic Plan (NSP) for tuberculosis elimination 2017-2025* for the control and elimination of TB in India by 2025. According to NSP, TB elimination have been integrated in to four strategic pillars: *Detect - Treat - Prevent - Build.*[22]

❖ Detect

It aims at finding all drug sensitive cases (DS-TB) and drug resistant TB cases (DR- TB) with emphasis on reaching TB patients seeking care from private providers and undiagnosed TB cases in high risk populations (prisoners, migrant workers, people living with HIV/AIDS etc.).[22]The main initiatives under this strategies are:

✔ Notification of TB cases: All health care providers(Government, private, NGO, individual practitioners) should notify TB case to local health authorities every month.

**NIKSHAY**: To facilitate TB notification, RNTCP has developed a case based, web-based TB surveillance system called NIKSHAY for both Government and private health care facilities. Public - private partnership: Private providers are provided incentive for TB case notification. The incentives are provided through direct beneficiary transfer.

✔ Free drugs and diagnostic tests to TB patients in private sector.[22]

❖ Treat

The main strategies under this include:

✔ Provision of free TB drugs in the form of daily fixed dose (FDCs) for all TB cases with the support of directly observed treatment.

✔ Screening of all patients for rifampicin resistance.

✔ Treatment of drug sensitive cases.

✔ Nikshay poshak yojana: Centrally sponsored scheme under NHM,

financial incentive Rs.500/- per month provided for nutritional support to each notified TB patient for which the patient is on anti- TB treatment.
Incentives are delivered through direct benefit transfer.

✔ Intensifying the TB control activities in following key populations: TB-HIV, diabetic and tobacco and

alcohol dependence, under nourished, socially and economically backward etc. [22]

❖ Prevent

The main methods of TB prevention recommended are:

✔ Scale up air borne infection control measures at health care facilities.

✔ Treatment for latent TB infection in contacts of bacteriologically confirmed cases.

✔ Address social determinants of TB through inter sectoral approach.

✔ Isoniazid preventive therapy.

✔ BCG vaccination.[22]

❖ Build

It mainly aims at health system strengthening, enabling policies, empowering institution and human resources with enhanced capacities.[22]

**WHO - END TB strategy**

**Vision:** A world free of tuberculosis – zero deaths, disease and suffering due to tuberculosis.[23]

**Goal:** End the global tuberculosis epidemic.[23]

**Milestones for 2025** :75% reduction in tuberculosis deaths (compared with 2015) 50% reduction in tuberculosis incidence rate (less than 55 tuberculosis cases per 100 000 population) – No affected families facing catastrophic costs due to tuberculosis.[23]

**Targets for 2035:** 95% reduction in tuberculosis deaths (compared with 2015) 90% reduction in tuberculosis incidence rate (less than 10 tuberculosis cases per 100 000 population) – No affected families facing catastrophic costs due to tuberculosis.[23]

**Principles**

1. Government stewardship and accountability, with monitoring and evaluation
2. Strong coalition with civil society organizations and communities

3. Protection and promotion of human rights, ethics and equity

4. Adaptation of the strategy and targets at country level.[23]

**Pillars and components**

1. Integrated, patient-centered care and prevention

✧ Early diagnosis of tuberculosis including universal drug-susceptibility testing and systematic screening of contacts and high-risk groups Treatment of all people with tuberculosis including drug-resistant tuberculosis, and patient support

✧ Collaborative tuberculosis/HIV activities, and management of comorbidities

✧ Preventive treatment of persons at high risk, and vaccination against tuberculosis.[23]

✧ Bold policies and supportive systems

✧ Political commitment with adequate resources for tuberculosis care and prevention

✧ Universal health coverage policy, and regulatory frameworks for active notification, vital registration, quality and rational use of medicines, and infection control.

✧ Social protection, poverty alleviation and actions on other determinants of tuberculosis.[23]

2. Intensified research and innovation

✧ Discovery, development and rapid uptake of new tools, interventions and strategies.

✧ Research to optimize implementation and impact, and promote innovations.[23]

## TUBERCULOSIS TREATMENT

The antitubercular drugs are used in various combinations in different circumstances. Some anti-tuberculosis drugs (first line drugs) are only used for the treatment of new patients who are very unlikely to have resistance to any of the TB drugs. Second line drugs are only used for the treatment of drug resistant TB. Some new drugs were also found to be useful for treatment but most are still undergoing testing. It is often now that several TB drugs are combined together in one tablet or pill. This is known as a FDC, or Fixed Dose Combination.[24]

### TB drug regimens

A regimen means a course of treatment. For TB this means a combination of TB drugs. Drug regimens are described in a standard manner. The first line TB drugs are: Isoniazid (H), Rifampicin (R), Pyrazinamide, (Z) Ethambutol (E).[25]These are the anti-tubercular drugs that generally have the greatest activity against TB bacteria. These medicines are particularly used for the treatment of active TB cases who have not had TB drug treatment before. All other TB drugs are generally referred to as second line drugs.[25] Second line drugs are quinolones including levofloxacin, moxifloxacin, linezolid, clofazimine, para amino salicylic acid, thioacetone etc. [26]

### New TB Drugs

Bedaquiline is a new TB drug which is also known by the trade name of Sirturo. Bedaquiline acts by blocking an enzyme inside the Mycobacterium tuberculosis bacteria called ATP synthase. Bedaquiline is given in combination with other TB drugs to treat pulmonary TB in adults when they have multi drug resistant TB (MDR-TB). The recommended dose is 400 mg a day for two weeks and then 200 mg taken three times a week (with at least 48 hours between doses) for the next 22 weeks.[27]

Delamanid is another new TB drug used for TB treatment. Formerly it was known as OPC-67683 and the trade name was Deltyba. It is the first in a new class of TB drugs called nitroimidazoles. Delamanid is used for the treatment of TB that is affecting the lungs, and which is multi drug resistant. It is available as 50mg tablets and the recommended dose is two tablets taken twice a day with food. Treatment is for six months.[28]

