

A preventive practice and its educational role with an academic community of Dentistry

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ABSTRACT

The study aimed to verify the adherence of undergraduate Dentistry students to the hepatitis B and tetanus vaccination campaign in a private Dental school. The hypothesis tested was that the vaccination campaign would be an effective program in prevention of HBV and tetanus infection. The vaccination's card copies and the Anti-HBs exam were analyzed as main outcome. Data were submitted to bivariate and multivariate Poisson regression analyses ($\alpha < 0.05$). Age, admission year, studying shift, doses of hepatitis B and tetanus vaccinations were independent variables. Out of the 485 students, 318 delivered the vaccination's card, and 295 presented the Anti-HBs exam. The median age of the students was 21 years (76.1% female and 23.9% male). In the univariate and multivariate Poisson regression model, failure to receive the tetanus vaccination was considered as a risk factor. Undergraduate students enrolled in the initial years were more likely to have not received the vaccination than the senior years ($p \leq 0.001$). Out of the total number of students (318) who submitted the documentation for hepatitis B, 86.1% completed the vaccination protocol (3 doses), while 13.9% the incomplete protocol (1 or 2 doses). Older students were more likely to have refrained from taking the vaccinations compared to younger ($p \leq 0.001$). In relation to the Anti-HBs, 73.9% had positive protective titer. Vaccination campaigns for undergraduate students may be effective if adherence of the individuals to the schedule can be ensured. Strategies for greater adherence of students, should be thought and planned by Dental Schools.

Descriptors: Students. Immunization. Hepatitis B. Tetanus.

1 INTRODUCTION

Dentists may be at a higher risk of certain infections due to frequent exposure to blood and body fluids. This risk is higher during the period of professional training¹; therefore, dental schools should conduct awareness programs to educate students about hepatitis B and tetanus infections^{1,2}. In Brazil, according to the Brazilian National Curriculum Guidelines (DCN), the dentists' training aim to give the students the knowledge required for the practice of the profession. Among these requirements it is necessary for the futures professionals to be aware of the rules of workers in the oral health area in society and to have personal responsibility³.

Hepatitis B virus (HBV) infection is an inflammatory disease of the liver and is the most common viral infection⁴. The routes of transmission of HBV include unprotected sexual contact, blood transfusion, reuse of contaminated needles, and vertical transmission from mother to child during pregnancy⁵. In dental practice, the most common mode of transmission of the infection is through percutaneous exposure (needle stick injuries) and also by contact with blood or saliva of the infected individual. Studies have confirmed the possibility of transmission of HBV by exposure to saliva and gingival crevicular fluid, which increases the vulnerability of oral health professionals to hepatitis infection^{4,6}.

Tetanus is a non-contagious, infectious disease caused by the action of exotoxins produced by *Clostridium tetani*. The bacteria exist in the form of spores, and can be identified on animals' skin, on the ground, branches of trees, shrubs, rotting water, street dust, animals' intestinal tract, and feces. The infection occurs by the introduction of spores in solution of continuity of the skin and the mucosa. Tetanus can be prevented by immunization, and

healthcare professionals are recommended to be vaccinated against the infection⁷.

Immunization of healthcare professionals and students is an effective method to control the occupational risk in the personnel as well as the risk of infection in patients. Immunity against HBV is demonstrated by the concentration of Anti-HBs antibodies in the blood, and a value of ≥ 10 mIU / mL is considered seroprotective. In contrast, no test is required to confirm immunity against tetanus; however, a booster vaccination dose is indicated at intervals of every 10 years⁸.

Thus, the objective of the present study was to verify the adherence of undergraduate students to the hepatitis B and tetanus vaccination campaign at a private Dental school. The hypothesis tested was that the vaccination campaign would be an effective program in prevention of HBV and tetanus infection among undergraduate Dental students.

2 MATERIALS AND METHODS

The present study was approved by the Ethics Committee of number 062975/2017. The sample comprised students enrolled in a private Dental school in the year 2017. The participation of the students was voluntary and a total of 318 participants enrolled in the vaccination campaign.

The data were collected from the physical archives that stored the documents provided by the undergraduate students for the program "Vaccination Campaign". The data were cataloged by class, based on the list of students enrolled in the year 2017. The copy of the vaccination card and the results of the Anti-HBs examination were analyzed from the students who submitted the documents.

Information such as age, admission year, studying shift, doses of hepatitis B and tetanus vaccinations was verified. Anti-HBs test (reference value ≥ 10 IU) was also performed to

confirm the status of immunization.

The data were submitted to bivariate and multivariate Poisson regression analyses, with a confidence level of 0.05 using IBM SPSS 21 statistics software.

