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Prevalence and Associated Risk Factors of Tuberculosis among Smear positive Contact Individuals in Port Sudan

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Abstract

Background: Tuberculosis is a necrotizing granulomatous multisystem infectious disease that caused by mycobacterium, mainly mycobacterium tuberculosis, It is a serious global health problem that represent the commonest infectious cause of death. Many risk factors contribute in spread of tuberculosis, these factors include environmental factors, host factors and factors related to organism. Contact with smear positive patients is a major risk factors as every infectious patient can transmit the organism to ten to fifteen persons; therefore, contact tracing being an important element in DOTS (Direct Observed Therapy Strategy), because early detection and early management of cases prevent complication and improve the outcome.

Objectives: This study aims to determine the prevalence and assess risk factors of tuberculosis among TB smear positive contact whose registered in Port Sudan chest hospital TBMU center during third and fourth quarters; June to December 2023.

Methodology: This is a descriptive cross sectional community base study, Port Sudan, eastern Sudan, from June 2023 to December 2023.

Result: The study shows that prevalence of tuberculosis among smear positive contact individual is 4.6%s. And it shows other associated risk factors has a role in spread of the disease.

Conclusion: The prevalence of tuberculosis among smear positive contact individuals in Port Sudan is low comparing to literature and other studies due to strong tuberculosis program and stigma also play a role in this reduction. Tuberculosis spread more among female and elder contact as the spend more time in the home. And immunosuppression, poor ventilation and crowded household play an essential role in spread of tuberculosis.

Keywords: Prevalence, Tuberculosis, Risk Factors, Close Contact, Detected Cases

1. Introduction

Tuberculosis is an infectious necrotizing granulomatous multisystem disease caused by mycobacterium bacilli, mainly mycobacterium tuberculosis. Although it is multisystem disease it mainly affects the lung causing pulmonary tuberculosis which is the most common tuberculosis presentation worldwide [1], but in Red sea state eastern Sudan prevalence of extrapulmonary tuberculosis is more than pulmonary tuberculosis and represent more than 53% of all tuberculosis cases in this area [2]. In Sudan as other developing countries tuberculosis still represent major public health problem with an estimation of 29000 cases in 2019 [3].

In those individuals who exposed to mycobacterium tuberculosis just 10% develop TB disease while the immune system beside other factors as load of organism and size of droplet prevent the remainder 90% from developing TB disease [4].

Developing TB disease rather than Tb infection and presenting of TB as latent or active TB depend on many risk factors that divided into environmental factors, such ventilation, host factors such as immunosuppression as in diabetes, HIV and corticosteroid and other immunosuppressive drugs [5], those with occupational diseases as silicosis and pneumoconiosis are at increased risk to develop tuberculosis [6], and there are factors that related to organism as amount of organisms and size of droplets [7].

Symptomatically patient with pulmonary tuberculosis presented with chronic productive cough, nocturnal fever, shortness of breath, haemoptysis and weight loss while those with extrapulmonary tuberculosis presented with different manifestations that related to affected organ [8].

Diagnosis of tuberculosis confirmed by detecting the mycobacterium either with Ziehl neelsen stain, Gene X pert, culture or PCR [9, 10], in addition to CXR in correlation to clinical presentation while mantoux test and IGRA Interferon Gama Release Assay are used for survey in addition to diagnosis [11].

Treatment of tuberculosis follow DOTS (Direct Observed Therapy Strategy), which contain several elements that include both treatment and contact tracing in addition to its other components, DOTS treat tuberculosis with four drugs in intensive phase of two months, those are Rifampicin, Isoniazid, Pyrazinamide and Ethambutol and two drugs continuation phase of four months which are Rifampicin and isoniazid in FDC (Fixed Dose Concentration). With exception of tuberculous meningitis and Potts disease [12].

Contact tracing has major concern in DOTS because early detection and early standard management decrease both prevalence and complication of tuberculosis and improve outcome, there for this study concern on the prevalence and risk factors of tuberculosis among smear positive contact individuals.

2. Objectives

2.1 General objective

This research aims to study the prevalence and risk factors of tuberculosis among TB smear positive contact whose registered in Port Sudan chest hospital TBMU center during third and fourth quarters; June to December 2023.

2.2 Specific objectives

1. Determine the associated risk factors among contact persons:
2. Assess the effectiveness of tuberculosis control program in contact tracing.
3. Diagnose contact with latent or active tuberculosis.

3. Material and Method

3.1 Study design

This is a descriptive cross sectional community base study.

3.2 Study area

The study conducted in Port Sudan, Red Sea state, eastern Sudan.

3.3 Study duration

This study done within the period from June 2023 to December 2023, the period which cover the third and fourth quarter according to tuberculosis control program policy.

3.4 Study population

All household contact to TB smear positive who registered in Port Sudan chest hospital TBMU are included in this study.

3.5 Exclusion criteria

Casual contact excluded because of difficulty in tracing reaching them, and those with history of previous tuberculosis also excluded.

