Knowledge About Antibiotic Prescription Among Eighth- and Ninth-Semester Dental Students *

Conocimiento sobre la prescripción de antibióticos entre estudiantes de odontología del octavo y noveno semestre

Conhecimento sobre prescrição de antibióticos entre estudantes de odontologia do oitavo e nono semestres

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ABSTRACT

Background: Dental students engage in prescribing antibiotics, which, worldwide, are overprescribed. **Purpose**: To evaluate knowledge, attitudes and practices of antibiotic prescription through a survey in students of the eighth and ninth semester of Dentistry. **Methods**: Analytical cross-sectional study that recorded information at a single moment without interfering in the sample, seeks to explain the association between level of knowledge in antibiotic prescription with sex and semester, the study was conducted on 109 students, with a non-probabilistic sample. In Google Forms, a survey was conducted taken from the article by Cortés & Montenegro sent to institutional emails on knowledge, attitudes and practices of antibiotics in four domains: characterization of medical practice, knowledge about the diagnostic process, attitudes of the respondents regarding claims, practices in antibiotic use. Data were analyzed in SPSS statistical package version 26.0. Pearson's Chi square and Student's t-test were performed with a 5 % significance level. **Findings**: 43.1 % of students had a poor level of knowledge about antibiotic prescription, 46.8 % had a regular level of knowledge, and 10.1 % had an acceptable level of knowledge. A level of significance p=0.77 was found between level of knowledge with sex and p>0.40 between level of knowledge with semester. **Conclusions**: Eighth semester Dentistry students showed a better level of knowledge in antibiotic prescription; while, in relation to sex, women had better results and the level of significance indicates that there is no relationship between the level of knowledge with semester and sex.
Keywords: antibiotic prescription; attitudes; antimicrobials; dental education; dental students; knowledge; pharmacological therapy; practices; therapeutics

RESUMEN

Antecedentes: Los estudiantes de Odontología están involucrados en la prescripción de antibióticos; los cuales, a nivel mundial son recetados en exceso. **Objetivo:** Evaluar conocimientos, actitudes y prácticas de prescripción antibiótica mediante encuesta

en estudiantes de octavo y noveno semestre de Odontología. **Metodología:** Estudio transversal analítico que registró información en un solo momento sin interferir en la muestra, busca explicar la asociación entre nivel de conocimientos en prescripción antibiótica con sexo y semestre, el estudio fue realizado en 109 estudiantes, con una muestra no probabilística. En Google Formularios se realizó encuesta tomada del artículo de Cortés & Montenegro enviada a los correos institucionales sobre conocimientos, actitudes y prácticas de los antibióticos en cuatro dominios: caracterización de la práctica médica, conocimiento sobre el proceso diagnóstico, actitudes de los encuestados con respecto a las afirmaciones, prácticas en uso de antibióticos. Se analizaron datos en paquete estadístico SPSS versión 26.0. Se realizó Chi cuadrado de Pearson y t-Student con nivel de significancia 5 %. **Resultado:** El 43,1 % de estudiantes presentaron nivel de conocimiento deficiente sobre prescripción antibiótica, 46,8 % regular y 10,1 % aceptable. Se encontró un nivel de significancia p=0,77 entre nivel de conocimiento con sexo y p>0,40 entre nivel de conocimiento con semestre. **Conclusiones:** Los estudiantes de Odontología de octavo semestre mostraron mejor nivel de conocimiento en prescripción antibiótica; mientras que, en relación con el sexo las mujeres tuvieron mejores resultados y el nivel de significancia indica que no existe relación entre el nivel de conocimiento con semestre y sexo.
PALABRAS CLAVE: actitudes; antimicrobianos; conocimientos; educación odontológica; estudiantes de odontología; prácticas; prescripción antibiótica; terapéutica; terapia farmacológica