### TB treatment for new patients

Patients who are previously treated, or had less than one month of anti TB drugs, are considered to be new patients. New patients are presumed to have drug susceptible TB (TB which is not resistant to any of the TB

drugs) unless there is a high level of isoniazid resistance in new patients in the area. The other people who may have drug resistant TB are people who have developed active TB disease after they have been in contact with someone who is known to have drug resistant TB.[29]

For new patients with drug sensitive TB the World Health Organization (WHO) recommends that they should have six months of TB drug treatment. This should consist of a two month "intensive" treatment phase followed by a four month "continuation" phase. For the two month "intensive phase" TB drug treatment, they should receive:Isoniazid (H/Inh)with rifampicin (R/Rif) and pyrazinamide (Z/Pza) and ethambutol (E/Emb) followed by isoniazid (H/Inh) with rifampicin (R/Rif) for the "continuation phase" of TB treatment.[29]

It is recommended that patients take TB drugs every day for six months. It is extremely important that all the recommended TB drugs are taken for the entire time. The amount of any drug that a patient needs to take depends on the patient's weight.[29]

- Isoniazid 5 (mg/kg body weight) maximum (mg) 300
- Rifampicin 10 (mg/kg body weight) maximum (mg) 600
- Pyrazinamide 25 (mg/kg body weight)
- Ethambutol 15 (mg/kg body weight).[29]

**TB treatment for patients who require retreatment**

Patients eligible for retreatment should be referred for a rapid molecular test or drug susceptibility testing to determine at least Rifampicin resistance, and preferably also isoniazid resistance status. On the basis of the result of the drug susceptibility test(s), a standard first line treatment regimen (2HRZE/4HR) can be repeated if no resistance is documented. If Rifampicin resistance is present, an MDR-TB regimen should be prescribed according to WHO's drug resistant TB guidelines.[29]

**Treatment of Multi – Drug Resistant Tuberculosis (MDR -TB)**

The standardized treatment regimen for MDR- TB in India is a six drugs regimen, with an intensive phase of six to nine months and a continuation phase of 18 months and that makes the total duration of treatment about 24- 27 months. The six drugs- kanamycin, levofloxacin, cycloserine, ethionamide, pyrazinamide, and ethambutol are used for intensive phase.[30]

Four drugs-levofloxacin, ethionamide, ethambutol, cycloserine are used during the 18 months of the continuation phase. P-aminosalicylic acid (PAS) is kept as a reserve drug in the event of intolerance of or a reaction to any one

of the other drugs. The regimen involves daily DOT, with kanamycin given for 6 days in a week. Patients are treated according to 3 weight bands: 16–25 kg, 26–45 kg, and more than 45 kg.[30]

**Treatment of Extensively Drug -resistant Tuberculosis**

The regimen for XDR-TB would be of 24-30 months duration, with 6-12 months intensive phase and 18 months continuation phase. The intensive phase consists of seven drugs- capreomycin (Cm),P-amino salicylic acid (PAS), moxifloxacin (Mfx),high dose INH, clofazimine, linezolid and amoxiclav.The continuation phase consists of six drugs-P-aminosalicylic acid (PAS), moxifloxacin (Mfx), high dose INH, clofazimine, linezolid and amoxiclav.[30]

**Side effects of TB drugs**

TB medicine has some side effects. Side effects can be minor or serious. Some of the minor side effects are [31]: rifampin can turn urine, saliva, or tears orange. Rifampin can make you more sensitive to the sun, makes birth control pills and implants less effective. If you are taking rifampin as well as methadone (used to treat drug addiction), you may have withdrawal symptoms. Your doctor or nurse may need to adjust your methadone dosage.[31]

Some of the serious side effects of TB drugs are:

Anorexia ,vomiting, yellowish skin or eyes,fever for 3 or more days, abdominal pain, tingling in the fingers or toes, pain in the lower chest or heart burn, feeling itchy, skin rash, easy bruising, bleeding from gums, nose bleeding, nausea, urine becomes dark or brown in color, aching joints, dizziness, tingling or numbness around the mouth blurred or changed vision, ringing in the ears, hearing loss.[31]

**Some of the studies that are related to topic under study are:**

M Muniyandi and Rajeswari Ramachandran (2008) conducted a study on *Socioeconomic inequalities of tuberculosis in India.* Their study showed the burden of TB for India for the year 2000 was estimated to be 8.5 million and the annual risk of TB infection varied from 1 to 2%. The TB prevalence was significantly higher among people living below the poverty line compared with those above the poverty line (242 versus 149/100,000 population). Among the marginalized people, TB was 1.5 times more prevalent. TB was disproportionately high among the poor.

Jose M. Valderas, Barbara Starfield, Bonnie Sibbald, Chris Salisbury,and Martin Roland (2009) conducted a study on *Defining Comorbidity: Implications for Understanding Health and Health Services.* They searched the literature for available definitions of the concept of comorbidity. Given the lack of specificity for standard search strategies for research in co morbidities. They defined the various constructs underpinning the co-occurrence of distinct diseases (comorbidity of an index disease, multimorbidity, morbidity burden, and patient complexity), described how these are interrelated, and shown how different constructs might best be applied to 3 different research areas (clinical care, epidemiology, health services).

SohamGupta, Vishnu PrasadShenoy, IndiraBairy, Hiresave Srinivasa, Chiranjay Mukhopadhyay (2011) conducted a study on *Diabetes mellitus and HIV as co-morbidities in tuberculosis patients of rural south India.* The mean age of the pulmonary TB patients was 41.11 ± 15.7 years, with significantly higher ($p < 0.0001$) preponderance of DM (31.8%) over HIV (8.9%). 72.13% of the diabetic patients belonged to the age group of 41–60 years. Extra-pulmonary TB patients had a mean age of 34.62 ± 12.9, years with a significantly higher ($p < 0.006$) HIV prevalence of 32.43% over DM (5.4%). 75% of the HIV patients belonged to the age group of 41–60 years. Occupationally, the majority of thepulmonary TB patients were agricultural labourers (25.2%) while the majority of the extra-pulmonary TB patients were housewives or self employed (18.92%).

