ORIGINAL ARTICLE

HEPATITIS B IMMUNIZATION STATUS AMONG MEDICAL RESIDENTS AT A HOSPITAL IN RECIFE

ESTADO DE IMUNIZAÇÃO CONTRA A HEPATITE B EM MÉDICOS RESIDENTES DE UM HOSPITAL DO RECIFE

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ABSTRACT

Purpose: To estimate the frequency of hepatitis B immune status and previous vaccination history about the residents of Barão de Lucena Hospital. **Methods:** Application of questionnaire and anti-HBs serum titer in fifty-three resident doctors. Considered immunity titration equal or larger 10 mUI/ml. **Results:** 83% of residents are immune against hepatitis B. 100% of residents received at least one dose of vaccine, of which 75.5% received three or more doses of the vaccine, 11.3% received two doses and 13.2 % couldn't inform how many doses had been received. 96.2% considered as mandatory vaccination recommendation for doctors or medical students. **Conclusion:** Although all residents had taken a dose of the vaccine, many had not checked if there was seroconversion, even those who had not received the full course of three doses. It is necessary that hospitals and educational institutions conduct educational measures concerning the prevention of occupational accidents and infection against hepatitis B.

Keywords: Hepatitis B. Health professionals. Immune status. Vaccine against hepatitis B.

RESUMO

Objetivo: Estimar a frequência do estado de imunização contra a hepatite B e a situação vacinal em residentes do Hospital Barão de Lucena. **Métodos:** Aplicação de questionário e dosagem sérica da titulação Anti-HBs em 53 residentes. Foi considerada imunidade a titulação a partir de 10 mUI/ml. **Resultados:** Dos residentes avaliados, 83% apresentaram imunidade contra a hepatite B. Todos haviam recebido alguma dose da vacina, dos quais 75,5% receberam 3 ou mais doses, 11,3% receberam 2 doses e 13,2% não sabiam informar quantas doses receberam. Um percentual de 96,2% considerou como obrigatória a recomendação da vacinação para médicos ou estudantes de medicina. **Conclusão:** Apesar de todos os residentes referirem ter tomado alguma dose da vacina, muitos não checaram se houve soro conversão, mesmo os que não haviam recebido o esquema completo. Torna-se necessária a realização de medidas educativas em relação à prevenção de acidentes ocupacionais e de infecção contra a hepatite B.

Palavras-chave: Hepatite B; Profissionais de saúde; Estado imune; Vacina contra a hepatite B

INTRODUCTION

Hepatitis B represents a significant global public health challenge. The estimated serological evidence is 2 billion people, with approximately 373 million chronic carriers and 1 million annual deaths from hepatitis B-related liver disease[1].

Vaccine-induced immune responses vary among individuals. The successful immunization produces seroconversion with detectable anti-HBs antibodies. Immunity requires anti-HBs levels ≥ 10 mIU/ml, while global seroconversion rates reach 95% and decline with age. Routine post-vaccination testing for anti-HBs seroconversion is unnecessary except for healthcare professionals, patients under chronic hemodialysis, and individuals at risk for recurrent exposure, which must be performed one to two months after primary vaccination. Non-responders require a second three-dose series with subsequent anti-HBs testing and HBsAg screening. Additional measures, including health education and infection control, remain essential[2].

Hepatitis B virus (HBV) represents the most common blood-transmitted virus in healthcare settings[3], placing healthcare professionals at elevated infection risk. However, this risk depends on the vaccination and viral antigenic status of the individual. Immunized professionals face almost no risk, whereas unvaccinated individuals experience 6% to 30% post-exposure risk. HBsAg and HBeAg-positive individuals carry higher viral loads and have a higher transmission potential. Although percutaneous exposure efficiently transmits the infection, it constitutes a minority of occupational cases among healthcare professionals[4,5].

HBV can survive on surfaces for up to one week at room temperature. Healthcare worker infections without documented exposure may result from direct or indirect contact with blood or biological materials[6].