3.6 Data collection method and technique

Data collected through direct interview with participants using structured questionnaire that covering demographical, symptoms and risk factors of tuberculosis. IGRA done for all contact and those with positive IGRA considered as the prevalence and their data analyzed to reach the study objectives.

3.7 Data analysis

Data analyzed using SPSS version 28.0.

4. Result

Close contact during study period were 522. From those 24 persons have Positive IGRA giving rate of 4.6% as prevalence of tuberculosis among smear positive contact individuals.

15 of those are females (62.5%) while males are 9 (37.5%). Their age between 5 years to 60 years, those below 10 years are 9 (37.5%), 11 to 20 years 2 participants (4.2%), those in age group between 21 to 30 years are 3 (12.5%) no one between 31 to 40 year 2 participants (4.2%) in age group 41 to 50 years while 8 (33.3%) are over 50 years old.

8 of participants (33.3%) are living in poor ventilated houses. 12 of them (50%) live in crowded house with more than 10 households.

18 (75%) of participants are diabetics, 7 (29.2%) malnourished and 3 (12.5%) with chronic kidney disease. 11 (45.8%) of participants are smoker and 3 (12.5%) alcoholism.

Most of participants are a symptomatic while 8 (33.3%) have cough and fever also appear in 8 (33.3%) while shortness of breath in 4 (16.7%) of participants and weight loss in 3 of them (12.5%).

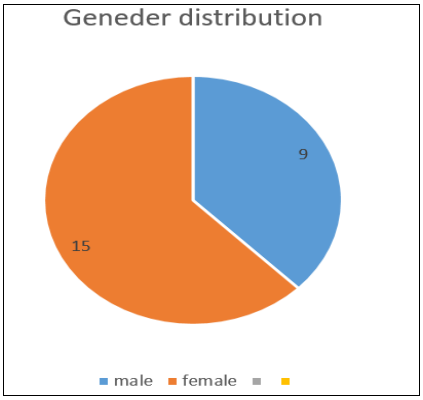

Fig 1: Gender distribution

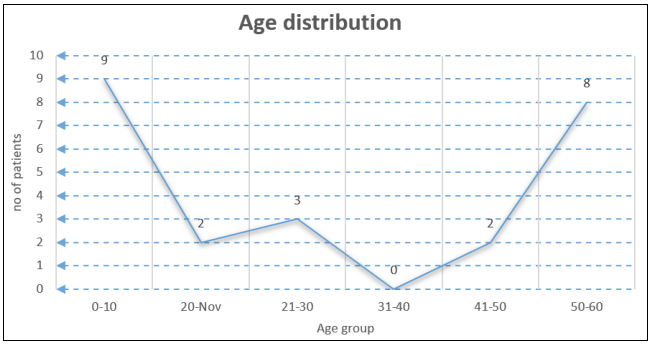

Fig 2: Age distribution

5. Discussion

Tuberculosis represent a serious and common health problem in Port Sudan, eastern Sudan with high social stigma this area; the thing that affect cases detection and diagnosis may be reached after complications as pulmonary fibrosis, traction bronchiectasis and even pulmonary

hypertension, therefore contact tracing should be active to facilitate early detection and early management of cases which are decrease the incidence and improve the outcome.

In this study we exclude casual contact because of difficulties in reaching them and include the close contact therefore the prevalence of tuberculosis appears low than literature 4.6% and 10% respectively [4], the other reasons in this study we use IGRA as single diagnostic tool.

Tuberculosis spread among female more than male 1.5: 1 while in many other studies like Alfaham *et al* study that studied the prevalence of pulmonary tuberculosis and risk factors in patient at Wad Madani tuberculosis center the prevalence among male is more than female and in literature [7, 13], this because in this area most of female not employee and they look after patients in home in a situation of poor ventilation and crowd houses as shown in results. The study shows increase risk of tuberculosis in child and elder as are at risk for both endogenous reactivation and exogenous infection due to low immunity [12].

Immunosuppression represents a major risk factor as 75% of positive IGRA are diabetics, 29.2% malnourished and 12.5% have CKD, the latter is approximately equal to that in previous study done in Port Sudan to studied the frequency and presentation of tuberculosis among patient with ESRD [14]. Smoking appears in in more than 45% of participants and more than 10% are alcoholism and both smoking and alcohol affect the phagocytosis and increase the risk of tuberculosis [7].

Most of participant are a symptomatic either this is latent TB as IGRA didn't differentiate between active and latent tuberculosis or they may deny symptoms because of social stigma the thing that delay the diagnosis and worsen the outcome.

6. Conclusion

The prevalence of tuberculosis among smear positive contact individuals in Port Sudan is low comparing to literature and other studies due to strong tuberculosis program and stigma which lead to some social isolation of patient also play a role in this reduction. Tuberculosis spread more among female and both child and elder contact as they spend more time in the home. And immunosuppression, poor ventilation and crowded household play an essential role in developing tuberculosis.

Contact tracing as a part of DOTS should be activated to enable early detection of TB cases and early intervention that prevent irreversible complication such as pulmonary fibrosis, traction bronchiectasis and even pulmonary hypertension.

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