

## ABSTRACT

Tuberculosis is a global emergency. It has remained a public health challenge from ancient times. This study aims to describe the epidemiological pattern of tuberculosis and to assess selected aspects of case detection, case treatment and case holding of pulmonary tuberculosis in the Colombo district.

This study was carried out at the Chest Clinic (Colombo), Branch Chest Clinics (Angoda and Avissawella) and Chest Hospital (Welisara), which are the focal points for management of tuberculosis services in the district of Colombo, under actual programme conditions without additional input of monetary or any other incentives either to patients or to health care staff.

This study composed of three components. First component was a descriptive study, based on retrospective analysis of secondary data of all cases of tuberculosis registered in year 2002 with National Programme for Tuberculosis Control and Chest Diseases in the Colombo district. The objective was to describe selected aspects of epidemiology of tuberculosis, current treatment practices and to evaluate treatment outcomes. The second component was also a descriptive study, where data was collected prospectively to identify delays in the diagnosis and initiation of treatment, and patients' compliance to treatment. The third component was a case control study to determine the risk factors, including a contact history, of smear-positive pulmonary tuberculosis.

For the first component, a data collection form was developed to use for each patient to enter the necessary information, collected from the retrieved records and registers. For the second and third components of the study, an interviewer-administered questionnaire was the main study instrument. It consisted of questions on patient's demographic characteristics, socio-economic characteristics, clinical characteristics, knowledge about the disease and treatment, and components of the health belief model (HBM) which attempts to explain health care seeking behaviour.

Of the 1862 tuberculosis patients registered in the Colombo district in year 2002, pulmonary tuberculosis accounted for 77% of cases, among them 1121 (60%) were smear-positive and 309

(17%) were smear-negative. Twenty-three percent (432) of patients had extra-pulmonary tuberculosis and tuberculosis lymphadenitis was the commonest form of extra-pulmonary TB, which accounted for 11% (207) of all TB cases. By treatment category, 1705 patients (92%) were new cases and 157 (8%) were re-treatment cases.

Among smear-positive (76%) and smear-negative (64%) pulmonary tuberculosis patients, a majority were males, but among extra-pulmonary tuberculosis patients, significantly more were females (54%) ( $p = 0.00$ ). Patients with extra-pulmonary TB (median age 31 years) were significantly younger than the both types (i.e. smear-positive and smear-negative) of pulmonary TB patients (44 years) ( $p = 0.00$ ).

Predictors of being a patient of smear-positive PTB, after removal of confounding effects, using multivariate analysis, were found to be: age < 45 years (OR = 2.2, 95% CI: 1.5, 3.2); being unmarried / separated / divorced (OR = 1.8, 95% CI: 1.1, 3.0); being uneducated or with an education up to grade 9 (OR = 2.0, 95% CI: 1.3, 2.9); a member of a household with monthly income less than Rs. 5,000 (OR = 3.4, 95% CI: 2.2, 5.3); a habitual smoker (OR = 4.3, 95% CI: 2.5, 7.5); using 'drugs' (OR = 7.0, 95% CI: 1.9, 25.6); and have a contact history of TB (OR = 1.9, 95% CI: 1.1, 3.5).

This study showed a cure rate of 66% and a defaulter rate of 26% for smear-positive pulmonary tuberculosis. This cure rate is much lower than the WHO set target of 85%. By taking into consideration of those who 'completed treatment' also, the treatment success rate was 71% for smear-positive PTB patients. The treatment success rate of new cases of smear-positive PTB patients (76%) was significantly more than for re-treatment cases (44%) ( $p = 0.00$ ). Among re-treatment cases of smear-positive PTB, defaulter rate for 'relapses' and 'failures' was 43% and 13% respectively, while 60% of patients who 'returned after default' again defaulted. This shows that the poor treatment outcomes for re-treatment cases was mainly due to the high defaulter rate among patients who 'returned after defaulting' the previous course of treatment.

Defaulters among new cases of smear-positive pulmonary TB did so after a median duration of 68 days of treatment, which was significantly shorter than for defaulters among re-treatment

cases (91 days) ( $p = 0.01$ ). It should be noted that the duration of intensive phase treatment for new and re-treatment cases are 60 and 90 days respectively. This shows that most of the patients who defaulted did so after the intensive phase.

A significantly higher cure rate of 71% for smear-positive PTB receiving directly observed treatment (DOT) compared with those receiving self-administered treatment (SAT) (58%) was observed ( $p = 0.00$ ). Twenty-two percent of patients who received DOT and 25% on SAT defaulted treatment. The overall treatment failure rate for DOT and SAT were 0.4% and 7% respectively. Thus, DOT showed a favorable outcome for smear-positive PTB patients by improving the cure rate and reducing the defaulter and failure rates.