RESUMO

Antecedentes: Estudantes de odontologia estão envolvidos na prescrição de antibióticos; que, em todo o mundo, são prescritos em excesso. **Objetivo:** Avaliar conhecimentos, atitudes e práticas de prescrição de antibióticos por meio de inquérito em estudantes do oitavo e nono semestre de Odontologia. **Metodos:** Estudo transversal analítico que registrou informações em um único momento sem interferir na amostra, busca explicar a associação entre nível de conhecimento em prescrição de antibióticos com sexo e semestre, o estudo foi realizado com 109 estudantes, com escolaridade não amostra probabilística. No Google Forms foi realizado um levantamento retirado do artigo de Cortés & Montenegro enviado aos e-mails institucionais sobre conhecimentos, atitudes e práticas de antibióticos em quatro domínios: caracterização da prática médica, conhecimento sobre o processo diagnóstico, atitudes dos respondentes frente às reclamações , práticas no uso de antibióticos. Os dados foram analisados no pacote estatístico SPSS versão 26.0. Foram realizados o Qui-quadrado de Pearson e o teste t de Student com nível de significância de 5 %. **Resultados:** 43,1 % dos estudantes apresentaram nível de conhecimento ruim sobre prescrição de antibióticos, 46,8 % tiveram nível de conhecimento regular e 10,1 % tiveram nível de conhecimento aceitável. Foi encontrado nível de significância p=0,77 entre nível de conhecimento com sexo e p>0,40 entre nível de conhecimento com semestre. **Conclusões:** Os alunos do oitavo semestre de Odontologia apresentaram melhor nível de conhecimento na prescrição de antibióticos; enquanto, em relação ao sexo, as mulheres obtiveram melhores resultados e o nível de significância indica que não há relação entre o nível de conhecimento com o semestre e o sexo.
Palavras- Chave: atitudes; antimicrobianos; conhecimento; educação odontológica; estudantes de odontologia; práticas; prescrição; terapêutica; terapia farmacológica

INTRODUCTION

According to Gómez (1), antibiotic resistance is a growing public health problem. When health personnel prescribe antibiotics, they influence not only patients and the time of their use, but also poor knowledge on the part of the patient. of the professional would be the cause of future infections, by favoring alterations in the resistance patterns of the bacterial microflora that colonizes people as a consequence of a bad dose. In Peru, a study conducted by Valdiviezo (2) suggests that 77.5 % of dental students have deficient knowledge about their prescription in scenarios specific to their work, while Okedo *et al*. (3) have observed this situation in students from countries with limited resources.

According to Segura *et al*. (4), in their study considers that antibiotics are overprescribed worldwide, agreeing with Goel, *et al*. (5), who estimate that 66.4% of dental prescriptions in England are antibacterial; while Tekam *et al*. (6); indicates that years ago dentists prescribed approximately 3.3 million antibiotics and currently that figure has been increasing. For his part, Chhabra (7) showed that knowledge of antibiotic prescription among dentistry graduates is only 45.7 %. Therefore, it is necessary to know the knowledge, attitudes and practices in antibiotic prescription of the students who will be the future prescribers of these drugs. This information is key to introducing educational initiatives that promote consistent and appropriate use of antibiotics.

In this study, a survey of knowledge, attitudes and practices regarding the use of antibiotics was carried out in students of the last two semesters of Dentistry.

MATERIALS AND METHODS

The study approved by the Research Committee of the Dental School was observational, transversal and analytical. The population was made up of all students who were studying the eighth and ninth semester of Dentistry during the 2021 period. The survey and informed consent were sent to the institutional emails of all those students enrolled in the last 2 semesters of Dentistry. The 109 participants who collaborated in this study were told that the information they provide in the survey will be completely anonymous; because at no time were their identifications requested and their personal data will not be exposed in the development of the study.

The survey was designed using Google Drive Forms software; in which are the 25 items contained in this study, prior to filling out the informed consent. To verify the reliability of the instrument, a global analysis of the survey was conducted, using Cronbach's Alpha test with a value close to 0.7.

The data obtained were analyzed in the statistical package SPSS version 26.0, t-Student and the Pearson Chi square test were performed to determine the relationship between the variables level of knowledge, attitudes and practices in antibiotic prescription with sex and semester of the students. With a reliability of 95 % and a significance level of %.

RESULTS

109 surveys were conducted on students; of which, data were obtained from 82 women (75.2 %) and 27 men (24.8 %). Regarding the semester, 56 students belonged to the ninth semester (51.4 %) and 53 to the eighth semester (48.6 %).

