A Study of Estimation and Analysis of Anti HBs Titre in Adolescent Children in Correlation with Socio Demographic Profile

T. Antony Leo Jerry¹*, S. Sundari¹ and Shanthi Ramesh¹

¹Department of Paediatrics, Sree Balaji Medical College and Hospital, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India.

Authors’ contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2020/v32i1230572

Editor(s):
(1) Dr. Paola Angelini, University of Perugia, Italy.

Reviewers:
(1) Jakeline Ribeiro Barbosa, Oswaldo Cruz Foundation, Brazil.
(2) Meer Ahmad Mydin Meera, Malaysia.

Complete Peer review History: http://www.sdiarticle4.com/review-history/54186

Received 17 May 2020
Accepted 23 July 2020
Published 30 July 2020

ABSTRACT

Introduction: Viruses are the most common causative agents of hepatitis today and infect many millions of individuals annually. Viral hepatitis encompasses several diseases and represents a global health problem. It induces major morbidity and mortality and places enormous demands on economic and medical resources.

Materials and Methods: The study was conducted in the Department of Pediatrics at Sree Balaji Medical College and Hospital, Chennai from April 2017 to March 2018. Vaccinated and unvaccinated (for Hepatitis B vaccine) adolescents between the age group of 10-19 years, who attended the department of Pediatrics, were included in this study. 160 adolescents who were vaccinated with Hepatitis B vaccine and 160 adolescents who were unvaccinated with Hepatitis B vaccine in the age group of 10-19 years. A total of 320 adolescents were included in the study. The correlation was done between two group based on socio-demographic data.

Results: Among the mothers, 10.93% (35) were illiterates, 25.62% (82) had finished primary school. 33.44% (107) and 21.56% (69) had done middle school and higher secondary school.
Hospital, Chennai from April 2017 to March 2018. Vaccinated and unvaccinated (for Hepatitis B vaccine) adolescents between the age group of 10-19 years, who attended the department of pediatrics, were included in this study. 160 adolescents who were vaccinated with Hepatitis B vaccine and 160 adolescents who were unvaccinated with Hepatitis B vaccine in the age group of 10-19 years. A total of 320 adolescents were included in the study. The correlation was done between two group based on socio-demographic data. The socio-economic classification was measured based on the BG Prasad scale (based on per capita monthly income). This scale was introduced in 1961 was later modified in 1982, 2001, 2013 and in 2016.

Conclusion: The findings of the present study show the need for catch up vaccination among the adolescent's population, who missed their routine immunization with Hepatitis B vaccine. For health care professionals, this study is a evidence that stresses more about the importance of providing Hepatitis B vaccination among adolescents.

Keywords: Adults; viral hepatitis; immunization; socio-demographic data.

1. INTRODUCTION

The hepatitis B virus (HBV) is a major cause of infectious liver disease. Worldwide approximately 300 million people are persistent carriers of HBV. In East Asia and tropical Africa, where vertical transmission of HBV is the major cause of infection, more than 10 percent of the population is chronic carriers [1]. Chronically infected patients with active liver disease carry a high risk of developing cirrhosis and hepatocellular carcinoma (HCC). In fact, the risk of HCC is 100-fold in patients with chronic HBV infection [2]. The latency period between infection and cancer varies from 35 to 45 years and liver cancer is seen mostly in those parts of the world where childhood or perinatal infection is common [3]. Most primary liver cancers (60% to 70%) globally occur in HBV carriers, and an estimated one million deaths from HBV related liver cancer occur annually. HBV-related primary hepatocellular carcinoma is one of the major causes of cancer-related death in major parts of Africa, Asia and Latin-America [4]. Since vaccination is the only route for the eradication of HBV, development, and delivery of a vaccine which is effective against all strains, and which induces a response in all vaccine recipients without exceptions, is an absolute requirement. The occurrence of non-responsiveness and the reports of breakthrough infections following vaccination, due to the emergence of escape mutants with variant HBsAg sequences are signals to reconsider vaccine design [5]. In this study Anti Hbs Titre in Unimmunised Adolescent Children in Correlation with Socio-Demographic Profile was analysed.

2. MATERIALS AND METHODS

The study was conducted in the Department of Pediatrics at Sree Balaji Medical College and Hospital, Chennai from April 2017 to March 2018. Vaccinated and unvaccinated (for Hepatitis B vaccine) adolescents between the age group of 10-19 years, who attended the department of pediatrics, were included in this study. 160 adolescents who were vaccinated with Hepatitis B vaccine and 160 adolescents who were unvaccinated with Hepatitis B vaccine in the age group of 10-19 years. A total of 320 adolescents were included in the study. The correlation was done between two group based on socio-demographic data. The socio-economic classification was measured based on the BG Prasad scale (based on per capita monthly income). This scale was introduced in 1961 was later modified in 1982, 2001, 2013 and in 2016. The scale is updated periodically as inflation is an ongoing process. There are tools and calculations available which enables a real-time update of the classification to maintain the validity of the published data. After taking consent, using a proforma, history regarding the vaccination status of the participants was collected and entered, following which venous blood samples were collected from all the participants to assess the Anti HBC and Anti HBs antibodies titre by Enzyme-linked immunosorbent assay (ELISA) method, the procedure of which is as follows. The test principle is based on Antigen Sandwich Enzyme Immunoassay. In this technique, serum samples containing HBs antibody are allowed to react with coated recombinant HBs Ag (ad and ay subtypes). ELISA was performed using kits provided by Idetek.

