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Original Article

An Overview of the Prevalence of BCG Lymphadenitis among Infants Registered in Consulter Clinic for Chest and Respiratory Diseases, Kirkuk, Iraq

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Abstract

Background: Bacille Calmette-Guérin (BCG) lymphadenitis is one of the uncommon complications of BCG vaccination among infants, as it may lead to many serious problems as fistula or disseminated infection. **Objectives:** The study aimed to show the distribution of BCG lymphadenitis among vaccinated infants along the past 5 years who were diagnosed and managed in tuberculosis (TB) center. **Materials and Methods:** An observational study was carried out including 22 infants of both sexes who had BCG lymphadenitis. The diagnosis was made either clinically or it used polymerase chain reaction to examine the suppression, and biopsy was applied for indicated cases. All cases were managed by anti-TB and no death was reported. **Results:** The results showed male predominance ratio of 2:1. Regarding the latent period between the time of vaccination and appearance of the symptoms; the highest number was between 1 and 2 months (45.5%) whereas the lowest was in the group of 7–9 months following vaccination (4.5%). The results also found high incidence rate of BCG lymphadenitis (1.5%), among the infants. The high occurrence of TB lymphadenitis in the study may indicate many reasons, the most frequent being the dose of the vaccine and the wrong technique. **Conclusion:** It was concluded from results of the study that it is necessary to follow-up infants, and check for the appearance of lymphadenitis and to inform parents to present the baby to the TB center as soon as possible if any complications were observed.

Keywords: BCC, lymphadenitis, suppuration, TB lymphadenitis, tuberculosis

Introduction

It is clear that Bacille Calmette-Guérin (BCG) is used worldwide as a part of immunization program for newborn. The main purpose for the vaccination is to protect babies from two serious types of tuberculosis, that are disseminated and TB meningitis.[1] BCG related lymphadenitis are classified as either non-suppurative, that develops within 6 months post immunization affecting the axillary, cervical or supraclavicular lymph nodes which may either regress or progress to suppuration with time. The second type is the suppurative lymphadenitis with fluctuation, edema, erythema and puss collection which may rupture and ends by sinus formation resulting in scar sequels. The most serious complication of BCG vaccination is disseminated BCG infection or BCGosis, and this entity occurs in immunocompromised persons. It is reported among children with primary immunodeficiency, chronic granulomatous disease, and Mandilion susceptibility to mycobacterial disease.[2,3] BCG lymphadenitis as any other vaccine has its own risk factors to develop; these factors are either related to vaccine as residual virulence of BCG strain being more reactogenic than others or the viability of living bacilli in proportion to the death of the final product or the dose of injected vaccine; whereas the host-related factors include the age at vaccination as it is observed that newborn are at a higher risk of lymphadenitis; the immunological response to vaccine especially in AIDS cases, and the last

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factor related to host is the characteristics of the recipient population.[4] BCG lymphadenitis is diagnosed clinically depending on the history and clinical examination; as these cases are diagnosed as ipsilateral enlarged local lymph nodes at the site of BCG vaccination without any constitutional symptoms, and mycobacterial separation of BCG from lymph nodes aspirate is confirmatory, whereas species identification needs phage typing or genetic analysis. The management of BCG lymphadenitis is usually done by repeated aspirations using wide bore needle for ease of evacuation of thick inflammatory material being a safer option for managing lymphadenitis than surgical excision which needs general anesthesia, whereas incision and drainage should be avoided in cases of suppurative BCG lymphadenitis because of the risk of persistent draining, unpleasant scar formation, and delayed wound healing.[5,6] The study aimed to show the distribution of BCG lymphadenitis among vaccinated infants along the past 5 years who were diagnosed and managed in tuberculosis center.

Materials and Methods

An observational study was carried out including 22 infants of both sexes who had BCG lymphadenitis. The diagnosis was made either clinically or it used polymerase chain reaction to examine the suppression, and biopsy was applied for indicated cases for all cases which were managed by anti-TB and no death was reported.

Ethical approval

Approval permission was presented to the director of Kirkuk Health Directorate according to the document number 1003 (including the number and the date in 19/12/2022). An interview was conducted with these patients using a questionnaire form created by the investigator, which included demographic information such as age, gender, and so on.