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Bibha Marak, Prabhdeep Kaur , Sudha R Rao and Sriram Selvaraju (2016) conducted a study on *Non-communicable disease comorbidities and risk factors among tuberculosis patients, Meghalaya, India*. A cross-sectional study showed prevalence of ever smoking was 74.5% and 55.4%; alcohol consumption 31.0% and 22.3%; hypertension 24.5% and

17.3%; diabetes 7.5%, 4.5% among TB patients and non-TB subjects,respectively.

R.Duarte, K.Lonnroth, C.Carvalho, F.Lima, M.Munoz-Torrico and R.Centis (2017) conducted a study on *Tuberculosis, social determinants and co- morbidities (including HIV)* their study revealed Socioeconomic determinants have an effect on degree of exposure, risk behaviors and access to health care. TB additionally has a negative effect on the productivity and socioeconomic status of the individual.

Natasha S. Hochberg ,Sonali Sarkar, C. Robert Horsburgh Jr, Selby Knudsen, Jane Pleskunas, Swaroop Sahu, Rachel W. Kubiak, S. Govindarajan, Padmini Salgame, Subith Lakshminarayanan, Amsaveni Sivaprakasam, Laura F. White, Noyal Maria Joseph, Jerrold J. Ellner, and Gautam Roy (2017) conducted a study on *Comorbidities in pulmonary tuberculosis cases in Puducherry and Tamil Nadu, India: Opportunities for intervention.* Data were analyzed for 409 participants enrolled between May 2014-June 2016; 307 (75.1%) were male, 60.2% were malnourished (body mass index [BMI] <18.5 kg/$m^2$), and 29.1% severely malnourished (BMI <16). “Hazardous” alcohol use (based on AUDIT-C score) was reported by 155/305 (50.8%) of males. Tuberculosis cases were more likely than the Puducherry population to be malnourished (62.6% v 10.2% males and 71.7% v 11.3% of females; both p<0.001), and male cases were more likely to use alcohol than male non-cases (84.4% v 41%; p < .001). The PAF of malnutrition was 57.4% in males and 61.5% in females; the PAF for alcohol use was 73.8% in males and 1.7% in females.

## CHAPTER – IV METHODOLOGY

The proposed study was intended to study Social determinants and Comorbidities among tuberculosis patients in General Hospital TB Unit, Ernakulam.

### STUDY DESIGN

Study design selected for this study was descriptive cross - sectional study design. A descriptive cross - sectional

study is a study in which the disease or condition and its potentially related factors are measured at a specific point in time for a defined population.[43]The main objective of the study was to assess the Social determinants and Comorbidities among tuberculosis patients.

**SETTING**

There are five Tuberculosis Units (TU) in Ernakulam district: District TB centre Ernakulam, General Hospital Ernakulam, General Hospital Aluva , Taluk Hospital Kothamangalam and General Hospital Perumbavoor under District TB centre Ernakulam. Among these tuberculosis units, General Hospital TB Unit, Ernakulam was selected using simple random sampling method for the present research study.

**STUDY POPULATION**

Population selected for the present study was all TB patients registered in General Hospital TB Unit, Ernakulam during the study period. There were 1807 Total cases were registered in 2019 according to the statistics given by District TB centre Ernakulam. There were 410 registered TB cases in the General Hospital TB Unit alone.

**SAMPLING:**

- **Sample size**

Sample size was calculated using Cochran's formula.

$n0 = Z^2 Pq / e^2$

$= 1.96 \times 1.96 \times 0.9 \times 0.1$

$(0.5)^2$

N = population size

$$\mathbf{n} = \frac{\mathbf{n_0}}{1 + \frac{\mathbf{n_0} - 1}{N}}$$

$\mathbf{n} = 132$

$1 + \frac{132 - 1}{410} = 118$

e = margin of error

p = Proportion of population

q = 1-p

n = adjusted sample size

The sample size calculated using Cochran's formula was 118. It was rounded to 120.

120 TB patients were selected for the present study.

✔ **Sampling Procedure**: Systematic sampling

Systematic sampling is a probability sampling method where the elements are chosen from a target population by selecting a random starting point and selecting other members after a fixed 'sampling interval'. Sampling interval is calculated by dividing the entire population size by the desired sample size. In this study it is an appropriate method for sampling as the patient's register is available and each patient having a permanent OP number.

**Hypothesis**

H01: There is no relation between socio economic status and Tuberculosis. H02: There are no comorbidities with Tuberculosis.

- **Inclusion criteria:**

✔ All Tuberculosis patients (Pulmonary and Extra pulmonary) coming for treatment at Ernakulam GH TB unit during the study period

✔ Patients who are taking TB drugs for at least 3 weeks.

✔ TB Patients who are willing to participate in the study.

- **Exclusion criteria**:

✔ Patients who have completed the treatment

✔ Patients who are not willing to participate in the study

✔ Patients who are critically ill.

✔ Patients who are taking TB drugs for < 3weeks.

**METHODS OF DATA COLLECTION**

Primary data collection: All the patients were interviewed with standardized questionnaire

Secondary data collection: Research papers, Journals, magazine news related to topic under study were collected.

**DESCRIPTION OF THE TOOL**

Questionnaire had two sections. First section was on demographic characteristics of patients, family history of TB,site of TB . Second part had questions to assess the Comorbidities like Diabetes, Hypertension, COPD, HIV, Liver disease, Heart Disease, Renal disease and Neurological complaints.