Before widespread vaccination, healthcare professionals demonstrated higher marker prevalence than the general population. Routine vaccination and prevention protocols reduced infection rates below general population levels since the 1990s[7,8].

Hepatitis B vaccination achieves 95% protection rates, ranging from 80% to 100% among vaccinated individuals[9]. Despite proven efficacy, the vaccination coverage of healthcare professionals remains incomplete. Medical residents represent a particularly susceptible group due to limited procedural experience during professional training. In this context, all healthcare workers, including young professionals, should be vaccinated[10].

The Hospital Barão de Lucena (HBL) serves as a general hospital with multiple specialties, training numerous medical residents. This study assessed the frequency of hepatitis B immune status among HBL residents and the vaccination status within this group of professionals.

METHODS

This observational, cross-sectional, descriptive, and prospective study included medical residents from the HBL. After receiving information about the research objectives and signing informed consent forms, participants answered questionnaires about their vaccination history and provided 5 mL blood samples for quantification of anti-HBs titer. Exclusion criteria were loss of blood samples, inconclusive laboratory results due to technical collection difficulties, or residents absent from hospital services during the collection period.

Blood samples were collected via antecubital venous puncture by hospital laboratory technicians or, when unavailable, by researchers following aseptic techniques.

Categorical variables were expressed by absolute and relative frequencies. Numerical variables were expressed by means and standard deviations.

RESULTS

A total of 75 out of 89 residents (73%) were invited to participate in the study; 55 agreed to participate. The remaining 24 residents were in other services outside HBL during the collection period and were excluded from the study. The sample meeting the inclusion criteria comprised 53 residents, representing 59.5% of the total HBL residents.

Research participants consisted of 32 women (60.4%) and 21 men (39.6%). Regarding age, 62.3% were ≤ 28 years and 37.7% were > 28 years old. Mean age was 28 ± 2.3 years.

All participants reported receiving hepatitis B vaccination. Seven participants could not recall the number of doses received, representing 13.2% of the total. The remaining participants reported receiving ≥ 2 vaccine doses (Table 1).

Table 1. Frequency of residents by number of doses received.

Number of doses	Absolute frequency (n)	Relative frequency (%)
2	6	11.3
3	30	56.6
More than 3	10	18.9
Do not know	7	13.2
Total	53	100.0

n: número de residentes que receberam as doses.

The immunization status, defined as anti-HBs titers greater than 10 mIU/ml, was achieved by 44 medical residents (83% of the individuals evaluated). All of these residents had received at least one vaccine dose (Table 2).

Table 2. Frequency of immune residents and number of doses received.

Number of doses	Absolute frequency (n)	Relative frequency (%)
2	3	6.8
3	28	63.6
More than 3	8	18.2
Do not know	5	11.4
Total	44	100.0

n: número de residentes que receberam as doses.

Before the study, 25 participants (47.2%) had their anti-HBs titers measured after vaccination to assess immunization; 22 were immune (88%), and one reported only two vaccine doses. Among these 22 residents with positive anti-HBs, two presented titers below 10 mIU/ml.

Of the three residents who were not immune after a three-dose schedule, two received booster doses but were not reassessed for anti-HBs. Both achieved protective antibody titers. Three participants (5.7%) did not respond whether they performed the post-vaccination anti-HBs measurement.

Among residents who received three or more vaccine doses, 90% presented anti-HBs levels above 10 mIU/ml, while those who received two doses showed a 50% immunization frequency (Table 3).

Table 3. Absolute frequencies of anti-HBs antibody titers and number of vaccine doses.

	Anti-HBs				
Number of doses	Until 10	Between 10 and 100	Between 100 and 1000	More than1.000	Total
2 doses	3	2	0	1	6
3 doses	2	15	10	3	30
More than 3	2	2	1	5	10
Do not know	2	4	1	0	7
Total	9	23	12	9	53

Regarding the recommendations of hepatitis B vaccination among physicians and medical students, 51 of the 53 evaluated residents (96.2%) considered vaccination mandatory. One individual did not respond, and another considered it optional.

