IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 5 Ver. 1 (May. 2018), PP 37-40
www.iosrjournals.org

Efficacy of Hbv Vaccine on Healthy and Leukemic Children in Libya

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Abstract: *Hepatitis B is one of the most important causes of acute and chronic hepatitis world over. Children with malignant disease are at an especially high risk for developing hepatitis B virus (HBV) infection. The increasing potential for the cure of childhood malignant diseases emphasizes the need for a method of reducing hepatitis and its sequelae in these children. The efficacy of this HBV vaccine among Leukemic children in Tripoli Medical center (TMC), Tripoli, Libya is the aim of this study.*
Study was conducted at TMC, Tripoli, Libya in 2016 with 399 healthy (255) and leukemic (144) children. All cases were treated with HBV vaccine of 3 doses. Venous blood collected and examined for AntiHBST.
Result showed that male leukemic children were more than healthy one. 4 to 6 years old male children have observed more in this study. Regarding AntiHBST, no differences have seen in healthy and leukemic children, no gender variation in its responses and the responses were gradually decreased with increase of ages. It is concluded that, the HBV vaccination has not shown much role in controlling the HBV infection in Luekemic children and booster dose may be required.

Key words: *HBV Vaccine, Leukemia, Children, Libya*

Date of Submission: 17-04-2018 Date of acceptance: 05-05-2018

I. Introduction

Leukemia is a group of cancers that usually begins in bone marrow and result in high number of abnormal white blood cells. Childhood leukemia is a most common type of cancer in child and teens, is a cancer of white blood cells. Due to abnormal WBC form from the bone marrow, there is a more chance of infection and other problems. Almost all cases of childhood leukemia are acute (85%), which means they develop rapidly (Esparza and Sakamoto, 2005). A tiny number are chronic and develop slowly. According to the American Cancer Society, leukemia is the most common type of cancer among children and teens, causing about 30 percent of all childhood cancers (Robert, 2015). Leukemia can develop in children of any age, but the most likely age at diagnosis is between two and ten years.

Hepatitis B is one of the most important causes of acute and chronic hepatitis world over. Approximately, two billion individuals worldwide have been infected with HBV and between 350 and 400 million persons have chronic Hepatitis B Virus infection (Lavanchy, 2004; Franco et al., 2012). In Libya, hepatitis B remains an important communicable disease because of the intermediate prevalence of the carriers, the incidence of new cases and the burden of acute and chronic disease, which is accompanied by an increasing rate of hospitalization for liver disease and its complications including hepatocellular carcinoma. The estimated number of chronic HBsAg carriers in Libya is 120.000-150.000 individuals, with a concentration of the disease in certain populations with high-risk behaviors associated with viral transmission (Elzouki, 2007). Vaccination is the most effective means of preventing hepatitis B, cirrhosis and hepatocellular carcinoma worldwide (Alavian et al., 2010).

In Libya, hepatitis B vaccine was introduced since 1993 to all newborns. Children with leukemia are especially at high risk for developing hepatitis B infection due to immunosuppression secondary to chemotherapy, radiotherapy, and multiple blood transfusions (Meir et al., 2001). Majority of them develop chronic hepatitis (Jonas, 1994). This may play an adverse prognostic role in terms of their disease-free survival because of delay in chemotherapy (Sevenir et al., 2003).

Although the immune system is redundant, almost all current vaccines work through antibodies in serum or on mucosa that block infection or bacteremia/viremia and thus provide a correlate of protection. The

functional characteristics of antibodies, as well as quantity, are important. Since there is a more risk of Hepatitis B virus especially in Leukemic children, HBV vaccine is more important to those cases with Leukemia. In this study, the authors aimed to study the efficacy of this HBV vaccine among Leukemic children in Tripoli Medical center (TMC), Tripoli, Libya.

II. Materials and Methods

The present study was conducted with 399 healthy and leukemic children randomly selected from Tripoli medical center, Tripoli, Libya in 2016. All subjects received three doses of recombinant hepatitis B vaccine at birth according to Libyan mandatory schedule of vaccination. The cases were divided in two groups:
Group-I: included **255** blood samples from healthy child, Tripoli, Libya.
\Group-II: blood from **144** leukemic children attending to oncology department at TMC, Tripoli, Libya.

About 5 ml of venous blood sample were collected from the participants. Each tube was labeled with the data of the participants and stored at -20 C until analyzed. All samples were analyzed for anti-HBST by using full automated Roche Elecsys 2010 immunoassay analyzer based on Electrochemiluminescence immunoassay "ECLIA" technique.

III. Results and Discussions

The study was conducted on **399** blood samples taken from healthy and leukemic child at Tripoli medical centre (TMC), Libya. HBV prophylaxis is necessary and that the vaccination schedule is effective in preventing HBV infection in the children (Adalet et al., 2000). Distribution of cases in the present study is tabulated in accordance to the gender in Table 1. It indicates that Leukemic children rate is more in male (20.80%) than the female (15.29%).

Table 1: Distribution of cases involved in this study according to gender.