2.1 Statistical Analysis

The data was entered in excel sheet and analyzed using Statistical Package for the Social Sciences (SPSS Version 16). Descriptive statistics with mean, standard deviation and proportion (%) was calculated for quantitative variables. To test the hypothesis ANOVA, Z test
and Chi-Square test was used. p-value <0.05 was considered as statistically significant.

3. RESULTS

A cross-sectional study was done among 320 adolescents attending the Department of Pediatrics, Sree Balaji Medical College and Hospital. The study included 160 adolescents who were vaccinated with Hepatitis B vaccine and 160 adolescents who were unvaccinated with the Hepatitis B vaccine in the age group of 10-19 years. There was no refusal of the participants to take part in the study. Among the selected 320 adolescents, 55.6% were males and 44.4% females.

In the study, 43.8% (70) were vaccinated and 40% (64) were unvaccinated in 10-13 years. Among 14-16 years 41.2% (66) were vaccinated and 34.4% (55) were unvaccinated. 15% (24) and 25.6% (41) were vaccinated and unvaccinated in 17-19 years age group. This was not found to be statistically significant (p=0.57).

![Fig. 1. Association between age distribution and vaccination](image1)

*Blue: vaccinated; Red: unvaccinated*

![Fig. 2. Association between mother’s education and vaccination](image2)

*Blue: vaccinated; Red: unvaccinated; HSC: Higher secondary school/certificate*
In our study mothers of 9.4% (15) of vaccinated and 12.5% (20) unvaccinated children were illiterates, 25.6% (41) of both groups of mothers had completed primary school, 31.9% (51) and 35 % (56) of mothers from vaccinated and unvaccinated groups had finished middle school. Of the total 10%, (16) of vaccinated mothers and 6.9% (11) of unvaccinated mothers were graduates. The association between vaccination and mother's education was not found to be statistically significant (p=0.692).

Among the fathers of vaccinated adolescents, 5.6% (9) were illiterates, 21.9% (35) had finished primary school, 20% (32) had done middle school, 33.1% (53) have completed HSC and 19.4% (31) were graduates. In the unvaccinated group 8.8% (14) were illiterates, 25% (40) had primary education, 16.9% (27) completed middle school, 36.3% (58) did HSC and 13.1 % (21) were graduates. The association between the father’s education and vaccination was not found to be statistically significant (p = 0.41).

In the vaccinated group, 31.9% (51) belonged to rural areas and 68.1% (109) belonged to urban areas. Among unvaccinated 19.4% (31) belonged to rural areas and 80.6% (129) belonged to urban areas. The association between the area of residence and vaccination was found to be statistically significant (p = 0.01).

The study showed that in vaccinated group 43.1 (69) belonged to the lower and 30.6% (49) belonged to the lower middle class, 13.8% (22) belonged to middle class and 12.5% (20) belonged to upper middle class. In the unvaccinated group, 55.6 % (89) were lower class, 30.6% (49) were in the lower middle class, 4.4% (7) belonged to middle class and 9.4% (15) belonged to upper middle class. It was not found to be statistically significant (p=0.117).
Among the vaccinated group 8 were positive for anti HBC and 152 were negative, among unvaccinated 13 were positive and 147 were negative. This was found to be not statistically significant (p=0.263).