TABLE 1
Level of antibiotic prescribing knowledge by sex and semester (chi-square) in dentistry students during the period 2021

Sex	**Deficient**	**Regular**	**Acceptable**	**p**
Female	36 (43.9)	37 (45.1)	9 (11)	0.779
Male	11 (40.7)	14 (51.9)	2 (7.4)	
Total	47 (43.1)	51 (46.8)	11 (10.1)	
Semester				
Eighth	20 (37.7)	26 (49.1)	7 (13.2)	0.407
Ninth	27 (48.2)	25 (44.6)	4 (7.1)	
Total	47 (43.1)	51 (46.8)	11 (10.1)	

Table 1 shows the result in knowledge about the use of antibiotics. According to the defined assessment, it was identified that no one had an outstanding level, 10.1 % had acceptable knowledge, 46.8 % had a regular level and 43.1 % had a poor level. No differences were observed in the proportion of poor responses by sex (43.9 % for women vs 40.7 % for men, p=0.78) or by semester (37.7 % for eighth grade, 48.2 % for ninth grade, p=0.41).

Figure 1 reflects the results of the level of knowledge in percentage form as follows. In the statement that the students responded mostly assertively, it was regarding the importance of the relationship with the site of infection for the choice of antibiotic, in which 87.2 % answered correctly (true), followed from the question about the longer duration of use causes greater resistance to antibiotics; in which, 78 % answered correctly (true). The opposite of these results was obtained in the statement: the diagnosis of bacterial infection is necessary for the initiation of antibiotics, in which only 9.2 % answered correctly (false).

