

Relationship Between Atopic Dermatitis And BCG Vaccination

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Abstract:

The results reported in this paper are based on a case control study conducted in Basrah in 2005 to test the hypothesis that neonatal BCG vaccination decreases the subsequent development of atopic dermatitis. The study included all children with atopic dermatitis who attended the dermatological out patient clinic of Al – Sadr Teaching hospital, The total number of the cases was 252 children with atopic dermatitis, compared to a control group (350 child) who were chosen from the pediatric out patient clinic in the same hospital, The studied children or their parents were asked about the history of previous BCG vaccination and examined to detect the presence or absence of BCG scar, and the diameter of BCG scars was measured by a tape measure.

The results of this study showed that the percentage of children with atopic dermatitis who had BCG scar diameter less than 1mm (negative BCG vaccine) was higher than that in the control group, and the risk of atopic dermatitis was 3.2 times more in children with negative BCG scar (diameter < 1mm) than in children with weak or positive BCG scar. The conclusion is that BCG immunization may provide protectiveness against atopic dermatitis.

Introduction:

In 1925, Coca introduced the concept of atopy, meaning "out of place" or "strange", to signify the heredity tendency to develop allergies to food and inhalant substances.⁽¹⁾

The prevalence of allergic disorders has considerably increased in recent decades.^{2,3}

Atopic dermatitis is one of these disorders, which is a common chronic relapsing inflammatory skin disease, characterized by intense itching, dry skin, inflammation and exudation.⁽¹⁾

BCG or Bacillus Calmette Guerin is the most widely used vaccine in the world, it is made of a live, weakened strain of Mycobacterium bovis.⁽⁴⁾

In Iraq, this vaccine is routinely administered to all new born babies in the first week of life.

The BCG vaccine is considered as an effective stimulus for cell – mediated immunity and may be used to modulate immune response in atopic subject to reduce allergic activity.⁽⁵⁾ This could be achieved by administration of BCG vaccine early in life.⁽⁶⁾

In support of this theory, some studies showed the protective role of BCG in reduction of allergic disorders and atopic dermatitis.^(7,8) while, some other studies showed conflicting results.^(9,10) These conflicting results stimulated the researcher to explore the effect of early BCG vaccination on the prevention or exacerbation of atopic dermatitis in childhood period in Iraq.

The aim of this study which was conducted in Basra in 2005 is to test the hypothesis that neonatal BCG vaccination decreases subsequent development of atopic dermatitis.

Materials and Methods:

A case control study was designed to test the hypothesis stated above. The study included all children with atopic dermatitis who attended the dermatological out patient clinic of Al – Sadr Teaching hospital, for the period extended from March to October 2005. The diagnosis of atopic dermatitis was based on the criteria of Hannifin and Rojka.⁽¹¹⁾

The total number of the cases was 252 children with atopic dermatitis, A control group consisted of 350 children were chosen from the pediatric out patient clinic in the same hospital, who were free from any sign and symptom of atopic disorders. Both cases and control were matched for age and sex.

The studied children or their parents were asked about the history of previous BCG vaccination and examined to detect the presence or absence of BCG scar.

The diameter of BCG scar (if any) was measured by a tape measure and by the same investigator. According to the BCG size, children were divided into the following groups:

1. BCG reaction positive: when scar diameter > 5 mm.
2. BCG weak positive: when scar diameter 1 – 5 mm.
3. BCG negative: when scar none or dot like i.e. < 1 mm.⁽⁴⁾

Statistical analysis was done on statistical package for social science programme (SPSS version 11), all results were expressed as numbers and percentages, odds ratio was calculated to show the strength of association, chi – squared test was used to test the significance, and p – value < 0.05 was considered as an indication of significant difference.

Results:

A total of 602 children, 252 were cases (children with atopic dermatitis) and 350 were control group (those who were free from any sign and symptom of atopic dermatitis).

The age of studied children range from 1 – 8 years, there was no significant difference in age composition in the whole age groups between cases and controls, the mean and stander deviation for both cases and control were 3.52 ± 2.25 years and 3.50 ± 2.23 years respectively (Table 1). There was no significant difference in sex composition of both cases and control groups, of the cases 58.7% were males in comparison to 56.6% in control groups, while females constituted 41.3% of the cases and 43.4% of the control group.

No significant difference was noted between the two groups regarding place of residence and family history of atopy. Table (1).

