

TUBERCULOSIS IN ADOLESCENTS AND CHILDREN: DATA ON CLINICAL PRESENTATION AND TREATMENT OUTCOMES FOR A PERIOD OF 4 YEARS, FROM A TERTIARY CARE HOSPITAL IN SOUTH INDIA

Jayasree Poroor¹, Doye George²

HOW TO CITE THIS ARTICLE:

Jayasree Poroor, Doye George. "Tuberculosis in Adolescents and Children: Data on Clinical Presentation and Treatment Outcomes for a Period of 4 Years, from a tertiary care hospital in South India". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 18, May 04, 2015; Page: 2752-2757.

ABSTRACT: INTRODUCTION: Adolescents are less frequently studied population as far as tuberculosis is concerned. And their response to the disease as well as clinical manifestations is different from children. **MATERIALS AND METHODS:** A retrospective study was done on patients up to the age of 19 years and classified them in to child and adolescent. Up to 12 years was taken as child and beyond that as adolescent. Data collection was done from the RNTCP registers and medical records. The incidence of pulmonary, extra-pulmonary was found separately. Among pulmonary as well as the total intra-thoracic tuberculosis, sputum positivity was found. The incidence of lymph node tuberculosis, pleural effusion and others were also recorded. The records were checked to find out the completion/cure of disease and any record of relapse. **RESULTS:** Total 67 patients were included in the study, 35 males and 32 females. 40.3% were adolescents and the rest were children. 48.14% were having pulmonary tuberculosis among adolescents while 85% in childhood had this presentation. (p-0.001). Intra-thoracic tuberculosis (pulmonary, intra-thoracic nodes and pleural effusion) occurred to 62.96% adolescents and 87.5% children. 53.84% of adolescents with pulmonary TB were sputum positive whereas in children it was only 18.7%. The increased chance of sputum positivity among adolescents was statistically significant (p-0.026). Among the total tuberculosis patients in each category, 29.6% adolescents had extra-thoracic lymph node tuberculosis while only 7.5% children had this (p-0.04). There were no statistically significant differences in other forms of extra-pulmonary tuberculosis. All patients were compliant and had completed treatment. **DISCUSSION AND CONCLUSIONS:** Our adolescents had greater incidence of extra-thoracic Tb (37%) while Cruz et al found 18.6% of this type. Smear positivity of adolescents with intra-thoracic TB was also higher in our study (41.17%) compared to the other study (25%). Arora VK et al reported 54% smear positivity among adolescents with pulmonary TB, similar to us. Extra-pulmonary tuberculosis predominates in the adolescents compared to adults as per the studies done by de Pontual L et al and others. We could find that extra-pulmonary Tb was more common in adolescents compared to children. Compliance was not a problem unlike studies from other countries.

KEYWORDS: Tuberculosis, Pediatric tuberculosis, Adolescent, treatment outcomes, India.

INTRODUCTION: Tuberculosis (TB) is a global emergency causing high morbidity and mortality, especially in the impoverished and developing nations¹. The burden of tuberculosis is the highest in India, with 17% of the world population we carry 26% of all the tuberculosis cases. The

ORIGINAL ARTICLE

National Tuberculosis Programme (NTP) which was launched in 1962 to combat the disease, had immunization with Bacille Calmette-Guerin (BCG) as its main plank. This strategy failed miserably and the programme failed to achieve its objectives. Even though the Revised National Tuberculosis Control Programme (RNTCP) with its emphasis on Directly Observed Treatment, Short course (DOTS) has been successful in improving the case detection and treatment success rates, tuberculosis still remains one of the most important public health problems in India.²

TB disease in children under 15 years of age (also called pediatric tuberculosis) is a public health problem of special significance because it is a marker for recent transmission of TB.² The disease dynamics and presentations in childhood tuberculosis and adolescent tuberculosis is vastly different from each other, even though they are generally classified as pediatric tuberculosis. The immune response against Mycobacterium tuberculosis (MTB) is less effective among adolescents³. Adolescents have peculiar clinical TB manifestations and may present without symptoms but are more likely to have cavitating disease compared to adults or children.⁴

The population of adolescents in India was 170 million in 2006 which was around 15 percentage of the total population of the country.⁵ Very few studies are there among this population from Indian scenario. In this study we have attempted to bring out the clinical characteristics of adolescent tuberculosis and how it is different from tuberculosis in younger children.