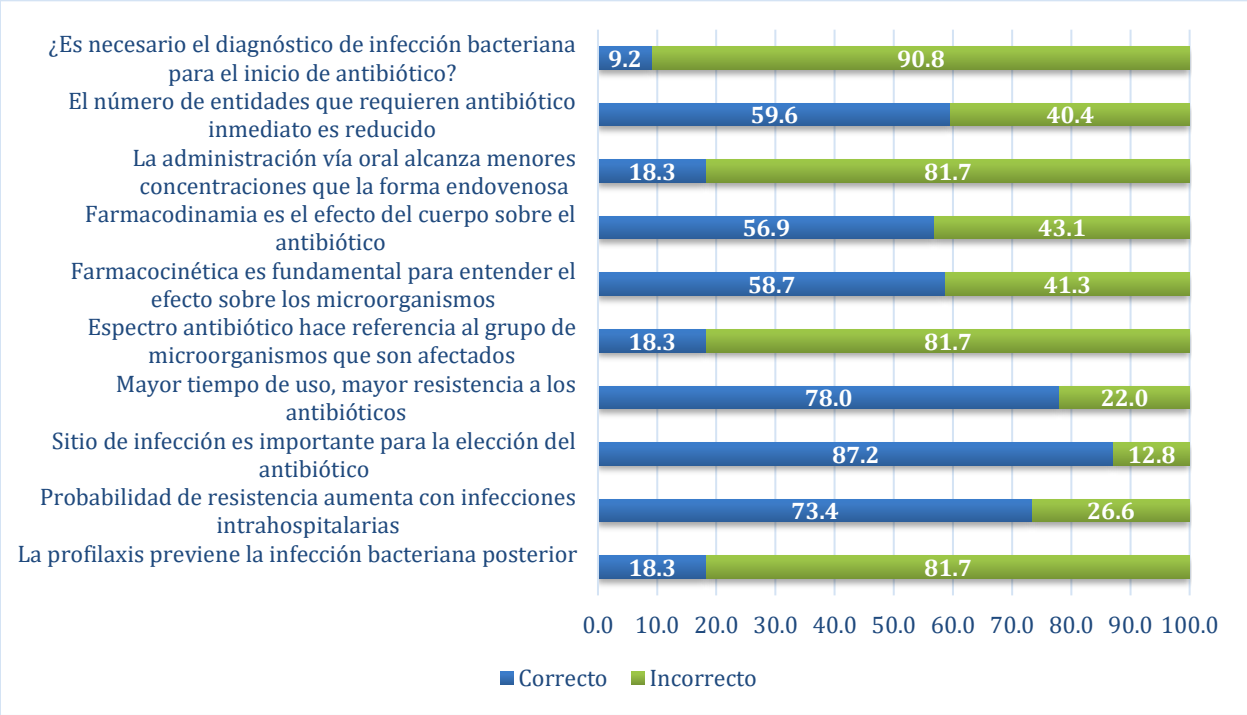

FIGURE 1
Correct answers to knowledge questions

TABLE 2
Attitudes towards antibiotic prescribing claims

Antibiotic prescribing attitudes	Frequency (Percentage)			Total
	Agreement	Neutral	Disagreement	
The concept of an infectologist is valuable when interconsulting.	64 (58.7)	39 (35.8)	6 (5.5)	109 (100,0)
Guidelines from other countries are applicable in the country	20 (18.3)	76 (69.7)	13 (11.9)	109 (100,0)
Price is the main factor in the prescription of antibiotic.	31 (28.4)	51 (46.8)	27 (24.8)	109 (100,0)
It is preferable to use broad spectrum antibiotics.	25 (22.9)	48 (44)	36 (33)	109 (100,0)
The information acquired in the undergraduate degree is sufficient for the formulation of antibiotics.	27 (24.8)	61 (56)	21 (19.3)	109 (100,0)
Health faculties and institutions should favor antibiotic restriction programs.	72 (66.1)	28 (25.7)	9 (8.3)	109 (100,0)
The adverse effect profile modifies the possibility of prescription.	73 (67)	32 (29.4)	4 (3.7)	109 (100,0)
Dosage interval does not affect prescription compliance.	25 (22.9)	33 (30.3)	51 (46.8)	109 (100,0)
Sale of antibiotics under medical prescription.	96 (88.1)	8 (7.3)	5 (4.6)	109 (100,0)
Overcoming resistance with new antibiotics	44 (40.4)	42 (38.5)	23 (21.1)	109 (100,0)

Table 2 shows the students' attitudes regarding the use of antibiotics. It was observed that the majority of respondents maintained a neutral position (69.7 %) on the fact that the guidelines of other countries are applicable in the country; while, when considering the dosing interval does not affect prescription compliance, 46.8% disagreed. The highest value on which students agreed (88.1 %) was obtained regarding the sale of antibiotics under medical prescription.

TABLE 3
Antibiotic prescribing practices in eighth and ninth semester dental during the period 2021

Antibiotic prescription practices	Frequency (Percentage)				Total
	Almost never (1-25 % of time)	Sometimes (26-50 % of time)	Frequently (51-75 % of time)	Almost always (76%-100 % of time)	
Request for culture prior to initiation of antibiotics	48 (44)	38 (34.9)	15 (13.8)	8 (7.3)	109 (100,0)
Do you use antibiotics because the patient or family member wants them?	83 (76.1)	16 (14.7)	5 (4.6)	5 (4.6)	109 (100,0)
How often do you use local antibiotic guidelines?	28 (25.7)	38 (34.9)	31 (28.4)	12 (11)	109 (100,0)
Kidney function counts for adjustment of certain antibiotics	14 (12.8)	17 (15.6)	28 (25.7)	50 (45.9)	109 (100,0)

In Table 3, in the statement about antibiotic prescription because the patient or family member wants it, a high percentage (76.1 %) almost never considers it, while 45.9 % of participants almost always take kidney function into account when adjusting certain antibiotics.

TABLE 4
Operationalization of variables

Variables	Operational Definition	Type	Ranking	Categorical indicator	Measurement Scales
Knowledge in students in relation to the semester on antibiotic prescription.	People who are currently studying dentistry. Data will be obtained at the time of the survey.	Independent	Qualitative Ordinal	Ninth semester Eighth semester	1 2
Knowledge of antibiotic prescribing in relation to sex	Organic condition that distinguishes between man and female. It will be obtained at the time of the survey.	Independent	Qualitative Nominal	Female Male	1 2
Level of knowledge in antibiotic prescription	It is the information that the student has regarding the indications for prescribing antibiotics. Data to be obtained in the “knowledge about the diagnostic process” section of the survey.	Dependent	Qualitative Nominal	True Fake	1 2
Attitude level in antibiotic prescribing	It is the student´s predisposition to the prescribed antibiotics. Data to be obtained in the “respondents´ attitudes toward the statements” section of the survey.	Dependent	Qualitative Nominal	Agreement Neutral (N) Disagreement (D)	1 2 3
Level of practices in antibiotic prescribing	Frequency with which respondents consider indications in practice when prescribing antibiotics. Data to be obtained in the “antibiotic use practices” section of the survey	Dependent	Discrete Quantitative	0-25 % times 26-50 % times 51-75 % times 76-100 % times (Majority)	1 2 3 4

TABLE 5

frequency of sample characterization in eighth and ninth semester of dentistry students during the period 2021

Variable	Frequency (%)
Sex	
Female	82 (75.2)
Male	27 (24.8)
Semester	
Eighth	53 (48.6)
Nineth	56 (51.4)
Total	109 (100)

