

COMPARISON OF TUBERCULIN REACTION SIZES AT 48 AND 72 HOURS AMONG CHILDREN IN TIRUVALLUR DISTRICT, SOUTH INDIA

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Summary

Setting: A rural population in Tiruvallur district, south India.

Objective: To study the variability of skin test reaction sizes between 48 and 72 hours.

Methods: A tuberculin test survey was conducted among children aged less than 10 years. The reaction sizes were read by the same reader at 48 hours and 72 hours independently. The results of the tuberculin test were compared.

Results: Of 957 children aged below 10 years were included in the study; the male and female ratio was 1:1.1. There were no significant differences between the readings of reaction size at 48 and 72 hours.

Conclusion: The tuberculin test results can be read either at 48 hours or 72 hours without compromising the validity. [*Indian J Tuberc* 2007; 54:152-156]

Key words: Tuberculosis, tuberculin test, comparison.

INTRODUCTION

Tuberculosis (TB) is highly prevalent in India and continues to be a leading cause of death¹. Prevalence of tuberculous infection in younger children is an important index of the total tuberculosis situation in a country². The Tuberculin survey is conducted among children to estimate the prevalence of infection and compute the annual risk of tuberculosis infection (ARTI), which is a measure of the extent of transmission of infection with mycobacterium tuberculosis in a community and trends over a period of time^{3,4}. There were numerous studies conducted in various pockets of India. In these studies, the reaction sizes were read at various intervals, namely 48-72 hours⁵ and 48-96 hours^{6,7,8}. Of late, in the nation-wide survey conducted in four zones of the country, the reaction sizes were read about 72 hours later⁹. There are limited studies, which attempted to analyze the variation in the induration, read at different intervals. Delayed hypersensitivity reactions to tuberculin (i.e., a positive test) begin at 5 to 6 hours, are maximal at 48-72 hours, and subside over a period of days. Tuberculin Skin Test (TST) readings more than four days after application may not be accurate and should not be

accepted¹⁰. The objective of the study is to compare the variability of readings of reaction size at 48 and 72 hours among the same children included in a survey.

METHODS

All children less than 10 years old in five selected villages in Tiruvallur District, south India were registered in a house-to-house census, between December 2004 and January 2005. They were skin tested with 1TU RT23 with Tween 80, after recording the presence or absence of BCG scar. The tests were administered on the mid-volar aspect of the left forearm. Informed written consent was obtained from the parents/guardians. Name, sex, age, date of testing, presence or absence of BCG scar, and the readings of reaction size measured at 48 and 72 hours without knowledge of BCG scar status were recorded on individual child cards. The reader who read the reaction at 72 hour was blinded to the reaction size read by him at 48 hours.

Data were scrutinized and entered twice in order to ensure accuracy, corrected for discrepancy and missing information. The

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readings at 48 and 72 hours were compared using paired t test. Pearson correlation coefficient was also calculated to assess the extent of correlation

between the two readings. The frequency distributions of tuberculin reaction sizes were plotted for 48 hours and 72 hours separately and

Figure 1: Distribution of reaction sizes at 48 hours among children aged 1-9 years