MATERIALS AND METHODS: For this study, adolescent was defined as a person aged 13 years to 19 years. Anybody below that age was defined as child. Data was obtained from old case records and RNTCP register. Patients' age, sex, category, type of disease, whether pulmonary or extra-pulmonary were recorded in the proforma. If pulmonary, search was done to find out whether sputum was positive. In case of extrapulmonary disease, the site of involvement was recorded. In patients who were referred out, communication was done with the treating RNTCP centre to find the outcome. The whole data was entered in Microsoft Excel worksheet. The presentation of tuberculosis up to the age of 19 years was found out and also, the segregated data of childhood and adolescents were compared with each other. Statistical methods were applied to find out the significance of observations.

RESULTS: There were total 67 patients, 35 were males and 32 females (M: F=1.09:1). 63 were receiving category I treatment and 4 receiving category II. 40(59.7%) were children and 27(40.3%) were adolescents (child:adolescent=1.48:1). Male: female ratio in adolescents had been 12:15(0.8:1) while in children the ratio was 23:17(1.35:1). This apparent increase of female patients in adolescence was not found to be statistically significant ($p=0.23$). Among the total cases of pediatrics and adolescent tuberculosis, 47 were pulmonary and 20 were extra-pulmonary. 13 out of 27(48.14%) adolescents were having pulmonary tuberculosis in whereas 34 out of 40(85%) children were having this presentation. This observation of lesser incidence of pulmonary tuberculosis in adolescence compared to childhood was found significant ($p=0.001$, OR= 0.164, 95% CI=0.05 to 0.518) statistically (Table 1). In other words, increased incidence of extra-pulmonary tuberculosis in adolescents was found to be statistically significant ($p=0.001$). Total number of intra-thoracic tuberculosis (pulmonary, intra-thoracic lymphadenopathy and

ORIGINAL ARTICLE

pleural effusion together) in adolescents was 17 (62.96%) and in children it was 35(87.5%). Out of the total 47 pulmonary tuberculosis, 13(27.65%) were sputum positive for AFB and the remaining were sputum negative. When we did the split up according to the age, it was found that 7 out of 13(53.84%) adolescent pulmonary TB were sputum positive whereas among childhood tuberculosis, only 6 out of 34(17.7%) were sputum positive. This observation of higher sputum positivity in adolescents with pulmonary tuberculosis compared to children also was statistically significant ($p=0.026$, $OR=5.4$, $95\% CI=1.34$ to 22.13). When we considered the total intra-thoracic tuberculosis together, we found that 7 out of 17 adolescents (41.17%) and 6 out of 35 children (17.14%) were sputum smear positive. Lymph node tuberculosis affected 12 patients totally. Adolescents were 8(8 out of 27-29.6%) and children were 3(3 out of 40 i.e., 7.5%). The increased incidence of lymph node tuberculosis in adolescence was found to be significant statistically ($p=0.040$, $OR=3.7$, $95\%CI=1.0$ to 14.22) (Table 1).

Total (n=67)	Adolescent TB (n=27)	Childhood TB (n=40)	Significance	OR (95% CI)
Sex				
Male	12 (44.4%)	23(57.5%)	p-0.23	1.23 (0.82-1.85)
Female	15(55.5%)	17(42.5%)		
Site of infection				
Extra-pulmonary	14 (51.9%)	6 (15%)	p-0.001*	0.164 (0.05 to 0.518)*
Pulmonary	13 (48.1%)	34(85%)		
Sputum positivity (Among pulmonary TB)				
Yes	7 (53.8%)	6 (17.6%)	p-0.026*	5.4 (1.34 to 22.13)*
No	6 (46.2%)	28 (82.4%)		
TB Lymphadenitis				
Yes	8 (29.6%)	3 (7.5%)	p-0.040*	3.7 (1.0 to 14.22)*
No	19 (70.4%)	37 (92.5%)		

Table 1: The clinical patterns of adolescent tuberculosis and pediatric tuberculosis

*statistically significant.