DISCUSSION

The results of this study were compatible with other research, which indicated a varied immunity among the participants from 48% to 94%[11-14].

Regarding vaccination, all medical residents evaluated received one or more doses of the vaccine, while 75.5% reported having received three doses or more. These data were similar to those found in studies involving healthcare professionals[15,16].

A study conducted in 2012 demonstrated that approximately 90% of healthcare professionals and students at the Universidade Federal da Bahia had complete vaccination schedules against hepatitis B[12]. An increase in the number of healthcare professionals with complete vaccination schedules was observed, possibly due to increased knowledge about hepatitis B prevention, greater vaccine availability in health services, and effective vaccination campaigns. Data from the Centers for Disease Control and Prevention showed that the incidence of infection and hepatitis B reduced by approximately 50% and 95%, respectively, among healthcare professionals[16].

Nine residents (17%) evaluated did not have anti-HBs titers at protective levels. Of these, three (5.6%) had received two doses of the vaccine, two (3.7%) had received three doses, two (3.7%) did not know how to quantify the number of doses received, and three (3.7%) had received more than three doses. Since some participants were part of a risk group, revaccination with three doses (for those who completed the vaccination schedule but did not show seroconversion and those who did not know how many doses they received) or completion of the vaccination schedule (for those who underwent only two doses) was needed to achieve immunity. The literature indicates that approximately 2% to 12% of immunocompetent individuals are unable to produce anti-HBs, which explains why five residents received three or more doses of the vaccine without developing protective anti-HBs titers[18]. Additionally, some residents had been vaccinated several years ago, and titers may have decreased over time despite previous seroconversion. Those individuals who did not obtain titers at protective levels were properly informed and guided on how to proceed.

Protection increases with the number of doses administered. A study revealed an immunological response of 20% to 30% after one dose of the vaccine, 75% to 80% after two doses, and 90% to 95% after three doses[9]. This relationship was evident in our study, which showed that 90% of the individuals presented adequate anti-HBs levels after receiving three or more doses of the vaccine. In contrast, the seroconversion rate among those who received two doses was only 50%, whereas the number of individuals who received two doses of the vaccine was small (six residents). These data reveal that a small portion may not become immune even after complete vaccination, indicating the importance of performing the serological tests recommended by the Ministry of Health to confirm immunization of healthcare professionals.

Most residents considered mandatory vaccination among physicians and medical students, and this evaluation was considered satisfactory, as vaccination against hepatitis B is recommended for all at-risk individuals who are not immune[17,18]. Memory bias may have been present since participants did not provide previous serological examinations and vaccination records; thus, considering only what was reported in the questionnaire.

The lack of HBsAg measurement among participants may be considered a limitation. Therefore, individuals with hepatitis B could not be identified among those who did not present seroconversion.

Increased surveillance through active case finding, evaluation of immune status, and educational measures regarding the prevention of occupational accidents and infections through vaccination are important to prevent HBV infection, which could lead to severe clinical consequences. Hospitals and educational institutions need to implement educational measures regarding the prevention of occupational accidents and infection against hepatitis B.

CONCLUSION

Although vaccination is the most cost-effective protection against hepatitis B, many healthcare professionals remain inadequately vaccinated despite the high infection risk. In this study, all residents reported receiving vaccine doses; however, many failed to verify seroconversion, including those with incomplete vaccination schedules.

