

Scar Formation and Tuberculin Conversion Following BCG

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ABSTRACT

Objective: To determine frequency of scar formation and positive tuberculin conversion test following BCG vaccine administered within 0-28 days of life in children in 6 months to 6 years of age presenting at outpatient department of Fauji Foundation Hospital Lahore.

Study Design: Descriptive case series.

Place and Duration of Study: Outdoor Department of Pediatrics, Fauji Foundation Hospital, Lahore from 1st July 2020 to 30th December 2020.

Methodology: Ninety seven children were included. Base line demographic information of patients (age, gender, weight on weight machine) was recorded. 0.5 ml BCG was administered in right arm. Tuberculin skin test was assessed as per operational definition. After 48 to 72 hours, scar formation was assessed after 1 month. Data regarding scar formation and positive tuberculin conversion test was recorded.

Results: The mean age was 3.20±1.46 years, 39 (40.21%) were male whereas 58 (59.79%) were females. The scar formation following BCG vaccine administered within 0-28 days of life in children in 6 months to 6 years of age was 59 (60.82%) and positive tuberculin conversion test following BCG vaccine administered within 0-28 days of life in children in 6 months to 6 years was recorded in 47 (48.45%).

Conclusion: Most babies have developed a post-vaccination scar. The combination of the BCG scar and the positive skin testing tuberculin was very important. The development of BCG scars had no effect on age or sex. Greater trials are advised in order to detect the true extent of the problem and to evaluate regularly the BCG vaccination programs.

Keywords: Infants, Tuberculosis, BCG vaccination, Scar formation, Positive tuberculin conversion test

INTRODUCTION

One of the top ten worldwide causes of death for children is tuberculosis (TB) caused by a mycobacterium tuberculosis complex (MTBC). In 2013 the World Health Organization (WHO) was developing with the goal of reaching no deaths due to infantile TB by 2025. Pediatric tuberculosis has received recent attention. 1 Children are more susceptible to active TB (about 30%) than adults following infection. 2 Vaccination against Bacillus Calmette-Guerin has always been an important part of childhood TB prevention. BCG scar is a single vaccine marker and a significant vaccination index. But scar failure is a recognized phenomenon with a prevalence of between 1% and 20%. 3 According to the WHO guideline, a single BCG vaccination policy is used for full security at or before 1 month of age. BCG, with a vaccine residual efficacy up to 20 to 25 years, is the only vaccine available for preventing TB with a period of defense of at least ten years. 4 The potential of BCG vaccine to cause the delayed kind of hypersensitivity (DTH) is Allergic power and tuberculin reactivity shown by Mantoux's TST after BCG vaccination. The BCG vaccine and its immunogenicity indirectly measured most often.

BCG scar formation and immunogenicity of BCG reflected by positive TST following BCG vaccination has always been a matter of great clinical interest. In a study by Dhanawade et al⁵ has showed that frequency of scar formation was 94.4% and tuberculin conversion test was positive in 71.4% following BCG in children. In a study by Tahseen et al⁶ showed that frequency of scar formation was 89% following BCG in children. In a study by Gambo et al⁷ has showed that frequency of scar formation was 81.5% and tuberculin conversion test was positive in 56.7% following BCG in children.

There is very limited data on this subject in our Pakistani population. As far as my research is concerned only one study from Bahawalpur done by Rahman et al⁸ 2013 showed positive scar in 88% children. That study only address scar formation. This prompts me to determine frequency scar formation and positive tuberculin conversion test following BCG vaccine in children in our local population. My study will provide important

insights into the immunogenic activity and protective efficacy of the BCG vaccine.

MATERIALS AND METHODS

The descriptive case series was conducted at Outdoor Department of Pediatrics, Fauji Foundation Hospital, Lahore from 1st July 2020 to 30th December 2020 and 97 children were enrolled. The children from 6 months to 6 years of age, both genders, gestational age 34 weeks to 40+6 weeks and BCG vaccination within 0-28 days of life were included. Children with unknown gestational age or gestational age less than 33 weeks or more than 42 weeks, sick enough to be admitted in the hospital at birth during 1st month of life, steroid therapy, chronically ill and malnourished on history, anti-tuberculosis therapy, HIV exposed infants and those with family history of TB and clinical manifestations suggestive of TB (unexplained cough >2 weeks, fever >2 weeks, night sweats and significant weight lost) were excluded. Base line demographic information of patients (age, gender, weight on weight machine) was taken. 0.5ml BCG was administered in right arm. Tuberculin skin test was assessed as per operational definition. After 48 to 72 hours, scar formation was assessed after 1 month. Data regarding scar formation and positive tuberculin conversion test was recorded. The data was entered and analyzed through SPSS-22.