In Table 2, the results of this study showed that the percentage of children with atopic dermatitis who had BCG scar diameter less than 1mm (negative BCG vaccine) was 55.6% compared to 28.0% in the control group. Whereas the percentage of the children with more than 5 mm scar diameter was 36.1% in atopic dermatitis patients in comparison to 65.4% in control group, with a highly significant difference.

Furthermore, the study showed that the risk of atopic dermatitis was 3.2 times more in children with negative BCG scar (diameter < 1mm) than in children with weak or positive BCG scar.

Table (1): Characteristics of study groups:

		Atopic dermatitis Total no.=252		Control group Total no.=350		P – value
		No.	%	No.	%	
Age / years	< 2	81	32.2	118	33.7	NS
	2 – 5	117	46.4	160	45.7	
	> 5	54	21.4	72	20.6	
Sex	Male	148	58.7	198	56.6	NS
	Female	104	41.3	152	43.4	
Place of residence	Center	149	59.1	195	55.7	NS
	Others	103	40.9	155	44.3	
Family history of atopy	Positive	85	33.7	115	32.9	NS
	Negative	167	66.3	235	67.1	

Table (2): Relation of atopic dermatitis with the diameter of BCG scar.

		Atopic dermatitis		Controls	
		No.	%	No.	%
Diameter of BCG scar	<1mm(negative)	140	55.6	98	28.0
	1 – 5 mm(weak)	21	8.3	23	6.6
	>5mm(positive)	91	36.1	229	65.4
Total		252	100.0	350	100.0

$X^2 = 52.45$ $df = 2$ odds ratio = 3.21* p – value < 0.001

*Odds ratio: Refers to comparison of negative BCG scar versus weak and strong positive reaction.

Discussion:

T – Helper cells play a critical role in controlling immune responses, and the subsequent inclination of the TH1 – TH2 balance toward TH1 may be responsible for an inverse association between exposure to *Mycobacterium tuberculosis* and allergic diseases.⁽⁵⁾

BCG vaccination is routinely done within the first month of age and the scar usually develops within 6 weeks after vaccination, that means after one year old all children are supposed to be vaccinated and the scar had developed.⁽⁴⁾ At this time the immunity developed and then wears off with the passage of time and disappear in 5 – 7 years.⁽¹²⁾ For this reason in this study, children aged from 1 – 8 years were chosen on the assumption that they still had cell-mediated type of immunity.

In the present study there was no significant difference in age and sex distribution in the studied groups and this is due to the matching process, also there was no significant difference between atopic dermatitis patients and control group regarding the place of residence and family history of atopy, and this is very important to overcome any confounding factor.

The results of the present study showed that the percentage of children with atopic dermatitis who had BCG scar diameter less than 1mm was higher than those in the control group and this difference was statistically significant, further more the study showed that the risk for development of atopic dermatitis was higher in children with negative BCG scar than in those with weak and positive BCG scar. This result indicates that the BCG vaccine is a strong T helper incentive and contributes to decrease the risk of T helper 2 dependant atopic diseases. This important result goes with other studies conducted elsewhere. For example, a study done in Japan which concluded that the successful BCG vaccination inhibited the development of atopic disorders.⁽¹³⁾ Similar results were shown in a double blind study in Korea which proved that the BCG had beneficial effect in patient with asthma and allergic disorders.⁷ The same result was reported in a cross sectional study done in Iran which showed a significant reverse correlation between BCG scar and atopy (asthma and atopic dermatitis).⁽⁸⁾

In a multicentre study there was a reverse correlation between atopy and diameter of BCG scar as in Turkey and Thailand.⁽¹⁴⁾

While in some other studies this correlation have not been found, like the study which was done in Germany which conclude that BCG vaccination in early infancy was not associated with a subsequent decrease in the risk of atopic sensitization or allergy.⁽¹⁵⁾

These conflicting results among these different studies may be influenced by many factors such as ethnic or genetic factors in modulating the immune system, and this was proved by a study which was done in Germany in which the non German children had reverse correlation between atopy and BCG reaction, but German children did not show this relation.⁽¹⁶⁾ Or this contradiction in the end results of these studies could be due to an important cause in which there were different strains of BCG vaccine and the immunogenicity of these strains may be different.⁽¹⁷⁾

From the results of the present study it is strongly recommend to revaccinate children with at a 7 years interval in different age groups specially in tuberculin negative subjects or in the absence of typical scar to have more protection against atopic disorders.

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