3 RESULTS

All the students enrolled in the Dental school (n=485) between years 2014-2017 were invited to participate in the vaccination campaign. From the total number of students, only those who submitted the vaccination-related documentation (hepatitis B and tetanus) (n=318) were included in the sample. The median age of the students was 21 years, ranging from 16 to 44 years of age. There were 217 (68.2%) female (68.2%) and 101 (31.8%) male students. Most of the students (64%) attended school during the day, while 39% attended in the night.

For data analysis, the age of the included students was dichotomized (≤ 20 years old and $>$

20 years old), from the median (21 years old). The period of attendance was also dichotomized based on the initial (1st and 2nd) and senior (3rd and 4th) years.

In the univariate Poisson regression model, failure to receive the tetanus vaccination was considered as a risk factor. The results demonstrated that older students were more likely to have refrained from taking the vaccination compared to younger students [$p = 0.048$ / RP: 2.70 (1.00 -7.25)].

No association was observed with gender of the included students ($p = 0.532$). Undergraduate students enrolled in the initial years of the course were more likely to have not received the vaccination than students in the senior years [$p \leq 0.001$ / RP: 8.02 (2.39-26.84)]. The students who attended the school during the night were more likely to have not received the tetanus vaccine compared to those who attended during the day [$p = 0.002$ / RP: 4.75 (1.77-12.77)] (table 1).

Table 1. Distribution of tetanus variable through univariate and multivariate analyses

Variables	Tetanus		Bivariate		Multivariate	
	N	(%)	p value	RP brut	p value	RP adjusted
<i>Age (Years)</i>						
≤ 20	209	43.1	reference	-	reference	-
> 20	276	56.9	0.048	2.70 (1.00-7.25)	0.006	3.60 (1.44-8.97)
<i>Gender</i>						
Male	116	23.9	reference	-	-	-
Female	369	76.1	0.532	0.68 (0.20-2.26)	-	-
<i>Series</i>						
Initial	220	45.4	≤ 0.001	8.02 (2.39-26.84)	≤ 0.001	9.76 (3.18-29.97)
Final	265	54.6	reference	-	reference	-
<i>Shift</i>						
Daytime	307	63.3	0.002	4.75 (1.77-12.77)	0.034	2.73 (1.08-6.93)
Night	178	36.7	reference	-	reference	-

Bold values indicate a statistically significant difference ($p < 0.05$), univariate and multivariate Poisson regression.

In the multivariate and univariate Poisson regression model, association was observed between all variables.

Out of the total number of students (318) who submitted the documentation for hepatitis B, 274 (86.1%) completed the vaccination protocol

(3 doses), while 44 (13.9%) underwent the incomplete protocol (1 or 2 doses). The data used for statistical analyses belonged to the 295 students who presented the reports of the Anti-HBs investigation. Among these, 218 (73.9%) students had values above 10 IU, and were immune to hepatitis B, while 77 (26.1%) presented results lower than 10 IU.

In the univariate Poisson regression model, the same risk factors as those considered for tetanus were used. The results demonstrated that older students were more likely to have refrained from taking the vaccinations compared to younger students [$p \leq 0.001$ /RP:2.05(1.36 - 3.08)]. Undergraduate students enrolled in the initial years of the course were more likely to

have not received the vaccine than students in the senior years [$p \leq 0.001$ /RP:2.47 (1.70-3.59)]. Students who attended school in the night were more likely to have not received the vaccination compared to those who attended during the day [$p = 0.03$ /RP: 1.52 (1.04-2.22)].

The analysis included students who underwent the complete and incomplete protocols for hepatitis B vaccination. Students who received all the three doses of hepatitis vaccination were more likely to be immunized against the disease [($p=0.04$ / RP: 1.86 (1.22-2.83)]. The results have been depicted in table 2. In the multivariate Poisson regression model, no correlation was observed between the univariate and multivariate variables ($p < 0.05$).

Table 2. Univariate and multivariate regression analyses for hepatitis B

Variables	Hepatitis		Bivariate		Multivariate	
	N	(%)	p value not adjusted	RP (IC)	p value adjusted	RP (IC)
<i>Age (Years)</i>						
≤ 20	140	47.5	reference		reference	-
> 20	155	52.5	≤ 0.001	2.05 (1.36 - 3.08)	≤ 0.001	2.32 (1.52- 3.53)
<i>Gender</i>						
Male	60	22.3	0.65	1.10 (0.72-1.75)	-	-
Female	235	79.7	reference	-	reference	-
<i>Series</i>						
Initial	93	31.5	reference	-	reference	-
Final	202	68.5	≤ 0.001	2.47 (1.70-3.59)	≤ 0.001	2.02 (1.40-2.91)
<i>Shift</i>						
Daytime	187	63.4	0.03	1.52 (1.04-2.22)	0.02	1.54 (1.07-2.23)
Night	108	36.6	reference	-	reference	-
<i>Dose</i>						
Incomplete	256	86.8	≤ 0.001	1.86 (1.22-2.83)	≤ 0.001	2.18 (1.45-3.27)
Complete	39	13.2	reference		reference	

Bold values indicate a statistically significant difference ($p < 0.05$), Poisson regression.