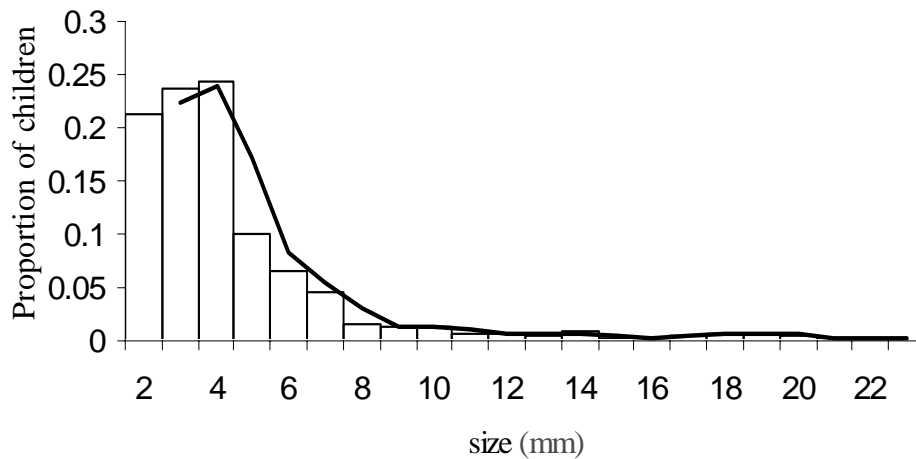
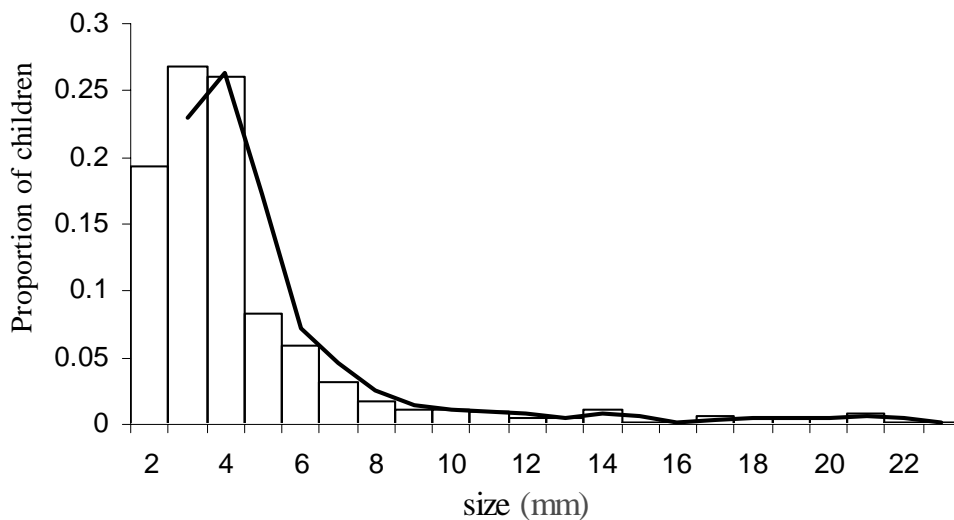


Figure 2: Distribution of reaction sizes at 72 hours among children aged 1-9 years



the cut-off point of reaction attributable to tuberculosis infection were identified from the frequency distribution at 48 hours. We used this cut-off point to define infection for children tested at 72 hours for comparability^{11,12}. The agreement in reading the reaction sizes between the second and third day was corrected for chance expected agreement using kappa statistic. Mc Nemar chi-square test was used to test the difference between the discordant pairs.

RESULTS

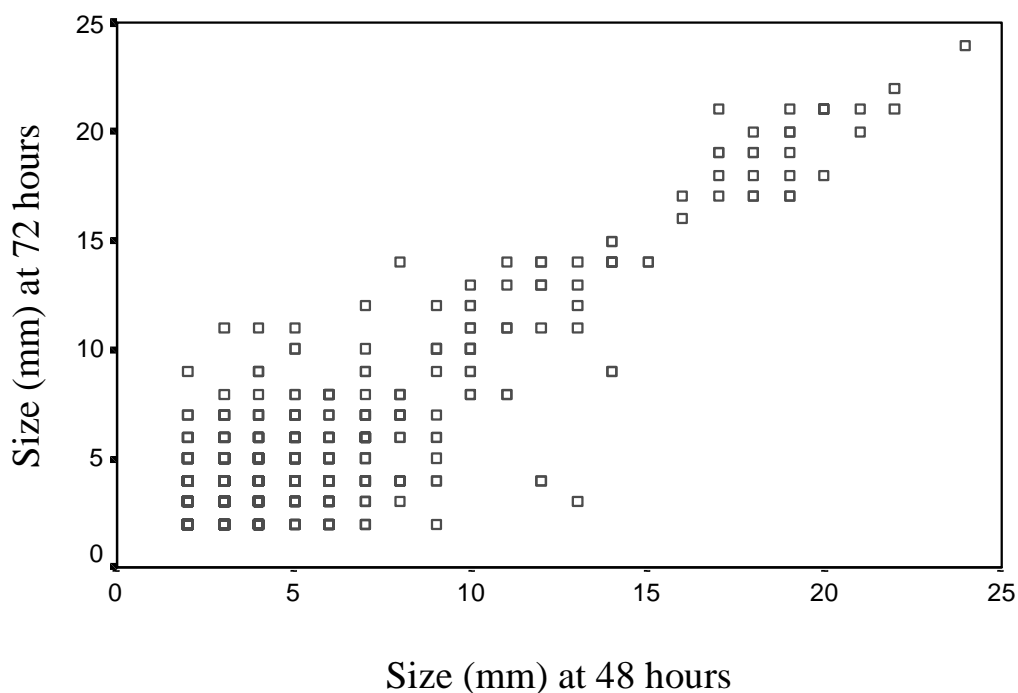
Nine hundred and fifty-seven children aged below 10 years participated in the study. The mean age of the children was 5 years (Standard deviation = 2.8). The male and female ratio was 1:1.1. The frequency distributions of tuberculin reaction sizes are plotted for 48 hours and 72 hours separately (Fig. 1&2). Fig 1 indicated a fairly anti-mode at 13mm. The children were classified