TABLE 6

Level of knowledge in antibiotic prescription in eighth and ninth semester of dentistry students during the period 2021

Knowledge	Frequency (Percentage)		$\bar{x}$	σ	Total
	True	False			
Prophylaxis prevents subsequent bacterial infection	89 (81.7)	**20 (18.3)**	0.8	0.40	109 (100,0)
Probability of resistance increases with hospital-acquired infections	**80 (73.4)**	29 (26.6)	0.63	0.49	109 (100,0)
Site of infection is important for antibiotic choice	**95 (87.2)**	14 (12.8)	0.86	0.34	109 (100,0)
Longer use time, greater antibiotic resistance	**85 (78)**	24 (22)	0.63	0.49	109 (100,0)
Antibiotic spectrum refers to the group of microorganisms that are affected	89 (81.7)	**20 (18.3)**	0.7	0.46	109 (100,0)
Pharmacokinetics is essential to understand the effect on microorganisms	**64 (58.7)**	45 (41.3)	0.53	0.50	109 (100,0)
Pharmacodynamics is the body´s effect on the antibiotic	**62 (56.9)**	47 (43.1)	0.6	0.49	109 (100,0)
Oral administration reaches lower concentrations than the intravenous form.	89 (81.7)	**20 (18.3)**	0.76	0.43	109 (100,0)
The number of entities requiring immediate antibiotic treatment is small.	44 (40.4)	**65 (59.6)**	0.36	0.49	109 (100,0)
Is the diagnosis of bacterial infection necessary for antibiotic initiation?	99 (90.8)	**10 (9.2)**	0.96	0.18	109 (100,0)

($\bar{x}$): arithmetic mean

(σ): standard deviation

TABLE 7

Level of knowledge about antibiotic prescribing in eighth and ninth semester dentistry students**.**

Level	F (%)
Deficient	47 (43.1 %)
Regular	51 (46.8 %)
Acceptable	11 (10.1 %)
Total	109 (100 %)

TABLE 8
Instrument reliability

Component	Cronbach's alpha	Number of elements
Knowledge	0.665	10
Attitudes	0.716	10
Practices	0.728	4
Global	0.698	24

DISCUSSION

In the present study, data on knowledge, attitudes and practices on antibiotic prescription were collected in eighth and ninth semester students of a dental school in Latin America, identifying that a deficient level of knowledge predominates in 43.1 % of the students. regular in 46.8 % and acceptable in only 10.1 %. These data are similar to the Peru study carried out by Chumpitaz (8), which reflected that 53.84 % have a low level of knowledge when prescribing antibiotics, 32.47 % regular and only 13.69 % obtained a level high; Similarly, the study carried out in Trujillo revealed that the level of knowledge in dentistry interns about antibiotic prescription was insufficient in 77.5 % (2); which agree with what was identified in Nigeria by Chukwu, *et al*. (9), in which it was found that only 17 % answered appropriately.

According to Struzycka *et al.* (10), dentists, despite being the ones who prescribe antibiotics the most, do not always prescribe them rationally, for this reason, Kamoto (11), emphasizes the need for students to have adequate knowledge of antibiotic prescription, only in this way they will be able to contribute to stopping the growing resistance to antibiotics. Currently, Sobierajski (12) points out that 54 % of students are aware that dentists prescribe antibiotics in cases in which they are not necessary.

In relation to the level of knowledge in antibiotic prescription associated with the semester, 13.2 % with an acceptable level was obtained in eighth grade students compared to ninth grade students in whom 7.1 % was found; Furthermore, there was no level of significance between the variables level of knowledge and semester ($p>0.407$), data that agree with the study by Águila (13), carried out in Iquitos, in which there are no significant differences in the level of knowledge between the last two levels IV and V ($p=0.289$); Furthermore, in the survey carried out by Sánchez (14), to Dentistry students, a better average was obtained in V level with 10.7 points out of 20 in relation to IV level, which was found to be 9.4 points.

The level of knowledge in relation to sex in the present study showed that women have a slightly better level of knowledge in antibiotic prescription, obtaining an 11 % acceptable level compared to 7.4 % of that same level in men. data that coincide with the study conducted in Yungai, in which a poor level of knowledge was determined in men of 83.3 %, a figure higher than that obtained in women of 16.7 % (15), these studies that differ with the one conducted in Piura in which a slightly higher acceptable level was obtained in men (16).