**ANALYSIS**

Chi- square test of association and frequency distribution were used. The analyzed data is presented in the form tables, graphs etc. Statistical analysis was done using statistical packages for social sciences (SPSS by IBM) and MS Excel

**Kuppuswamy Scale**- Socioeconomic status is one among important indicators to evaluate health status and nutritional status of a family. This scale was devised by Kuppuswamy and is the most widely used scale for determining the socio-economic status of an individual or a family in urban areas. Initially the scale was formulated for determining SES of an individual but later on, it was modified to determine SES of a family rather than an individual. The scale was initially developed by Kuppuswamy in the year 1976 including index

parameters like education, occupation, and total income which was further modified in later years to include head of families educational status, occupational status and overall aggregate income of the whole family, pooled from all sources. The Kuppuswamy SES has included 3 parameters and each parameter is further classified into subgroups and scores have been allotted to each subgroup which have been defined later in this paper. The total score of Kuppuswamy SES ranges from 5-29 and it classifies families into 5 – Upper , Upper Middle, Lower Middle, Upper Lower and Lower socio economic classes.

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# CHAPTER – V RESULTS

This chapter is about the results of the study conducted among 120 TB patients selected from General Hospital TB Unit, Ernakulam. Analyzed data is presented in the form of tables and graphs. Cross tabulation and chi square of test of association were used for analysis.

**Frequency and percentage distribution of demographic variables**

**Table 1: Frequency and percentage distribution according to age**

| Age in Years | Frequency | Percentage |
|---|---|---|
| 21-30 | 6 | 5.0 |
| 31-40 | 34 | 28.3 |
| 41-50 | 43 | 35.8 |
| 51-60 | 32 | 26.7 |
| 61-70 | 5 | 4.2 |
| **Total** | **120** | **100.0** |

Table 1 shows the frequency and percentage distribution of age of TB patients who participated in the study. Highest percentage of patients (35.8%) belonged to age group 41-50 .Lowest percentage (4.2%) was from the 61-70 age group. From the table we can see that the majority of TB patients belonged to the productive age group. The economic cost for the society will be high if it affects the productive group. That shows how TB burden affects a country.

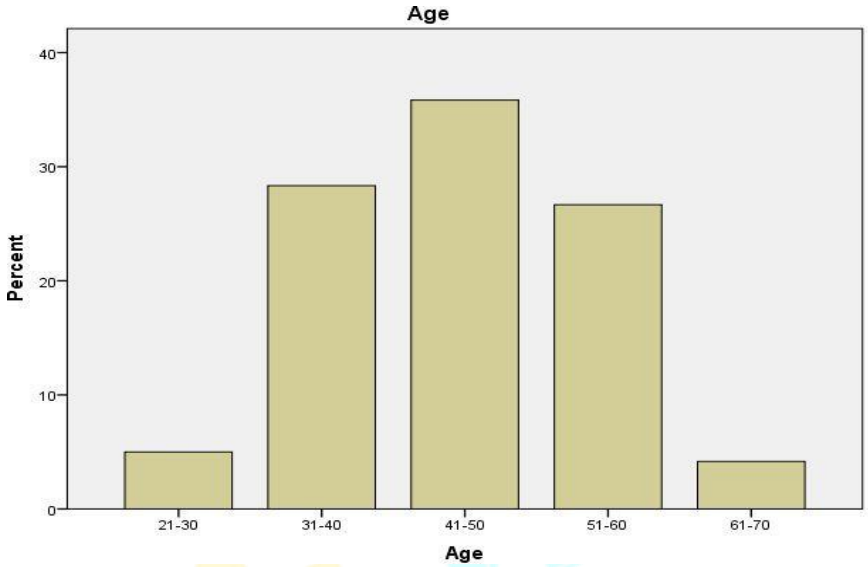


**Figure 1: Frequency distribution of age**

**Table 2 : Frequency and percentage distribution of Sex**

| Sex | Frequency | Percentage |
|---|---|---|
| Male | 89 | 74.2 |
| Female | 31 | 25.8 |
| **Total** | **120** | **100.0** |

Table 2 shows the frequency and percentage distribution of sex of TB patients who participated in the study. 74.2% respondents were males and 25.8% were females. Previous study reports showed that men are more likely to be diagnosed with TB than women, with male to female ratio of 1.6:1 globally.[4]

**Table 3 : Frequency and percentage distribution of Marital Status**

| Marital Status | Frequency | Percentage |
|---|---|---|
| Unmarried | 12 | 10.0 |
| Married | 104 | 86.7 |
| Widowed | 1 | .8 |
| Separated/Divorced | 3 | 2.5 |
| **Total** | **120** | **100.0** |

Table 3 shows the frequency and percentage distribution of Marital Status of respondents. 86.7% were married, 10% Un married, 2.5% Seperated and only .8% was Widowed.

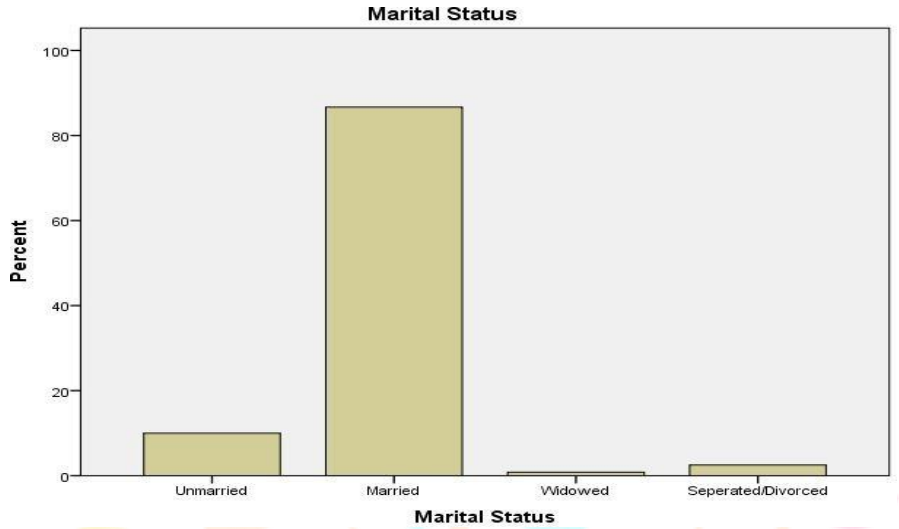


**Figure 2: Frequency distribution of Marital status**

**Table 4: Frequency and percentage distribution of Religion**

| Religion | Frequency | Percentage |
|---|---|---|
| Hindu | 49 | 40.8 |
| Christian | 33 | 27.5 |
| Muslim | 38 | 31.7 |
| **Total** | **120** | **100.0** |

Table 4 shows the frequency and percentage distribution of religion of respondents. 40.8% were Hindus, 31.7% were Muslims and 27.5% were Christians.

