Knowledge About Syphilis and Its Oral Manifestations Among Dental Students: Cross-sectional Study

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Abstract

Background: Clinical manifestations of the syphilis can occur in the mouth and in the perioral region. This study aimed to investigate the knowledge about syphilis and its oral manifestations among dental students and to discuss the role of the dentist in prevention and control of this disease.

Methods: This is a cross-sectional study carried out with dental students from a Public University. Data collection was performed by a semi-structured questionnaire containing 16 questions answered by students in classroom. Analyses of absolute and relative frequency were performed. To perform association among variables, the Chi-square test (or Fisher's exact test with Yates correction) was performed with 5% significance level.

Results: Only 40 (46.4%) students correctly answered the question about disease stages. Almost all participants answered that syphilis has oral manifestations; however, only 44 (25.7%) answered the question correctly. Regarding differential diagnoses of other oral lesions, only 63 (37.3%) reported knowledge on this subject. There was a statistically significant association between student's educational level and knowledge about the etiological agent ($p = 0.000$), clinical manifestations ($p = 0.000$), disease stages ($p = 0.000$), oral manifestations ($p = 0.000$) and drugs ($p = 0.005$) related to the disease.

Conclusions: Participants showed important gaps in their knowledge about syphilis and its oral manifestations. Our findings, together with the increased number of new cases of the disease in the world, reinforce the need for training dental professionals with knowledge about early diagnosis, effective treatment and follow-up of syphilis cases.

Background

Syphilis represents a chronic worldwide infection on the rise. This infection affects more than 10 million people worldwide per year [1], with 60% or more of cases occurring in men who have sex with men, being strongly associated with HIV co-infection and high-risk sexual behavior [2].

The disease presents four distinct stages that are characterized by particular symptoms, clinical manifestations, and infectivity levels: primary, secondary, tertiary, and latent syphilis. Clinical manifestations can occur in the mouth and in the perioral region and primary and secondary lesions are highly contagious. For this reason, in many cases, the dentist is the professional who makes the diagnosis of this pathology, and therefore plays an extremely important role in contributing to the effectiveness of diagnosis, control and treatment, through the identification of its signs and symptoms, guiding the patient in relation to procedures, treatment support and follow-up [3].

In addition, the possibility of non-sexual transmission makes the dentist to be among health professionals most at risk of contamination, as accidental contact with saliva and blood may occur during clinical practice. In addition, the risk is greater when considering that 9 out of 10 patients with

syphilis do not present any clinical manifestations, although they remain infectious and that in most cases lesions are painless [4].

Considering the importance of academic formation that allows the insertion of dentists in multiprofessional teams for diagnosis and treatment of sexually transmitted infections (STIs) [5] and that the knowledge may influence attitudes and behaviors [6], the aim of this study was to investigate the knowledge about syphilis and oral manifestations among dental students and to discuss the role of the dentist in prevention and control of this disease.

Methods

This is a cross-sectional study conducted with dental students from a Brazilian Public University. The sample universe was composed of students enrolled in the second, third, fourth and fifth years in the first semester of 2019. Students in the first year and first semester of the second year (third period) were excluded for not having taken the Stomatology discipline, which officially addresses the content discussed in this study. A pilot study was carried out with first-year students.

Data collection was performed by a semi-structured questionnaire, which was answered by students in classroom, containing 16 questions about identification (sex, age), school year and aspects related to knowledge about syphilis (what is it, agent etiology, forms of transmission, clinical manifestations, disease stages, oral manifestations, differential diagnoses and drugs used for treatment).

Data were statistically analyzed with the IBM SPSS Statistics for Windows 19.0 software package. Analyses of absolute and relative frequency were performed. To perform the association among variables, the Chi-square test (or Fisher's exact test with Yates correction) was performed with 5% significance level.

This project was approved by the Ethical Committee of the Department of Science, Federal University of Espírito Santo, Brazil. All participants who agreed to participate in the research signed the Free and Informed Consent Form.

Results

The number of research participants was 169, 129 (75.1%) of whom were female and 139 (81.9%) aged under 25 years (Table 1).

Table 1
Characteristics of participants (n = 169).

Variables		n(%)
Sex	Female	129 (76.3%)
	Male	40 (23.7%)
Age	Less than 25 years	139 (81.9%)
	Between 25 and 29 years	26 (15.7%)
	Between 30 and 34 years	2 (1.2%)
	Between 35 and 39 years	2 (1.2%)
Educational level	Early years of dentistry course (second and third years)	86 (51.0%)
	Final years of dentistry course (fourth and fifth years)	83 (49.0%)

All students reported to know what syphilis is and 167 (98.8%) received information about the disease during the undergraduate course. When asked about the etiological agent, 135 (79.9%) answered *Treponema pallidum*. Regarding forms of transmission, 166 (98.2%) students claimed to know them, and 160 (94.7%) considered unprotected sexual contact as one of the main transmission forms (Table 2).