When we studied the incidence of lymph node tuberculosis among the extra-pulmonary tuberculosis in adolescents (8 out of 14=57.1%) and children (3 out of 6 i.e., 50%), the difference was not found to be statistically significant ($p=0.69$). Also, the apparently higher incidence of pleural effusion among adolescents with extra-pulmonary tuberculosis (4 out of 14 i.e., 28.57%) compared to same category of children (1 out of 6 i.e., 16.67%) was not found to be statistically significant ($p=0.573$). Other than lymph node and Pleural effusion, we had 2 cases of bone and joint tuberculosis (1 adolescent and 1 child) and 1 cases of TB meningitis (child). 61 patients were either declared cured or completed treatment. 6 were continuing treatment during the study. No one has reported to our center with relapse.

ORIGINAL ARTICLE

DISCUSSION: There were very few comparable studies which deal with the clinical patterns of adolescent tuberculosis. Apparently there was increased incidence in children compared to adolescents. This was in variance with the observation made by Arora VK et al.⁷ Cruz AT et al⁸ has studied 145 cases of adolescents with tuberculosis over 15 years and observed that 78.6% had isolated intra-thoracic TB. In our study we got slightly lower percentage of 63%. In their study 18.6% of adolescents had extra-thoracic TB while in our study 37% had this clinical type. 37% (10 out of 27) of extra-thoracic TB had been TB lymphadenitis for adolescents in their study, whereas in our study it had been 57.1%. This significantly higher level of lymph node tuberculosis among extra-pulmonary indirectly implies the lower incidence of more serious form of tuberculosis in this age group in our country. The difference could be due to difference in genetic susceptibility and also due to the routine use of BCG vaccine in our country. Being an endemic country for tuberculosis, increased awareness and early detection of minor forms of tuberculosis may also be another reason. Smear positivity was 25% for intra-thoracic TB in adolescents in their study. For us it was higher (41.17%). The former study had 54% culture positivity, while in our study cultures were not done routinely. Studies conducted in United States during 1993 to 2001 had shown that adolescents aged 15 to 18 years were more likely to be smear positive.⁹ We also have observed that smear positivity was significantly higher in adolescents compared to children. 54% smear positivity was recorded in adolescents with pulmonary tuberculosis by Arora VK et al⁷ which is similar to our study. Extra-pulmonary tuberculosis predominate in the adolescents compared to adults as per the studies done by de Pontual L et al,¹⁰ Sant' Anna C et al¹¹ and Kam A et al.¹² This observation was more apparent when we compared with children in our study.

From our study it was apparent that compliance was not a problem in children and adolescents with tuberculosis in our place. Some other studies show that compliance is a real problem in adolescents and there are studies on the techniques like coaching,¹³ giving incentives¹⁴ and using peer counselling¹⁵ to improve compliance. The difference may be due to the increased parental influence which is being practiced in our country till adulthood in contrast with the more independent life of adolescents in several other countries. The population which came under our study had been relatively financially secure middle or upper middle socio economic class. In our place itself the compliance may be less in other social situations.

CONCLUSIONS: Adolescent tuberculosis is less studied area. Higher sputum positivity and more chance of making close contacts with others in peer groups or class rooms make them more infective. There is good compliance to treatment among our adolescents. More studies are required about tuberculosis and the disease dynamics in our adolescents. Data from different social classes are required to get a clearer picture of Indian scenario since socio economic differences between different classes are extreme our society.

ACKNOWLEDGEMENTS: We express our sincere gratitude to Ms. Winnie Philip for giving statistical assistance. We also thank Mrs. Shalini, our DOTS provider who helped us with data collection.