**Table 5: Frequency and Percentage distribution of Place of Residence**

| Place of residence | Frequency | Percentage |
|---|---|---|
| Rural | 44 | 36.7 |
| Urban | 62 | 51.7 |
| Urban Slum | 14 | 11.7 |
| **Total** | **120** | **100.0** |

Table 5 shows the frequency and percentage distribution of Place of Residence of respondents. 51.7% were residing in urban areas, 36.7% in Rural and 11.7% in urban slum areas. This shows a significance were its increasing threat to urban population regarding the chance of getting infected with close contact settings such as the workplace and living areas of crowded nature.

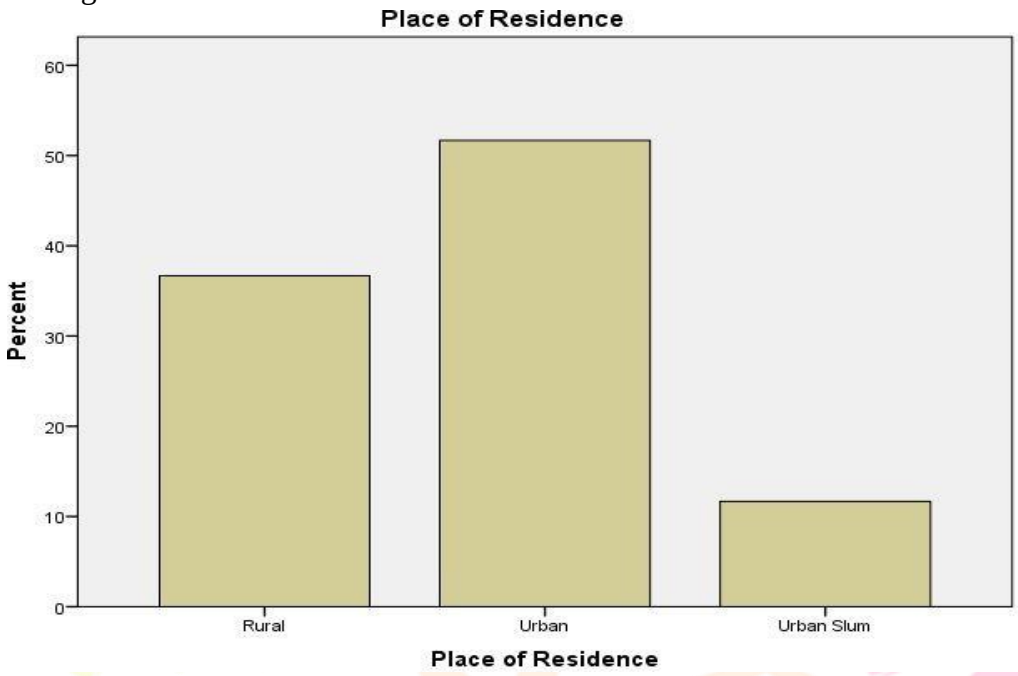


**Figure 3: Frequency distribution of Place of Residence**

**Table 6: Frequency and percentage distribution of Type of house**

| Type of House | Frequency | Percentage |
|---|---|---|
| Kacha House | 13 | 10.8 |
| Semi Pucca House | 67 | 55.8 |
| Pucca House | 40 | 33.3 |
| **Total** | **120** | **100.0** |

Table 6 shows frequency and percentage distribution of Type of houses of respondents. 55.8% of respondents were living in a Semi pucca house, 33.3% were in a Pucca house and 10.8% in a Kacha house.

**Table 7: Frequency and percentage distribution of Family History of TB**

| Family History of TB | Frequency | Percentage |
|---|---|---|
| Yes | 14 | 11.7 |
| No | 106 | 88.3 |
| **Total** | **120** | **100.0** |

Above table shows Family history of TB among respondents and its frequency and percentage distribution. 11.7% of subjects having family history of TB and 88.3% having no history of TB.

**Table 8: Frequency and Percentage distribution of Site of TB.**

| Site of TB | Frequency | Percentage |
|---|---|---|
| Pulmonary | 103 | 85.8 |
| Extra Pulmonary | 17 | 14.2 |
| **Total** | **120** | **100.0** |

Here, the table shows frequency and distribution of Site of TB among respondents. 85.8% of study subjects having Pulmonary TB and 14.2% of study subjects having Extra Pulmonary TB (TB infection other than area of lungs) .

**Table 9: Frequency and Percentage distribution of History of Tobacco chewing.**

| History of Tobacco chewing. | Frequency | Percentage |
|---|---|---|
| Yes | 15 | 12.5 |
| No | 105 | 87.5 |
| **Total** | **120** | **100.0** |

The above table shows History of Tobacco chewing and its frequency-Percentage distribution among respondents. 12.5% of respondents had a history of tobacco chewing and 87.5% of respondents had no history of tobacco chewing.

**Table 10: Frequency and Percentage distribution of History of chain smoking**

| History of Chain Smoking | Frequency | Percentage |
|---|---|---|
| Yes | 54 | 45.0 |
| No | 66 | 55.0 |
| Total | 120 | 100.0 |

Table 10 shows frequency and percentage distribution of History of chain smoking among respondents. 45% of respondents were chain smokers and 55% were not. This shows very significant results among the co-morbidities of TB.

**Table 11: Frequency and Percentage distribution of History of alcoholism**

| History of Alcoholism | Frequency | Percentage |
|---|---|---|
| Yes | 29 | 24.2 |
| No | 91 | 75.8 |
| Total | 120 | 100.0 |

Table 11 shows History of alcoholism among the respondents. 24.2% were found alcoholics and 75.8% found Non-alcoholics among respondents.