Of the total number of students, 84 (50.0%) reported to know the clinical manifestations of syphilis, of those, 66 (78.8%) reported that one of the most common syphilis lesions is hard chancre. Only 40 (46.4%) students correctly answered the question about disease stages. Almost all participants answered that syphilis has oral manifestations; however, only 44 (25.7%) answered the question correctly, that is, they reported that the appearance of chancre is common in the primary disease stages (Table 2).

Regarding the different diagnoses with other oral lesions, only 63 (37.3%) claimed to know them, while 110 (63.3%) knew that the main form of treatment is penicillin (Table 2).

Table 2

Numerical and percentage distribution of knowledge about syphilis and oral manifestations among dental students.

Questions		n (%)
Knowledge on the forms of transmission		166 (98.2%)
Forms of transmission	Sexual contact	160 (94.7%)
	Vertical	124 (73.4%)
	Dental office	101 (59.8%)
Etiological agent	<i>N. gonorrhoeae</i>	5 (3.0%)
	<i>C. trachomati</i>	6 (3.5%)
	T. pallidum	135 (79.9%)
	<i>T. vaginalis</i>	16 (9.5%)
	<i>H. ducreyi</i>	0 (0%)
Knowledge about the clinical manifestations of syphilis n (%)		84 (50.0%)
About clinical manifestations n (%)	One of the most common lesions is soft chancre	10 (14.3%)
	It is not possible to observe skin changes	2 (2.4%)
	One of the most common lesions is hard chancre	66 (78.4%)
	Thrush is commonly observed in these patients	5 (5.9%)
About disease stages n (%)	The disease is more contagious in the third stage with the presence of hard chancre	29 (35.7%)
	The third stage may not show symptoms	40 (46.4%)
	It is not possible to observe skin changes such as spots	5 (4.8%)
	There is no risk of contamination in the primary phase	6 (5.9%)

Questions		n (%)
Knowledge about oral clinical manifestations of syphilis n (%)		167 (98.8%)
About oral manifestations n (%)	There is no risk of contamination in the primary phase	23 (13.8%)
	In the secondary phase, the appearance of syphilitic gumma is common	34 (20.3%)
	In the tertiary phase, the appearance of hard chancre is common, which is the healing of lesions in the primary and secondary phase	62 (37.1%)
	The appearance of hard chancre is common in the primary phase	44 (25.7%)
Knowledge on differential diagnoses		63 (37.3%)
Not differential diagnoses of syphilis	Lichen Plan	16 (24.2%)
	Polymorphic erythema	10 (16.1%)
	Soft chancre	12 (19.3%)
	Hairy Leukoplakia	12 (19.3%)
	Herpes	14 (20.9%)
Main medication used for treatment	Penicillin	110 (63.3%)
	Azithromycin	12 (7.1%)
	Erythromycin	3 (1.8%)
	Fluconazole	15 (8.9%)
	Acyclovir	23 (13.7%)

There was a statistically significant association between student's educational level in the Dentistry course and knowledge about etiologic agent ($p = 0.000$), clinical manifestations ($p = 0.000$), disease stages ($p = 0.000$), oral manifestations ($p = 0.000$) and drugs ($p = 0.005$) related to syphilis. Students enrolled in the early years had better knowledge about the disease than students in the final years (Table 3).

Table 3
Association among variables related to knowledge about syphilis and the educational level of dental students

	Early years of dentistry course		Final years of dentistry course			
Variable	N	%	n	%	Chi-square	p-value
Etiological agente						
Knows	80	93.0%	55	66.3%	17.189	0.000
Does not know	6	7.0%	28	33.7%		
Clinical manifestations						
Knows	51	59.3%	15	18.1%	28.458	0.000
Does not know	35	40.7%	68	81.9%		
Syphilis stages						
Knows	34	41.5%	6	7.2%	24.491	0.000
Does not know	48	58.5%	77	92.8%		
Oral manifestations						
Knows	38	44.2%	6	7.2%	28.68	0.000
Does not know	48	55.8%	77	92.8%		
Differential diagnosis						
Knows	3	3.5%	7	8.4%	-	0.205*
Does not know	83	96.5%	76	91.6%		
Drugs						
Knows	65	75.6%	45	54.2%	7.569	0.005
Does not know	21	24.4%	38	45.8%		
* Exact fisher test						

Discussion

This study showed that dental students, in general, have inadequate knowledge about syphilis. Moleri et al. [5] reported that although many universities present their curricula aimed at general knowledge, they often have not adequately prepared students to recognize and diagnose complex clinical conditions, such as those presented by syphilis.