The median value presented on the Anti-HBs investigation for the whole sample was 67.7 IU (0-1638). The Mann-Whitney test was used to verify the association between the Anti-HBs values and the risk factors and was considered statistically significant at $p < 0.05$ (table 3). Regarding the age of the participants, older

students presented an Anti-HBs median value of 146.6 (0-1638), while younger students presented with 36.8 (0-1000), p value = 0.001. The median value of the senior students who attended in the last year was 114.4 (0-1638) and of those in the initial years was 16.2 (0-1000), p value ≤ 0.001.

Table 3. Results of the Anti-Hbs examination in relation to the variables age, gender, series, and studying shift

Variables	Median	Anti Hbs		p values
		Minimum	Maximum	
<i>Age(Years)</i>				
≤ 20	36.8	0	1000	≤ 0.001
> 20	146.6	0	1638	
<i>Gender</i>				
Male	44.7	0	1000	0.25
Female	73.3	0	1638	
<i>Series</i>				
Initial	16.2	0	1000	≤ 0.001
Final	114.4	0	1638	
<i>Shift</i>				
Daytime	72.5	0	1000	0.30
Night	53.6	0	1638	

Bold values indicate a statistically significant difference ($p < 0.05$), Mann-Whitney Test.

4 DISCUSSION

The hypothesis tested in the present study regarding effectiveness of the vaccination campaign in preventing HBV and tetanus infection in undergraduate Dental students has been proven. Out of the total number of students enrolled in the year 2017 ($n=485$), 318 submitted the details of the vaccination, and 295 presented the reports of the Anti-HBs investigation. Two hundred and eighteen students (73.9%) demonstrated protective Anti-HBs titers (>10 UI), which did not corroborate with the results reported in the studies by Lasemi *et al.* (2011)⁹, Sacchetto *et al.* (2013)¹⁰ and Al-Maweri *et al.* (2015)¹¹.

The present retrospective study proposes that schools of dentistry should conduct awareness programs to educate students regarding the importance of vaccination against hepatitis B and tetanus, similar to that suggested by Mahesh *et al.* (2014)². Among health professionals, dentists belong to the high-risk group in acquiring such infections, especially during clinical training period due to increased contact with the patient¹³. It is known that the immunization of healthcare professionals and

students is an effective method to control the occupational risk, which is higher during the period of professional training¹. Therefore, vaccination campaigns during the initial years of enrolment to Dental schools are critical. The results of tetanus vaccination in the present study demonstrated that in the initial years, students were more likely to have not received the vaccination than those in the final years. However, older students were more likely to not have received the vaccination compared to younger students. These data demonstrate that campaigns must be conducted and maintained in Dental schools to encourage students to take the vaccinations as per protocol. In our survey, data of 485 students were collected of these only 229 were analyzed. We were able to verify that there was no total adherence to the graded, corroborating with the studies of Sachetto *et al.* (2013)¹⁰, Al-Maweri *et al.* (2015)¹¹ and Lasemi *et al.* (2011)⁹. Possible strategies could be addressed for this problem to be remedied. Performing, at the time of enrollment in the course, the presentation of the vaccination portfolio. The loss of the vaccine document may also be detected as a problem to prove the

necessary vaccine protocol.

The HBV vaccine is composed of a recombinant HBV surface antigen (HBsAg), which induces specific antibodies (anti-HBs) and confers 95% immunity¹². The immunity acquired through vaccination and natural immunity provide lifelong protection against the infection. Immunity against HBV is demonstrated by the concentration of Anti-HBs antibodies in the blood, with a value of ≥ 10 mIU / mL being considered seroprotective⁸. However, Anti-HBs levels may decline over time, and many previously vaccinated individuals may exhibit Anti-HBs values below the protective threshold when tested 10-15 years after vaccination^{14,15}. These data reiterate the importance of continuation of vaccination campaigns and periodic repetition of Anti-HBs investigations. The results of the present study showed that older students were more likely to not have received the vaccine compared to younger students.