**Table 12: Frequency and percentage distribution of Diabetes Mellitus**

| **Diabetes Mellitus Status** | **Frequency** | **Percentage** |
|---|---|---|
| Diabetic | 24 | 20.0 |
| Non Diabetic | 94 | 78.3 |
| Unknown | 2 | 1.7 |
| **Total** | **120** | **100.0** |

Above table shows frequency and Percentage distribution of Diabetes Mellitus among the respondents. 20% of subjects were known diabetic, 78.3% were Non diabetic and 1.7 % were unknown about diabetic status.

**Table 13: Frequency and Percentage distribution of COPD**

| COPD Status | Frequency | Percentage |
|---|---|---|
| Yes | 7 | 5.8 |
| No | 95 | 79.2 |
| Unknown | 18 | 15.0 |
| **Total** | **120** | **100.0** |

Above table shows frequency and percentage distribution of COPD status among respondents. 5.8% were having COPD, 79.2% not having COPD and 15% were unaware about COPD status.

**Table 14: Frequency and Percentage distribution of Liver disease**

| Liver Disease status | Frequency | Percentage |
|---|---|---|
| Yes | 7 | 5.8 |
| No | 78 | 65.0 |
| Unknown | 35 | 29.2 |
| Total | 120 | 100.0 |

Table 14 shows frequency and percentage distribution of Liver diseases among study subjects. 5.8% were diagnosed liver disorders , 65% were not diagnosed with any liver disorders and 29.2% were unaware about liver disease status.

**Table 15: Frequency and percentage distribution of Heart disease**

| Heart Disease Status | Frequency | Percentage |
|---|---|---|
| Yes | 14 | 11.7 |
| No | 70 | 58.3 |
| Unknown | 36 | 30.0 |
| **Total** | **120** | **100.0** |

Above table shows frequency and percentage distribution of heart diseases among study subjects. 11.7% were diagnosed with Heart disease, 58.3% were having No heart disease and 30% of respondents were unaware about their heart disease status.

**Table 16: Frequency and percentage distribution of Cancer Disease**

| Cancer Status | Frequency | Percentage |
|---|---|---|
| Yes | 2 | 1.7 |
| No | 84 | 70.0 |
| Unknown | 34 | 28.3 |
| **Total** | **120** | **100.0** |

Table 16 shows frequency and percentage distribution of cancer Disease among respondents. 1.7% was diagnosed with Cancer, 70% were not diagnosed with any Cancer and 28.3% were unaware about cancer disease status.

**Table17: Frequency and Percentage distribution of Renal Disease Status**

| Renal Disease Status | Frequency | Percentage |
|---|---|---|
| Yes | 7 | 5.8 |
| No | 80 | 66.7 |
| Unknown | 33 | 27.5 |
| **Total** | **120** | **100.0** |

Above table shows Frequency and Percentage distribution of Renal diseases among respondents. 5.8% was diagnosed with Renal disorders , 66.7% were having no renal disorders and 27.5% were unaware about their Renal disease status.

**Table 18:Frequency and percentage distribution of Hypertension Status.**

| Hypertension Status | Frequency | Percentage |
|---|---|---|
| Hypertensive | 34 | 28.3 |
| Normotensive | 63 | 52.5 |
| Unknown | 23 | 19.2 |
| Total | 120 | 100.0 |

Table 18 shows frequency and percentage distribution of Hypertension among respondents. 28.3% were diagnosed with Hypertension, 52.5% found no hypertension (Normotensive) and 19.2% were unaware about Hypertension status.

**Table 19: Frequency and Percentage distribution of HIV status**

| HIV Status | Frequency | Percentage |
|---|---|---|
| Positive | 13 | 10.8 |
| Negative | 104 | 86.7 |
| Unknown | 3 | 2.5 |
| **Total** | **120** | **100.0** |

Above table shows Frequency and percentage distribution of HIV status among respondents. 10.8% were diagnosed with HIV were 86.7% were negative for HIV and 2.5% respondents were unaware about HIV status.

**Table 20: Frequency and percentage distribution of Nutritional status**

| Nutritional Status | Frequency | Percentage |
|---|---|---|
| Underweight | 25 | 20.8 |
| Healthy weight | 56 | 46.7 |
| Overweight | 35 | 29.2 |
| Obese | 4 | 3.3 |
| **Total** | **120** | **100.0** |

Table 20 shows frequency and percentage distribution of Nutritional Status of respondents. 46.7% respondents were belong to Healthy weight category, 29.2% belong to Overweight category, 20.8% were belong to Underweight category and 3.3% were Obese among the total 120 respondents.

**Table 21: Kuppuswamy Socio-Economic Scale and TB Cross Tabulation**

| Kuppuswamy's Socioeconomic Scale | Site of TB | | Total | Chi Square | P Value |
|---|---|---|---|---|---|
| | Pulmonary | ExtraPulmonary | | | |
| Upper | 1 | 1 | 2 | 14.785* | .005 |
| Upper Middle | 9 | 6 | 15 | | |
| Lower Middle | 36 | 7 | 43 | | |
| Upper Lower | 51 | 3 | 54 | | |
| Lower | 6 | 0 | 6 | | |
| Total | 103 | 17 | 120 | | |

*Significant

This table shows the chi square association of Kuppuswamy's socioeconomic scale with TB. Here the calculated value for the corresponding degree of freedom with significance level 0.05 is compared with the table value (9.488) for corresponding degree of freedom at significance level 0.05. If calculated value is greater than the table value null hypothesis is rejected, otherwise accepted. So here the null hypothesis is Rejected. There is a definite correlation between socio economic factors and TB among the study population.