In this perspective, few students know the oral manifestations of syphilis. In agreement with our research, Wu et al. [6] investigated the knowledge about occupational blood-borne pathogen among Chinese dental students and found that less than half of participants were able to answer which are the main oral manifestations of syphilis.

The main oral manifestations are hard chancre, mucous plaques and gumma. Oral chancre in primary syphilis is characterized as a painless ulcer, measuring 1 to 2 centimeters, with firm and rolled border [7]. It manifests as a single ulcer, usually on the lip or, more rarely, on the tongue [8]. Secondary syphilis presents multiple and generally symptomatic ulceration [9]. In these cases, lesions are maculopapular, affecting the hard palate and, sometimes, the soft palate⁸. Gumma, associated with tertiary syphilis, initially manifests as one or more painless swelling, especially on the hard palate [10].

Recognizing the oral manifestations of syphilis is a crucial role of the dentist, because as oral lesions are highly contagious, the reliability of the correct diagnosis helps in the adequate management, reduces the infection chain and reduces the risk of transmission to health professional [11]. It is worth mentioning that the form of transmission least reported by participants was through the dental practice. This occurs when correct professional practice is not established [3, 4].

In addition, a small percentage of students reported knowledge about the differential diagnoses of oral manifestations of the disease. Indeed, studies have shown that the diagnosis of oral manifestations of syphilis represents a challenge for professionals because they have a variety of clinical appearances [12, 13]. The fact that some characteristics may be similar to other conditions is of concern, and if diagnosis is not performed in the primary and secondary stages, the patient is exposed to the risk of complications related to the tertiary stage [12].

Our study also showed that students enrolled in the early years of the Dentistry course had better knowledge about etiologic agents, clinical manifestations, disease stages, oral manifestations and drugs than students enrolled in the last two years. The only association that was not statistically significant was in relation to differential diagnosis, where knowledge was low for both groups.

Unlike this research, studies that investigated the knowledge of dental students about HIV / AIDS [14–16] and occupational of blood-borne pathogens [17, 18] showed that knowledge about some aspects was greater among students with higher educational level. Keser et al. [14] justified this finding by the fact that the older group may have gained more experience over the years and was exposed to larger number of patients compared to the younger group. Brailo et al. [18] reported that this finding can be explained by the fact that in the clinical phase, at the beginning of the clinical practice in each department, students are introduced to this content again.

Usually, in the first years of the Dentistry course, students have the Stomatology discipline, which addresses the content about syphilis and its oral manifestations. However, we consider it essential that this content is addressed in other moments and disciplines throughout the undergraduate course, so that students are aware of all aspects that involve the disease, regardless of the educational level they are attending.

A fact that attracted attention was that studies on knowledge about the transmission of blood-borne pathogens among dental students conducted by Myers et al.[17] and Brailo et al.[18], published in 2012 and 2011, respectively, did not address syphilis. The study by Wu et al. [6], published in 2016, included the disease, probably due to its increasing prevalence worldwide. Syphilis started to become evident again a few years ago, so many clinicians do not consider syphilis in their differential diagnosis of oral lesions [19]. In Brazil, the disease has shown significant increase in incidence since 2010.

The number of participants who recognized penicillin as the drug of choice for treatment was less than expected. Penicillin became universal as an effective way of treating syphilis and was responsible for the significant decrease in the epidemiological numbers of the disease. This positive result in coping with the disease left a significant gap in medical and dental education [5].

The study has limitations due to its cross-sectional design. Another limitation was the limited number of articles published on the topic with dental students, which makes our research original. Our findings, together with the increased number of new cases of the disease in the world, reinforce the need for training dental professional with knowledge about early diagnosis, effective treatment and follow-up of syphilis cases. As the main form of infection transmission is sexual, its diagnosis and treatment must consider socio-cultural and ethical scope. The disease has repercussions on the affected people's way of life, and this issue should also be addressed during the undergraduate courses [20].

It is necessary to raise the student's interest not only in the clinical aspect of the disease, but also in care issues. Improving students' knowledge can be an effective way to increase the willingness to treat patients [6]. However, it is necessary to seek educational methods that can improve student's experience and learning skills.

Conclusions

Participants showed important gaps in their knowledge about syphilis and its oral manifestations. Knowledge was associated with student's educational level during the undergraduate course. Our results support a call to improve syphilis and its oral manifestations education at Dental Education Institutions.

Declarations

Ethics approval and consent to participate

This project was approved by the Ethical Committee of the Department of Science, Federal University of Espírito Santo, Brazil (number: 2.801.172). All participants who agreed to participate in the research signed the Free and Informed Consent Form.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analysed during this study are included in this published article

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

These authors contributed equally to this work.

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