According to Halboub *et al.* (17), in their study to correlate sex with knowledge of antibiotic prescription, found that female dentists had a better level, in the same way as the survey carried out by Mazińska *et al.* (18) revealed that 32 % of female professionals gave an accurate response to the spectrum of action of antibiotics, unlike men in whom only 23 % responded appropriately.

A study in Piura evaluated the level of knowledge in antibiotic prescription taking sex as a reference and obtained a slightly higher value of 1.4 % in men (16); while, in another study, a greater difference was obtained by revealing that 70.4 % of male professionals obtained a better score in knowledge of antibiotic prescription and resistance, unlike female professionals who only had 55.1 %. with correct answers (3).

For their part, Hu *et al*. (19), mentions that in the female sex there is a greater tendency to overprotection; Therefore, women administer antibiotics even in cases in which it is not required, agreeing with a study carried out in the United States by Spivack (20), which indicates that the female sex has a greater tendency to prescribe antibiotics unnecessarily. , contrasting with the study in Dubai by Al-Saleh, *et al.* (21), in which they point out that women prescribe antibiotics better than men.

Regarding the attitudes in the study carried out by Rojas (22), it was found that more than half of the respondents (55.1 %) obtained an unfavorable level, agreeing with what was mentioned in the research by Cárdenas (23), carried out to dentistry students, which indicated that 52 % had an inadequate attitude; These studies differ from what was found by Nemr, *et al.* (24), who indicate that around 79 % of health professionals registered a positive attitude towards the appropriate prescription of antibiotics with a medium attitude score. Torres (25), for his part, points out that antibiotic prescribers; In addition to having an adequate level of knowledge of these medications, they must acquire a good level of attitudes; which has been considered as the predisposition that the clinician adopts when prescribing, considering several factors.

In the present study, in the attitudes section, a large percentage opts for a neutral position in this domain, which may be due to what was mentioned by Maldonado (26), which indicates the importance of taking into account that the proper use of medications begins with the preferential use of those that have greater scientific evidence of a good comparative clinical efficacy profile and favorable safety; However, the WHO (27) also points out that a medicine can be effective and safe but if its cost is too high, it is not accessible to the patient; Therefore, it is the professional's duty to know well the drugs to be prescribed because there are high-cost drugs with pharmacokinetic characteristics of little clinical relevance.

Regarding practices, this study revealed that the majority of respondents (44 %) almost never request a culture before starting antimicrobial therapy; they do so empirically, based on the patient's symptoms, as mentioned in García's study. (28), conducted in Villavicencio-Colombia, 46 % of dentists prescribed antibiotics according to the patient's symptoms. In this domain, it was observed that only 11 % almost always use local antibiotic guidelines, data that differ from research in Nigeria, which indicates that 70.9 % of respondents frequently or moderately use practice guidelines (9).

According to Wasserman, *et al.* (29), antibiotic prescription practices are deficient in both high- and low-income countries; since, despite the fact that educational centers teach their knowledge about antibiotics, students do not put it into practice; Likewise, the study by Sulis *et al*.(30) agree that the level of antibiotic practices is unacceptable; corroborating with their study, that of the people who were administered antibiotics, 37.6 % reported complications, indicating that in that percentage the antibiotics were prescribed incorrectly.

According to Van der Voort *et al.* (31), when conducting a survey of two clinical cases, pointed out that in 49 % the prescription was harmful to the patients, similarly Alzouri *et al*. (32), in their study indicate that less than 30 % obtained a good level of antibiotic practices, while Aly *et al*. (33), reveal that of all prescriptions worldwide, half are unnecessary, which could be a cause of bacterial resistance.

Therefore, it can be concluded that only 10.1 % of students have a high level of antibiotic prescription and it is not related to sex or semester; That is, there is a high level of ignorance among students in recent semesters. However, subsequent studies could be conducted on knowledge, attitudes and practices in antibiotic prescription relating sociodemographic variables that were not incorporated in the present research, to find a greater relationship with these results.

CONCLUSIONS

The level of knowledge of antibiotic prescription obtained through a survey in Dentistry students was low with predominance in ninth semester students and it was reflected that women have a slightly better level of knowledge in relation to the male sex.

RECOMMENDATIONS

Despite being a study that was conducted directly on students who are in the latest educational levels, it has limitations when it was conducted on students from a single university; Therefore, similar investigations could be conducted that cover a larger study population.

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