ORIGINAL ARTICLE

REFERENCES:

1. World Health Organization: Global tuberculosis control 2011. WHO, Geneva Switzerland; 2011.
2. John TJ. Tuberculosis control in India: why are we failing? *Indian Pediatr.* 2014 Jul; 51(7): 523-7.
3. American Academy of Pediatrics. Tuberculosis. In: Pickering LK, Baker CJ, Kimberlin DW, Long SS, eds. *Red Book: 2009 Report of the Committee on Infectious Diseases*. 28th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2009: 680–701.
4. Nemir RL. Perspectives in adolescent tuberculosis: three decades of experience. *Pediatrics.* 1986 Sep; 78(3): 399-405.
5. RGI and Census Commissioner (2006) *Population Projections for India and States 2001–2026*. New Delhi: Report of the Technical Group on Population Projections Constituted By the National Commission on Population.
6. Kam A, Ford-Jones L, Malloy P, Khan K, Kitai I. Active tuberculosis among adolescents in toronto, Canada: clinical features and delays in diagnosis. *Pediatr Infect Dis J.* 2007 Apr; 26(4): 355-6.
7. Arora VK & Agarwal SP (2005) Paediatric tuberculosis: an experience from LRS Institute of tuberculosis and respiratory diseases. In: *Tuberculosis Control in India, I edn.* (eds SP Agarwal & LS Chauhan), Elsevier, New Delhi, pp. 115–118.
8. Cruz AT, Hwang KM, Birnbaum GD, Starke JR. Adolescents with tuberculosis: a review of 145 cases. *Pediatr Infect Dis J.* 2013 Sep; 32(9): 937-41.
9. Nelson LJ, Schneider E, Wells CD, Moore M. Epidemiology of childhood tuberculosis in the United States, 1993-2001: the need for continued vigilance. *Pediatrics.* 2004 Aug; 114(2): 333-41.
10. De Pontual L, Balu L, Ovetchkine P, Maury-Tisseron B, Lachassinne E, Cruaud P, Jeantils V, Valeyre D, Fain O, Gaudelus J. Tuberculosis in adolescents: A French retrospective study of 52 cases. *Pediatr Infect Dis J.* 2006 Oct; 25(10): 930-2.
11. Sant'Anna C, March MF, Barreto M, Pereira S, Schmidt C. Pulmonary tuberculosis in adolescents: radiographic features. *Int J Tuberc Lung Dis.* 2009 Dec; 13(12): 1566-8.
12. Kam A, Ford-Jones L, Malloy P, Khan K, Kitai I. Active tuberculosis among adolescents in toronto, Canada: clinical features and delays in diagnosis. *Pediatr Infect Dis J.* 2007 Apr; 26(4): 355-6.
13. Hovell MF, Sipan CL, Blumberg EJ, Hofstetter CR, Slymen D, Friedman L, Moser K, Kelley NJ, Vera AY. Increasing Latino adolescents' adherence to treatment for latent tuberculosis infection: a controlled trial. *Am J Public Health.* 2003 Nov; 93(11): 1871-7.
14. Kominsky GF, Varon SF, Morisky DE, Malotte CK, Ebin, VJ, Coly A, et al. Costs and cost-effectiveness of adolescent compliance with treatment for latent tuberculosis infection: results from a randomized trial. *Journal of Adolescent Health* 2007; 40(1): 61–8.
15. Morisky DE, Malotte CK, Choi P, Davidson P, Rigler S, Sugland B, et al. A patient education programme to improve adherence rates with antituberculosis drug regimens. *Health Education Quarterly* 1990; 17(3): 253–67.

ORIGINAL ARTICLE

AUTHORS:

1. Jayasree Poroor
2. Doye George

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Paediatrics, Pushpagiri Institute of Medical Sciences & Research Centre, Tiruvalla, Kerala, India.
2. Associate Professor, Department of Pulmonology, Department of Paediatrics, Pushpagiri Institute of Medical Sciences & Research Centre, Tiruvalla, Kerala, India.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Doye George,
Associate Professor,
Department of Pulmonology,
Pushpagiri Institute of Medical Sciences &
Research Centre, Tiruvalla-689101,
Kerala, India.
E-mail: pilimat@rediffmail.com

Date of Submission: 20/04/2015.
Date of Peer Review: 21/04/2015.
Date of Acceptance: 27/04/2015.
Date of Publishing: 04/05/2015.