Out of the total number of students (318) who submitted the documentation for hepatitis B, 274 (86.1%) completed the vaccination protocol (3 doses) while 44 (13.9%) underwent the incomplete protocol (1 or 2 doses). The percentage of students with Anti-HBs values above 10 IU (immune to hepatitis B) was 73.9%, while 26.1% students presented results lower than 10 IU. Similar results were reported in a study by Lasemi *et al.* (2011)⁹, wherein 75.8% of the students demonstrated immune response. In a study by Sacchetto *et al.* (2013)¹⁰, 126 out of 159 students (79.2%) were immune to hepatitis B. Determination of the appropriate dose of the Anti-HBs vaccination is crucial to achieve adequate response, as failure to achieve protective antibody levels may indicate the need for subsequent booster doses¹⁵.

The present study included the data of students who underwent the complete and incomplete protocols of hepatitis B vaccination.

As expected, students who received three doses of the vaccination were more likely to be immunized against the disease. Occasionally, low or lack of response after the recommended doses of vaccines may be reported in elderly individuals with immunodeficiency, chronic diseases, or cancer. In such cases, an additional dose of the vaccine, known as booster dose, may be recommended. Double-dose re-vaccination may be recommended in cases of non-response to the booster dose. Non-response to the double-dose should be considered as a non-sustained response to vaccination; therefore, should not be repeated¹⁶. In the present study, the booster dose was not evaluated, but future studies should analyze its effectiveness.

In the present study, information about the vaccination status of each student was obtained from the physical records provided by each student. This manner of acquisition of information was different from other studies, wherein self-administered questionnaires were used^{2,10,11,16}. The studies also obtained information of the Anti-HBs investigation¹⁰.

The evidence of effectiveness of vaccinations in the control of infectious diseases with high risk of transmission in dental health care settings is necessarily indirect, as field or clinical trials are not available. Such evidence could be used as a basis to design an immunization program specifically directed towards dental health care personnel¹⁷.

In Brazil, since the beginning of the nineteenth century, vaccines are used as a measure of disease control, but only in 1973 the National Immunization Program (PNI) was formulated. Anti-hepatitis B (HB) vaccine was included into the basic vaccination schedule in Brazil in 1998, with the first dose being given at birth. In the public health network, this vaccine is also freely offered, and health care worker are included groups for immunization¹⁷

According to the Immunization Action Coalition, supported by the Centers for Disease Control and Prevention (CDC), the Tetanus, Diphtheria, Pertussis (Tdap) vaccine has been recommended. Health education programs are essential to create awareness about tetanus, reiterating that vaccination is the best form of prevention, as the results of the present study demonstrated. It is essential to establish a vaccination campaign in Dental Schools to prevent occurrence of infectious diseases in undergraduate healthcare students.

5 CONCLUSION

Vaccination campaigns for undergraduate students may be effective, if adherence of the individuals to the schedule can be ensured. Strategies for greater adherence of students, like this campaign, should be thought and planned by Dental Schools for safety in caring for patients regarding the transmission of diseases such as hepatitis B and tetanus.

RESUMO

Prática preventiva e seu papel educacional junto a uma comunidade acadêmica de Odontologia

O estudo objetivou verificar a adesão dos estudantes de graduação em Odontologia à campanha de vacinação contra hepatite B e tétano em uma escola particular de Odontologia. A hipótese testada foi que a campanha de vacinação seria um programa efetivo na prevenção da infecção pelo HBV e tétano. O cartão de vacinação e o exame anti-HBs foram analisados como desfecho principal. Os dados foram submetidos à regressão de Poisson bivariada e multivariada ($\alpha < 0, 05$). Idade, ano de admissão, turno de estudos, número de doses de vacinas para hepatite B e vacinação para tétano foram variáveis independentes. Dos 485 estudantes, 318 entregaram a cópia do cartão de vacinação e 295 apresentaram o exame anti-HBs. A mediana de idade dos estudantes foi de 21 anos (76,1% do sexo feminino, 23,9% do sexo

masculino). Nos modelos de regressão de Poisson univariada e multivariada, a não vacinação contra o tétano foi considerada fator de risco. Os alunos de graduação matriculados nos anos iniciais foram mais propensos a não receberem a vacinação do que aqueles dos anos finais ($p \leq 0,001$). Do total de alunos (318) que entregaram a documentação para hepatite B, 86,1% completaram o protocolo de vacinação (3 doses), enquanto 13,9% o protocolo incompleto (1 ou 2 doses). Os estudantes mais velhos foram mais propensos a não terem tomado as vacinas em comparação com mais jovens ($p \leq 0,001$). Em relação ao anti-HBs, 73,9% apresentaram título de proteção positivo. As campanhas de vacinação para estudantes de graduação podem ser efetivas se a adesão dos indivíduos ao calendário vacinal puder ser assegurada. Estratégias para maior adesão dos estudantes, como essa campanha, devem ser pensadas e planejadas pelos cursos de Odontologia.

Descritores: Estudantes. Imunização. Hepatite B. Tétano.

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