The present study found that 92% of the new cases of smear-positive PTB received DOT, while re-treatment cases, who are generally believed to be poorly compliant and prone to lower cure rate, a significantly lower (83%) proportion received DOT ( $p = 0.001$ ). This shows that the selection of patients could have been improved. Ideally more patients belong to 're-treatment category' should be given DOT.

New cases of smear-positive PTB showed a median patient delay of 40 days, provider delay of 8 days and a total delay of 50 days. Unconfounded predictors of a patient delay of more than 30 days were: being uneducated or studied up to grade 9 (OR = 1.8, 95% CI: 1.0, 3.0), being a habitual smoker (OR = 2.2, 95% CI: 1.1, 4.3) and using self-medication (OR = 3.0, 95% CI: 1.6, 5.3).

Similarly, predictors of a provider delay of more than 7 days, using multivariate analysis, were found to be: visiting either a GP or private hospital first (OR = 4.1, 95% CI: 2.0, 8.5) and not doing sputum examination on first visit (OR = 7.3, 95% CI: 3.7, 14.7).

To shorten patient delay the public should be educated about symptoms of tuberculosis and the importance of early medical consultation. Health education campaigns should be conducted for this purpose. An effective means of shortening the provider delay is thought to be to develop suitable links between government health services and private sector care providers especially the general practitioners to facilitate referrals for investigations (especially sputum smear

examination) and for treatment. Efforts should be made to improve the diagnostic skills and the awareness of TB of all doctors, particularly general practitioners, since most patients first seek treatment from them. Further, adequate counseling and education of patients and close relatives is important to improve treatment compliance.

A follow up study among new cases of smear-positive PTB has shown that 23% of subjects were non-compliers. With advancing age, compliance of patients was becoming less. The median age of compliers (45 years) was significantly less than for non-compliers (50 years) ( $p = 0.05$ ).

Bivariate analyses have found that non-compliers were characterized by being male (OR = 3.9, 95% CI: 1.9, 8.1), educational status ('lower' vs. 'higher', OR = 2.1, 95% CI: 1.2, 2.6), place of residence ('urban slums' vs. 'urban residence', OR = 3.7, 95% CI: 2.1, 6.5), living alone ('alone' vs. 'from nuclear families', OR = 2.7, 95% CI: 1.1, 7.4), from extended families ('from extended families' vs. 'from nuclear families', OR = 4.5, 95% CI: 2.6, 7.8), role in the family ( $p < 0.01$ ), smoking (OR = 2.7, 95% CI: 1.6, 4.7), drug abuse (OR = 2.9, 95% CI: 1.4, 6.0), had severe drug side effects (OR = 2.8, 95% CI: 1.2, 6.3), knowledge score on TB ('low' vs. 'high', OR = 3.5, 95% CI: 2.0, 6.1) and the components of health belief model: 'perceived susceptibility' (OR = 3.4, 95% CI: 2.0, 5.7) and 'perceived benefits' (OR = 3.0, 95% CI: 1.8, 5.1).

Limited knowledge and misconceptions about tuberculosis and its treatment were observed among TB patients. The median knowledge score of patients who complied treatment was significantly higher than for those who did not comply treatment ( $p = 0.00$ ).

As many factors influence human behaviour, the defaulting patients may have similar or different reasons for their action depending on individual circumstances. In this study, health belief model (HBM) was used to study such 'factors' related to non-compliance. Difference in the "perceived susceptibility" and "perceived benefits" scores between the compliers and non-compliers was found to be statistically significant ( $p = 0.00$ ). But the differences in the scores of "perceived severity", "perceived barriers" and "cues to action" between the compliers and the non-compliers failed to reach significance.

Being a male (OR = 3.3, 95% CI: 1.1, 10.0), living alone or with extended family (OR = 2.9, 95% CI: 1.4, 6.1), serious drug side effects while being on treatment (OR = 4.0, 95% CI: 1.3, 11.7), perceiving non-susceptibility to adverse effects of illness (OR = 3.3, 95% CI: 1.6, 6.8), and perceiving no benefit in regular treatment (OR = 3.0, 95% CI: 1.4, 6.3) were shown as the predictors of non-compliance to treatment in the multivariate analysis.

Patients and their close relatives should be educated and adequately counseled about the duration of treatment, importance and advantages of DOT, side effects of the drugs and the consequences of interrupting treatment, to improve the treatment compliance.