RESULTS

There were 63 (64.95%) cases were upto 3 years of life whereas 34 (35.05%) were between 4-6 years of life with mean age was 3.20±1.46 years. Thirty nine (40.21%) were male whereas 58 (59.79%) were females. Mean weight of the neonates was 2.82±0.26 kgs. The scar formation following BCG vaccine administered within 0-28 days of life in children in 6 months to 6 years was 59 (60.82%) whereas 38 (39.18%) had no scar formation. The positive tuberculin conversion test following BCG vaccine administered within 0-28 days of life in children in 6 months to 6 years of age was 47 (48.45%) whereas 50 (51.55%) had negative tuberculin conversion test (Table 1).

Table 1: Demographic information of the patients (n=97)

Variable	No.	%
Age (years)		
Upto 3	63	64.95
4-6	34	35.05
Gender		
Male	39	40.21
Female	58	59.79
Weight (kgs)	2.82±0.26	
Scar formation		
Yes	59	60.82
No	38	39.18
Positive tuberculin conversion test		
Yes	47	48.45
No	50	51.55

DISCUSSION

BCG scar formation and immunogenicity of BCG reflected by positive TST following BCG vaccination has always been a matter of great clinical interest. However, there is very limited data on this subject in our Pakistani population. That study only address scar formation. This prompts us to determine the frequency scar formation and positive tuberculin conversion test following BCG vaccine in children in our local population. This study may provide important insights into the immunogenic activity and protective efficacy of the BCG vaccine.

Our results reveal that mean age was 3.20 ± 1.46 years, 39 (40.21%) were male whereas 58 (59.79%) were females, scar formation following BCG vaccine administered within 0-28 days of life in children in 6 months to 6 years of age was recorded in 59 (60.82%) and positive tuberculin conversion test following BCG vaccine administered within 0-28 days of life in children in 6 months to 6 years of age was recorded in 47 (48.45%) [Table 1]. The findings of our study are near with a study by Gambo et al⁷ showing that frequency of scar formation was 81.5% and tuberculin conversion test was positive in 56.7% following BCG in children. Whereas Dhanawade et al⁵ has showed that frequency of scar formation was 94.4% and tuberculin conversion test was positive in 71.4% following BCG in children. In a study by Tahseen et al⁶ showed that frequency of scar formation was 89% following BCG in children. These frequencies were higher than our study.

Another study in Guinea-Bissau (where as many as 50 percent of BCG-immunized children do not develop an associated scar) noted that development of a BCG scar was associated with lower mortality and morbidity among children <5 years of age. Protection was strongest against respiratory infection and in the first year of life.⁹

Thayyil-Sudhin et al¹⁰ found that tuberculin conversion was 80% in term infants and 80.7% in preterm infants. Many researchers, on the other hand, found a low TST positivity (44-68%).¹¹⁻¹³ Our findings are consistent with those of Aggarwal et al¹⁴, who found tuberculin conversion in 74.7% of term newborns vaccinated with 0.1 ml BCG. The broad variation in tuberculin conversion following BCG between studies is due to factors such as vaccine strain, efficacy, intensity of TU used, age groups studied, duration of TST after BCG, environmental mycobacteria, and so on. It has been demonstrated that tuberculin positivity improved dramatically when tested again at 1 year in infants who

were tuberculin negative 3 months after vaccination.¹⁵ The majority of babies developed a scar after being vaccinated. The connection between BCG scar and TST positivity was statistically important. Age or gender had no impact on the development of BCG scars. Larger researches to determine the true scope of the issue, as well as routine review of BCG vaccination programs, are advised. The discovery of a BCG scar as a predictor of lower childhood mortality should be investigated further in developing countries.

CONCLUSION

The majority of babies developed a scar after being vaccinated. The connection between BCG scar and TST positivity was statistically important. Age or gender had no impact on the development of BCG scars.

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