as infected and uninfected using this cutoff point. There was no significant difference between the mean of the readings of reaction sizes at 48 and 72 hours ($t = 0.393$, $p = 0.7$). Fig 3 represents scatter diagram of reaction sizes at 48 and 72 hours. There was a high degree of positive correlation ($r = 0.9$, $p < 0.001$) between the readings of the reaction sizes at 48 and 72 hours. The children infected at 48 hours (4.6%; 44 of

Table: Number of children infected (≥ 13 mm) at 48 and 72 hours

48 hours	72 hours		
	Infected	Not infected	Total
Infected	39	5	44
Not infected	8	905	913
Total	47	910	957

Figure 3: Distribution of reaction sizes at 48 and 72 hours among children aged 0-9 years



957) and 72 hours (4.9%; 47 of 957) is shown in the table. The Kappa statistic for the agreement between infected and not infected at 48 and 72 hours was estimated to be 85%. There was no significant difference between infections measured in two different days. (Mc Nemar $\chi^2 = 0.31$).

DISCUSSION

The study findings showed that there was no difference in the reaction sizes read at 48 and 72 hours. Most of the studies, the interval between the administration of the test and reading of the induration was 72 hours (3 days). But in some tuberculin surveys the induration was read on the second day (48 hours) due to exigency or emergency like non-availability of the tested children on the third day. In the tuberculin survey conducted among children aged 0-14 years⁸, the mean reaction sizes read among children at 48 hours was not different from among other children read at 72 hours (data not tabulated). So this study was especially undertaken to demonstrate that there is no difference in the readings at 48 and 72 hours among the same children. A study by American Thoracic Society recommended that tests administered by Mantoux technique be read at 48 or 72 hours after injection¹³. Whereas in another study by South Manchester University Hospital Trusts on 116 adult volunteers showed that Mantoux reaction was significantly higher at 72 hours compared to the reaction at 48 hours and concluded that in clinical practice tuberculin tests should be read at 72 hours as readings at 48 hours may underestimate the reaction size¹⁴. It may be noted that the tuberculin was bio-equivalent to 10 tuberculin of PPDS. In another study in five travel and TB control clinics in the Netherlands to assess the variation in skin test reaction between different days of reading showed that there was no significant difference in reaction size to ITU PPD between readings at 72 and 96 hours¹⁵. The study population was a cohort of non-BCG vaccinated adult travellers who were at least 15 years old. A study conducted by our Centre during 1999-2001 among adults aged more than fourteen years showed that the prevalence of infection was higher among men and women as well (66% vs 57%)¹⁶. In this survey all subjects

were given TST and the test reaction was read at 48-96 hours later. Most of the tuberculin surveys are confined to children aged <10 years as they are considered to be the ideal population to assess the extent of infection in the community. In the nation wide survey conducted recently in India, among children aged 1-9 years the reaction size was read at 72 hours⁹.

It should be borne in mind that we require a very large sample of children with a power to demonstrate a significant difference in readings at different days. Our study included nearly 1000 children with a 5% dropout and the remaining children were sufficient enough to study the variability in different days. The study also warrants for a similar study among adults to assure the current findings.

In conclusion, the tuberculin test result can be read either on 48 hours or 72 hours without compromising the validity.

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