REFERENCES

1. Estimations of worldwide prevalence of chronic hepatitis B virus infection: a systematic review of data published between 1965 and 2017. Disponível:<http://www.who.int/ immunozation/diseses/hepatitisB/HBsAG_estimates_and_ methods_final_V3.pdr?ua=1>
2. Stanaway J, Flaxman A, Naghavi M, Fitzmaurice C, Vos T, Abubakar I, et al The global burden of viral hepatitis from 1990 to 2013: findings from the Global Burden of Disease Study 2013 . The Lancet, 2016 , 388 , 1081 – 8 . http://doi.org/10.1016/S0140-6736(16)30579-7.
3. Ali N, Hussain W, Hayat A, Shah T, Wen R, Zeb I, Abdul Malik A, Ramzan R, Rehman MU, Khan I. Prevalence and risk factors of hepatitis Band C visuses among haemodialysis patients: a multicentric study. Eur J Gastroenterol Hepatol. 2018. doi: 10.1097/MEG.0000000000001220.
4. Al-Zoughool M, Al-Shehri Z. Injury and infection in dental clinics: risk factors and prevention.Toxicol Ind Health. 2018; 34(9):609-19. doi: 10.1177/0748233718769553.
5. Oliveira LC, Pontes JP. Frequency of hepatitis B immunity and occupational exposures to body fluids among brazilian medical students at a public university. Rev Inst Med Trop. 2010;52 (5): 247-52.
6. Sahana HV, Sarala N, Prasad SR. Decrease in Anti-HBs antibodies over time in medical students and healthcare workers after hepatitis B vaccination. Biomed Res Int. 2017; 2017:1327492. doi: 10.1155/2017/1327492
7. Thompson ND, Perz JF, Moorman AC, Holmberg SD. Nonhospital health care-associated hepatitis B and C virus transmission: United States, 1998-2008. Ann Intern Med 2009; 150:33.
8. Hasak JM, Novak CB, Patterson JMM, Mackinnon SE. Prevalence of needlestick injuries, attitude changes, and prevention practices over 12 years in an urban academic hospital surgery department. Ann Surg. 2018; 267(2):291-6. doi: 10.1097/SLA.0000000000002178.
9. Hada V, Saurabh K, Sharma A, Nag VL, Gadepalli RS, Maurya AK. Nursing students: A vulnerable health-care worker for needlesticks injuries in teaching hospitals. J Family Med Prim Care. 2018; 7(4):717-20. doi: 10.4103/jfmpc.jfmpc_265_17.
10. Chao SD, Wang BM, Chang ET, Ma L, So SK. Medical training fails to prepare providers to care for patients with chronic hepatitis B infection. World J Gastroenterol. 2015; 21(22):6914-23. doi: 10.3748/wjg.v21.i22.6914.
11. Zhang ZQ, Zhang XN, Lu W, Wang YB, Weng QC, Feng YL. Distinct patterns of serum hepatitis B core-related antigen during the natrual history of chronic hepatitis B. BMC Gastroenterol. 2017; 17(1):140. doi: 10.1186/s12876-017- 0703-9.
12. Carvalho P, Schinoni MI, Andrade J, Vasconcelos Rêgo MA, Marques P, Meyer R, Araújo A, Menezes T, Oliveira C, Macêdo RS, Macêdo LS, Leal JC, Matos B, Schaer R, Simones JM, Freire SM, Paraná R. Hepatitis B virus prevalence and vaccination response in health care workers and students at the Federal University of Bahia, Brazil. Ann Hepatol. 2012;11(3):330-7.
13. Brown CM, Donlon S, O'Kelly P, Casey AM, Collier C, Conlon PJ, Walshe JJ. A prospective study of hepatitis B vaccination - a comparison of responders versus nonresponders. Ren Fail. 2011; 33(3):276-9.
14. Simard EP, Miller JT, George PA, et al. Hepatitis B vaccination coverage levels among healthcare workers in the United States, 2002-2003. Infect Control Hosp Epidemiol 2007; 28:783.
15. Carneiro AF, Daher RR. Serum Prevalence of Hepatitis B Virus in sts. Rev Bras Anestesiol 2003; 53: 5: 672 -79.
16. Centers for Disease Control and Prevention (CDC). Hepatitis B vaccination coverage among adults--United States, 2004. MMWR Morb Mortal Wkly Rep 2006; 55:509.
17. Poland G, Jacobson RM. Prevention of Hepatitis B with the Hepatitis B Vaccine. N Engl J Med 2004; 351:2832-8
18. Romanó L, Paladini S, Galli C, Raimondo G, Pollicino T, Zanetti AR. Hepatitis B vaccination. Hum Vaccin Immunother. 2015;11(1):53-7. doi: 10.4161/hv.34306