Cases	**Male**		**Female**	
	No.	**%**	**No.**	**%**
Healthy	133	33.33	122	30.58
Leukemic	83	20.80	61	15.29
Total	216	54.13	183	45.87

% from the total cases

Study with different age groups among children (Table 2), 4-6 years old children are more (30.07%) involved in the study followed by 1- 3 years old (26.56%). In this age group-wise analysis also, Male children involvement is higher than the female.

Table 2: Distribution of cases in according to age groups.

Age Groups	**Gender**				**Total**	
	Male		**Female**			
	No.	**%**	**No.**	**%**	**No.**	**%**
1-3 years	60	15.04	46	11.53	106	26.56
4-6 years	70	17.54	50	12.53	120	30.07
7-9 years	47	11.78	50	12.53	97	24.32
10-12 years	39	00.098	37	00.03	76	19.05
Total	216	54.14	183	45.86	399	100

% from the total cases

Hepatitis B vaccines are well tolerated. Side effects are generally mild, transient and confined to the site of injection (erythema, swelling, induration). Systemic reactions (fatigue, slight fever, headache, nausea, abdominal pain) are uncommon. Immunizing newborns with the hepatitis B vaccine should be the highest priority in highly endemic areas, where the contribution of perinatal transmission to this disease burden is greatest. Table 3 explains about the Anti Hepatitis B surface antigen titer value in both healthy and leukemic children admitted in the TMC, Tripoli, Libya. The study result shows More than 175 cases from the healthy children and 99 cases of leukemic children responded with more than 10 mIU/ml for HBsAg. This result indicates that both cases responded in same percentage of more than 10mIU/ml AntiHBT. There is no much variation in the responses to this vaccination.

Table 3: AntiHSBT value among Healthy and Leukemic children

Quantity	**Healthy** (n=255)		**Leukemic** (n=144)		**p-value**
	No.	**%**	**No.**	**%**	
Less than 10 (mIU/ml)	80	31.4	45	31.3	0.980
More than 10 (mIU/ml)	175	68.6	99	68.7	0.980
Total	255	100	144	100	

No association was found between childhood leukemia and exposure to several common vaccines, including the MMR, DPT, Poliomyelitis or BCG vaccines. Goyal et al., (1998) study revealed antibodies to hepatitis B surface antigen detected in 19.7% of patients following vaccination.

Responses to the vaccination among gender also show no variations (Table 4). Result shows that the value observed in this study is more significant. This Study results are similar to Derry and Wolff (2009) who expressed that the Antibody responses to the HBV vaccination is useless. But the there is a decreased responses with an increased age groups (Table 5). Böcher *et al*.,(1999) have shown that a significantly high level of circulating anti-HBs-secreting B cells enriched in the bone marrow years after vaccination. In this study also the similar Anti HBST result expressed in both healthy and Leukemic indicates that the immunity may be cellular and others.

Table 4: AntiHBST value among Gender.

Quantity	**Male** (n=216)		**Female** (n=183)		**p-value**
	No.	**%**	**No.**	**%**	
Less than 10 (mIU/ml)	68	31.48	57	31.15	0.885
More than 10 (mIU/ml)	148	68.52	126	68.85	0.885
Total	216	100	183	100	

Table 5: AntiHBST value among different Age groups.

Quantity	1-3 years (n=106)		4-6 years (n= 120)		7-9 years (n= 97)		10-12 years (n= 76)		**p-value**
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
Less than 10 (mIU/ml)	13	12.3	36	30	36	37.1	40	52.6	0.000
More than 10 (mIU/ml)	93	87.7	84	70	61	62.9	36	47.4	0.000
Total	106	100	120	100	97	100	76	100	

HBV prophylaxis is necessary and that the vaccination schedule is effective in preventing HBV infection in the children (Adalet et al., 2000). Antibody may be highly correlated with protection or synergistic with other functions. Immune memory is a critical correlate: effector memory for short-incubation diseases and central memory for long-incubation diseases. Cellular immunity acts to kill or suppress intracellular pathogens and may also synergize with antibody. For some vaccines, we have no true correlates, but only useful surrogates, for an unknown protective response. Persistent abnormalities of T, B and NK-cell subsets have been previously described even after 6 months of treatment in heavily treated patients (Ek et al., 2005). Majority of the children who receive either intermediate or high risk chemotherapy protocols or all were lymphopenic. In addition to that, long term response of T cell memory to HBsAg after HBV vaccination play a crucial role in preventing chronic HBV infection (Wang et al., 2004).

IV. Conclusions

Result showed that male leukemic children were more than healthy one. 4 to 6 years old male children have observed more in this study. Regarding AntiHBST, no differences have seen in healthy and leukemic children, no gender variation in its responses and the responses were gradually decreased with increase of ages. It is concluded that, the HBV vaccination has not shown much role in controlling the HBV infection in Luekemic children. Leukemic children may require booster dose for the better result. But there is a necessity to continue the study to know the exact responses among the Libyan children for the vaccination. Improving prevention policy worldwide is mandatory in order to reduce the global burden of the disease. Consideration should be given to implementing routine vaccination of newborns against HBV infection globally to prevent mortality and morbidity due to infection acquired perinatally.

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Aboubaker Saleh Alasga "Efficacy of Hbv Vaccine on Healthy and Leukemic Children in Libya."IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 5, 2018, pp 37-40