**Table 22: TB and Chain Smoking History Crosstabulation**

| | Chain Smoking History | | | Pearson's R Value |
|---|---|---|---|---|
| | Yes | No | Total | |
| Site of TB Pulmonary | 48 | 55 | 103 | .079* |
| Extra Pulmonary | 6 | 11 | 17 | |
| Total | 54 | 66 | 120 | |

*Significant

Above table shows correlation coefficient (Karl Pearson's Correlation Coefficient value) between Chain smoking and TB. The calculated R value is between 0 and 1

, hence assumes Moderately positive correlation between smoking and TB among the study subjects.

**Table 23: TB and Alcoholism Cross tabulation**

| | | History Of Alcoholism | | | Pearson's R Value |
|---|---|---|---|---|---|
| | | Yes | No | Total | |
| Site of TB | Pulmonary | 25 | 78 | 103 | .06* |
| | Extra Pulmonary | 4 | 13 | 17 | |
| Total | | 29 | 91 | 120 | |

*Significant

Above table shows correlation coefficient (Karl Pearson's Correlation Coefficient value) between TB and Alcoholism. Calculated Pearson's R value is between 0 and 1 , and it shows Moderately Positive correlation between alcoholism and TB among the Respondents.

**Table 24: TB and HIV Crosstabulation**

| | | HIV Status | | | Pearson's R Value |
|---|---|---|---|---|---|
| | | Positive | Negative | Unknown | Total |
| Site of TB | Pulmonary | 12 | 88 | 3 | 103 |
| | Extra Pulmonary | 1 | 16 | 0 | 17 |
| Total | | 13 | 104 | 3 | 120 |

.028*

*Significant

Table 24 shows correlation cross tabulation between TB and HIV among the respondents. Pearson's R value is between 0 and 1, shows moderately positive correlation between TB and HIV.

# CHAPTER VI- DISCUSSION

This chapter presents discussion of the study conducted among TB patients.

Discussion is based on the objectives of the study, findings and results.

The study was conducted among selected 120 TB patients in General Hospital TB Unit, Ernakulam. Data was collected using the interview method. The analysis of data was done using SPSS software. Chi-square test of association and Pearson R value was used and analysed data was presented in the form of tables and graphs.

The main aim of the study was to find out Social determinants and Comorbidities among TB patients.

**Social Determinants of TB patients**

The study mainly aims at finding the Social determinants of TB patients among Urban TB unit of Ernakulam district, Kerala state. For convenience and more validity Socio-Economic classes have been found out and studied by using Kuppuswamy Scale. Which include mainly Occupation and Education of Head of the families and Total family income for classifying all respondents into five groups such as Upper, Upper Middle, Lower Middle, Upper Lower, Lower depending on their score. Among 120 respondents 54 were Upper lower category and others as follows- 43-Lower Middle, 15- Upper middle, 6-Lower and 2-Upper. Other social factors evaluated includes, Age, Sex, Marrital status, Place of residence, Type of House etc.

Calculated Chi square value revealed that Social determinants have an influence among TB cases. This is significant, in light of WHO- TB elimination strategy.

Regarding Social determinants observed results were similar to results obtained in a study conducted by SohamGupta, Vishnu PrasadShenoy, IndiraBairy, Hiresave Srinivasa, Chiranjay Mukhopadhyay (2011)

-*Diabetes mellitus and HIV as co-morbidities in tuberculosis patients of rural south India.* The mean age of the pulmonary TB patients was 41.11 ± 15.7 years and Extra-pulmonary TB patients had a mean age of 34.62 ± 12.9.

Risk factors that seem to be of importance at the population level include poor living and working conditions associated with high risk of TB transmission, and factors that impair the host's defence against TB infection and disease, such as HIV infection, malnutrition, smoking, diabetes, alcohol abuse, and indoor air pollution. Preventive interventions may target these factors directly or via their underlying social determinants. The identification of risk groups also helps to target strategies for early detection of people in need of TB treatment.

**CoMorbidities of TB Patients**

The study also aims to find the Co morbidities of TB patients. Questions related to habits of Tobacco chewing, Smoking, Alcoholism and diseases including Diabetes, Hypertension, COPD, HIV, Liver Diseases, Heart Diseases, Renal Diseases , Brain/Neurological diseases were included. The results were analyzed using Pearson R value for finding Correlation coefficient between TB and Co morbidities. Diabetes, Smoking and HIV shown Moderately Positive Correlation among the respondents which is also significant.

Regarding smoking habit of patients the results were very similar to Study conducted by Bibha Marak, Prabhdeep Kaur , Sudha R Rao and Sriram Selvaraju (2016) conducted a study on *Non-communicable disease co morbidities and risk factors among tuberculosis patients, Meghalaya, India*. A cross-sectional study showed revalence of ever smoking was 74.5% and 55.4%; alcohol consumption 31.0%.

## CHAPTER VII- CONCLUSION

This study on Social determinants and co morbidities of tuberculosis patients was conducted in General Hospital TB Unit, Ernakulam. The main objectives of the study were to find out Social determinants and comorbidities with TB . Data collection was done using questionnaire and interview methods. Data was collected from selected 120 TB patients. Analysis was done using SPSS software and results were presented in the form tables and graphs. Chi square test of association is used and Pearson R value test is used.

The main findings of the study are:

❖ Socio economic Classification by Kuppuswamy scale of measurement-
Among 120 respondents 54 were Upper lower category and others as follows- 43-Lower Middle, 15- Upper middle, 6-Lower and 2-Upper.

❖ Nutritional Status of respondents as - 46.7% respondents were belong to Healthy weight category, 29.2% belong to Overweight category, 20.8% were belong to Underweight category and 3.3% were Obese among the total 120 respondents.

❖ Comorbidities showing Moderately Positive correlation coefficient was the habit of Smoking, Alcoholism and disease –HIV.

❖ Hypertension- among respondents 28.3% were diagnosed with Hypertension, 52.5% found no hypertension (Normotensive) and 19.2% were unaware about Hypertension status.

❖ History of alcoholism- among the respondents 24.2% were found alcoholics and 75.8% found Non-alcoholics among respondents.

❖ History of chain smoking- among respondents 45% of respondents were chain smokers and 55% were not chain smokers.