Results

A total of 22 babies presented with post vaccination BCG lymphadenitis

Table 1 shows the age and gender distribution, with predominance of male gender in a ratio of 2:1, and the highest age was among 1–3 months.[7]

Table 2 illustrates the latent period between the time of vaccination and appearance of the symptoms; the highest number was between 1 and 2 months in a percentage of 45.5%, whereas the lowest was in the group of 7–9 months following vaccination in a percentage of 4.5%

Table 3 illustrates the effect of gender on appearance of symptoms; it was clear that most of the male patients (63%) had early appearance of lymph nodes enlargement in comparison to female patients (22.7%), who had obvious symptoms within the first 4 months post vaccination.

Table 4 demonstrates the type of lymphadenitis in comparison to age of affected children in months, as it is explored in the table. 77.3% were fortunately non-supportive type whereas only (22.7%) had suppuration.

Table 1: Age and gender distribution among post Bacille Calmette-Guérin vaccination babies

Age/Months	Male	Female	Total
1–3	7	1	8
4–6	6	6	12
7–9	2	0	2
Total	15	7	22

Table 2: Time period of vaccine and symptoms appearance

Period/months	Symptoms	%
1–2	10	45.5
3–4	9	40.9
5–6	2	9.0
7–9	1	4.5
Total	22	100

Table 3: Gender and duration of symptoms

Duration of symptoms/months	Male	Female	Total
1–2	6	4	10 45.5%
3–4	8	1	9 40.9%
5–6	1	1	2 9.0%
2–9	0	1	1 4.5%
Total	15	7	22 100%

Table 4: Relation of babies age with type of suppuration

Age (months)	Suppurative adenitis	Non-suppurative adenitis	Total
1–3	2	15	17 77.3%
4–6	0	5	5 22.7%
7–9	0	0	0 0%
Total	2	20	22 100%

Discussion

BCG vaccination is regarded one of the safest methods for the prevention of tuberculosis; so far lymphadenitis is the most common complication of BCG vaccination.[7] BCG was first incorporated in the WHO's expanded program

of immunization in 1974 to strengthen against the serious TB infections as meningitis and disseminated TB in infants and young children, as it is the only available vaccine which is considered as the most important part of TB control measures especially in endemic area.[8] BCG vaccine is a live attenuated form of *Mycobacterium bovis*; it is of four main types that are available and recommended for the use, but the Tokyo strain 172 accounts more than 90% of all vaccination worldwide.[9] The estimated rate of BCG lymphadenitis showed to be less than 4/10,000, in many countries.[10] The results in the current study found high incidence rate of BCG lymphadenitis (1.5%) among the infants. The high occurrence of TB lymphadenitis in the study may indicate many reasons, the most frequent being the dose of the vaccine and the wrong technique. The usual course of BCG vaccine starts by BCG strain multiplication at the site of inoculation and transported lymph nodes and lymphatics to the regional lymph nodes resulting in a reaction and development of very small foci in many organs mainly lymph nodes, following successful vaccination, these nodes will regress spontaneously vaccination these nodes will regress spontaneously. If it progresses to suppuration, definitive surgical excision or repeated aspiration has been advocated as therapeutic line of management.[11]

Lymphadenitis following BCG vaccination may cause very severe anxiety to parents as this adverse vaccination may be seen within the first 6 months of vaccination but it can persist beyond 12 months.[12]

A real problem is that how to differentiate BCG adenitis from tuberculous lymphadenitis, as it is often difficult but microbiological isolation bacilli is confirmatory. At the same time, antimicrobial drugs cannot prevent the development of suppurative isolated axillary lymphadenitis which is a very rare entity, so the best-chosen management is the repeated needle aspiration as it is regarded a safe and successful option compared to surgical excision.[13]

The outcome of BCG lymphadenitis is usually limited in four short term outcomes. The first being injection site reaction which is managed conservatively. The second is lymphadenitis which is further divided to non-suppurative that is managed by antituberculosis therapy whereas the suppurative types need either repeated aspiration or excision. The third type includes both injection site reaction and lymphadenitis which will be managed conservatively and recovered completely, and the last type which is the most severe ever seen is systematic complications including septic arthritis and osteomyelitis fortunately yet it is very rare.[14]

Conclusion

It is concluded from the results of the study that the rate of BCG lymphadenitis was evident in 1,5% of infants vaccinated by BCG, which is regarded among the acceptable range in comparison to worldwide occurrence, and their outcome was also in agreement with the expected guidelines.

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Conflicts of interest

There are no conflicts of interest.

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