4. DISCUSSION

This cross-sectional study was done to determine and compare the anti-HBs and anti-HBC levels among immunized and unimmunized adolescents. In this study, adolescents who had received HB immunization showed a higher rate of anti-HBs positivity, and a reduced rate of anti-HBC positivity, than a cohort of adolescents who had not received the immunization. Among the immunized individuals in our study, anti HBs titre was less than 10 IU/L in 7.5% participants with mean and SD of 6.31±3.3, whereas it was 10-400 IU/L in 51.3% individuals with mean and SD of 286.34±103.13 and >400 IU/L in 41.3% individuals with mean and SD as 1125.84±345.18. In the present study, among 88.7% adolescents who got vaccinated 48.1% were males and 40.6% were females [6,7]. The difference among vaccinated and unvaccinated adolescents for anti-HBs was found to be highly statistically significant. (p value<0.001).
study done by Blumberg BS et al among 1415 children who were vaccinated, there were 735 males and 680 females. In the present study, 43.8% (70) were vaccinated and 40% (64) were unvaccinated in 10-13 years. Among 14-16 years 41.2% (66) were vaccinated and 34.4% (55) were unvaccinated. 15% (24) and 25.6% (41) were vaccinated and unvaccinated in 17-19 years age group. This was not found to be statistically significant (p=0.57). Similarly among 5% of vaccinated adolescents 3.1% were boys and 1.9% was girls and the difference for anti-HBC was not statistically significant (p-value >0.05) [8]. In the previous study, among immunized children, 28 participants were found to have Anti-HBC positive. 55.6% (89) were vaccinated and 60.6% (97) were unvaccinated among males, among females 44.4% (71) were vaccinated and 39.4% (63) were unvaccinated in the present study. This was not found to be statistically significant (p=0.906). In our study mothers of 9.4% (15) of vaccinated and 12.5% (20) unvaccinated children were illiterates. 25.6% (41) of both groups of mothers had completed primary school, 31.9% (51) and 35% (56) of mothers from vaccinated and unvaccinated groups had finished middle school. Of the total 10%, (16) of vaccinated mothers and 6.9% (11) of unvaccinated mothers were graduates in our study [9]. The association between vaccination and mother's education was not found to be statistically significant (p=0.692). Among the fathers of vaccinated adolescents 5.6% (9) were illiterates, 21.9% (35) had finished primary school, 20% (32) had done middle school, 33.1% (53) have completed HSC and 19.4% (31) were graduates. In the unvaccinated group 8.8% (14) were illiterates, 25% (40) had primary education, 16.9% (27) completed middle school, 36.3% (58) did HSC and 13.1% (21) were graduates. The association between the father's education and vaccination was not found to be statistically significant (p=0.41). In the vaccinated group, 31.9% (51) belonged to rural areas and 68.1% (109) belonged to urban areas. Among unvaccinated 19.4% (31) belonged to rural areas and 80.6% (129) belonged to urban areas in the present study [10]. The association between the area of residence and vaccination was found to be statistically significant (p = 0.01). Our study showed that in vaccinated group 43.1% (69) belonged to the lower and 39.6% (49) belonged to the lower middle class, 13.8% (22) belonged to middle class and 12.5% (20) belonged to upper middle class. In the vaccinated group, 55.6% (89) were poor, 30.6% (49) were in the lower middle class, 4.4% (7) belonged to middle class and 9.4% (15) belonged to upper middle class [11]. It was not found to be statistically significant (p=0.117). Also there was no association found between age, gender, parent’s educational status, the area of residence and socioeconomic status and anti-HBs among the vaccinated and unvaccinated adolescents, in this study [12].

5. CONCLUSION

The findings of the present study show the need for catch up vaccination among the adolescent's population, who missed their routine immunization with Hepatitis B vaccine. For health care professionals, this study is a evidence that stresses more about the importance of providing Hepatitis B vaccination among adolescents.

CONSENT

As per international standard or university standard, patients’ and parental written consent have been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical approval was obtained from ethical committee of Sree Balaji Medical College and Hospital.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Di Bisceglie AM. New hepatitis viruses: Adding to the alphabet soup. Viral Hepatitis Reviews. 1995;1(1):3-5.
2. Berg T, Schreier E, Heuft HG, et al. Hepatitis G virus infection: The epidemiological aspects and clinical relevance. Dtsch Med Wochenschr. 1997; 122(9):268-274.
3. Beasley RP, Lin CC, Wang LY, et al. Hepatocellular carcinoma and hepatitis B virus: A prospective study of 22707 men in Taiwan. Lancet. 1981;2:1129-1133.
4. Lee WM. Hepatitis B virus infection. New Engl J Med. 1997;337:1733-1745.
5. Wallace LA, Carman WF. Surface gene variation of HBV: Scientific and medical
relevance. Viral Hepatitis Reviews. 1997; 3(1):5-16.
6. Lahariya C, Subramanya BP, Sosler S. An assessment of hepatitis B introduction in India: Lessons for roll out and scale up of new vaccines in immunization programs. Indian J Public Health. 2013;57:8-14.
7. World Health Organization. Documenting the Impact of Hepatitis B Immunization: Best Practices for Conducting a Serosurvey. Department of Immunization, Vaccines, and Biologicals, World Health Organization, Geneva. WHO document WHO/IVB/11.08; 2011.
8. Blumberg BS, Alter HJ, Visnich S. A "New" antigen in Leukemia Sera. JAMA. 1965; 191:541-6.
9. Dane DS, Cameron CH, Briggs M. Virus-like particles in serum of patients with Australia-antigen-associated hepatitis. Lancet. 1970;1(7649):695-8.
10. Alter MJ. Epidemiology of hepatitis B in Europe and worldwide. J Hepatol. 2003;39 (Suppl 1):S64-9.
11. Magnius LO, Norder H. Subtypes, genotypes and molecular epidemiology of the hepatitis B virus as reflected by sequence variability of the S-gene. Intervirology. 1995;38(1-2):24-34.
12. Lemon SM, Thomas DL. Vaccines to prevent viral hepatitis. N Engl J Med. 1997; 336(3):196-204.

© 2020 Jerry et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/54186