❖ Place of Residence of respondents- 51.7% were residing in urban areas, 36.7% in Rural and 11.7% in urban

slum areas.Recommendations

In light of the findings of this study, some recommendations for consideration are

✔ Provide health education regarding the importance of healthy lifestyle and to quit all kinds of addictions, most importantly Smoking and alcoholism.

✔ Use social media platforms to provide health education.

✔ Collaboration between TB treatment and nutrition programs to identify TB patients with food shortages and develop mechanisms that ensure improved food support.

✔ Financial and Nutritional assistance for the needy can be considered.

**Limitations of the study**

The study was conducted only in one tuberculosis unit of Ernakulam district and private sector was not included in the study. There was time limitation for data collection so selected sample size was small.

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## ANNEXURE

**Department of Public Health**
**School of Medical Education, CPAS Gandhinagar,Kottayam Kerala University of Health Science**

**The Social Determinants and Co-morbidities of Tuberculosis Patients**

**in**

**Ernakulam General Hospital TB Unit.**

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*Research Guide : Dr. Maria Cherryl Morris*

*Division of Health Managemrnt, SME, Kottayam*

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Your response will be kept secret and will not be exposed to any one for any other purposes against your interest; therefore your honest responses are highly appreciated.

**Code no :**

**Socio-demographic characteristics**

1. Age years

2. Sex: 1. Male 2. Female

3. What is your marital status?

1. Single 2. Married
3. Widowed 4. Separated / divorced

4. Education of head of the family

1. Profession or Honors 2.Gradute
3. Intermediate or diploma 4. High school certificate
5. Middle school certificate 6. Primary school certificate
7. Illiterate

5. Occupation of Head of the family

1. Professional 2. Semi- Professional 3. Arithmetic skill jobs 4. Skilled worker

5. Semi skilled worker 6. Unskilled worker 7. Unemployed

6. Monthly family income

1. 8248 and below 2.8249 – 24,498 3.24,499 – 40,831

4.40,832 – 61,247

5. 61,248 – 81,664 6. 81,665 – 1, 63,328 7. 1,63, 329 and above

7. Religion

2. Hindu 2. Christian

3. Muslim 4. Others

8. Place of residence

1. Rural 2.Urban

3. Urban slum 9.Type of house

1. Kacha house 2.Semi Pucca house 3.

Pucca house 10.Any TB cases in the family?

1.Yes 2.No

11. Site of TB

1. Pulmonary 2. ExtraPulmonary

12. Type of Patient

1. New 2. Recurrent 3. Transferred

**Comorbidities**

13. History of Tobacco Chewing
1. Yes 2.No

14. Current Tobacco user
1. Yes 2. No

15. History of Alcoholism
1. yes 2. No

16. Cureent consumtion of alcohol
1. Yes 2.No

17. History of Chain smoking
1. Yes 2. No

18. Current smoker
1. Yes 2.No

19. Diabetes mellitus status
1. Diabetic 2. Non Diabetic 3. Unknown

20. COPD status
1.Yes 2. No 3. Unknown

21. Status of Hypertension
1. Hypertensive 2. Normotensive 3. Unknown

22. HIV status
1. Positive 2. Negative 3. Unknown

23. Cancer status
1. Yes 2. No 3. Unknown

24. Liver Diseases any
1.Yes 2. No 3.Unknown

25. Renal Diseases any
1. Yes 2. No 3. Unknown

26. Heart diseases any
1. Yes 2. No 3. Unknown

27. Brain/Neurological diseases any
1. Yes 2. No 3. Unknown

28. Other diseases any_____(Specify)

29. Nutritional Status
1. Underweight 2.Healthy weight 3. Overweight 4.Obese

**INFORMED CONSENT**

**Title of the study:** The Social Determinants and Co-morbidities of Tuberculosis Patients in Ernakulam General Hospital TB Unit.

**Purpose of the research:** The research study is being done to find out the Social determinants and Co morbidities of TB patients. The study aims to identify the Social determinants and suggest some methods and strategies to improve TB treatment.

**Details of the researcher:** Jayakrishna Pai ,Center for professional and advanced studies (CPAS),SME,Gandhinagar,Ph: 9447543025

I .....(Name and address of participant) hereby voluntarily consent to participate in the research study on the

I hereby state that I have understood the purpose of the study and I am participating on my own will.I also understood that the information collected will be kept confidential.

Name :

Date : Signature of the participant

**സമ്മതപത്രം**

**ചുറ്റുപാടിന്റെ പേര് ക്ഷയരോഗികളുടെ സാമൂഹിക , അനുബന്ധ അസുഖങ്ങളും .**

**ല ◌ം: പഠനത്തിന്റെ ലക്ഷ്യം**
**ക്ഷയരോഗികളുടെ സാമൂഹിക ചുറ്റുപാടും അനുബന്ധ അസുഖങ്ങളും കണ്ടെത്തുകയാണ് പഠനത്തിന്റെ പ്രധാന ലക്ഷ്യം**

: ജയകൃഷ്ണ ൈ ഗവേഷണം നടത്തുന്ന ആളുടെ വിവരങ്ങൾ ജയകൃഷ്ണ പൈ

കോട്ടയം ഫോൺ 9447543025

ഞാൻ.....ഞാൻ..... (പേര് വിലാസം)

"ക്ഷയരോഗികളുടെ സാമൂഹിക ചുറ്റുപാടും , അനുബന്ധ

" എന്ന് ഈ അസുഖങ്ങളും ഗവേഷണത്തിൽ വിവരങ്ങൾ നൽകുന്നതിന്

തയ്യാറാണ്

ഈ ഗവേഷണത്തിന്റെ ലക്ഷ്യം അറിയുകയും ഞാൻ നൽകുന്ന പ്രതികരണങ്ങൾ സ്വകാര്യമായി സൂക്ഷിക്കും എന്ന് മനസ്സിലാക്കുകയും

. ചെയ്യുന്നു

പേര്

തീയ്യതി: ഒപ്പ്