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Original Research Article

Knowledge and practice of antibiotic prophylaxis for infective endocarditis among dental students

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ABSTRACT

Background: Infective endocarditis (IE) is a microbial infection of the valves and endocardium of the heart. IE is difficult to treat and has a poor prognosis. Dentists play a major role in preventing IE in susceptible patients. In this study, we evaluate knowledge and practice of antibiotic prophylaxis for IE among dental students, interns and PGs at S. N. Dental College, Kalaburagi.
Methods: A cross-sectional study was done by survey using questionnaire. Questionnaire was distributed to 159 dental students, interns and PGs at S. N. Dental College, Kalaburagi. Questionnaire included questions regarding to demographic information and knowledge and practice of the participants about antibiotic prophylaxis for IE.
Results: Out of 159 participants 135 provided the response, giving a response rate of 85%. Overall, average of 52.7% of the participants had a good level of knowledge regarding the cardiac conditions that require antibiotic prophylaxis. Participants also had better knowledge regarding dental procedures that require prophylaxis with an average of 75.7%. But only 37.2% prescribed correct drug, dosage and regime of antibiotic prophylaxis.
Conclusions: The level of knowledge and practice about antibiotics prophylaxis of IE amongst dental students, interns and PGs at the study site was not at an acceptable level. Awareness is essential because of the cardiac risks associated with the lack of appropriate prophylaxis. Up-to-date and accurate knowledge is mandatory for all dental students, interns and PGs who see and treat patients on a daily basis. This study emphasized the need for continuous education and for formal inclusion of the guidelines in the student's curriculum.

Keywords: Infective endocarditis, Knowledge, Prophylaxis

INTRODUCTION

Infective endocarditis (IE) is due to microbial infection of heart values (native or prosthetic), the lining of cardiac chamber or lining of blood vessel, congenital anamoly[1]. The causative organism is usually bacterium but may be rickettsia, chlymadia or fungus.[1] It is a serious disease with a significant risk of morbidity and mortality. Patients at risk of developing this disease include those with prosthetic heart valves, congenital heart defects, or a recent history of IE.[2] IE is difficult to treat and has a poor prognosis. Thus, prophylaxis plays very important role in preventing this disease.[3] The oral cavity harbors various microorganisms that can enter the blood circulation through tissue injury.[4] With increased survival rate of patients with heart diseases, dentist is more likely to be involved in dental treatment of patients with cardiac diseases.[5,6] The median age of the IE patients has gradually increased from the fourth decade in the early antibiotic era to the sixth and seventh decade recently. In the European heart survey, 26% were older than 70 years.[7] In the Indian scenario, still it is common in younger age groups. A study by Garg N et al, in Indian patients during the last decade indicates that 76% of the patients with IE were younger than 40 years (median age 27.6±12 years).[8] Dental manipulations like oral surgery, periodontal procedures and root canal treatment can lead to infection of sterile

vegetations on cardiac valves in susceptible patients to IE. While some specific cardiac problems and some dental procedures are well recognized to be a clear indication for prophylaxis to prevent IE. However, there is some controversy over other dental treatments as to whether or not they need prophylaxis.[9] For this reason, antibiotic prophylaxis guidelines have been published by number of bodies and have been updated periodically.[10,11] Expert groups, like the American Heart Association (AHA) issue guidelines periodically to specify antibiotic regimens for prophylaxis and its indications.[6] Since 1955, the guideline of AHA has been updated 9 times, with the last update published in 2007. The 2007 guidelines state that bacteraemia following daily routines such as eating and tooth brushing may be a greater risk factor for the development of IE than the transient bacteraemia that follows an invasive dental procedure and antibiotic administration is reasonable before all dental procedures which involve manipulation of the gingival tissue or the peri-apical area of teeth or the oral mucosa for patients at risk.[6]

The aim of this study was to determine the knowledge and practice of students, interns and PGs in S.N. Dental College, Kalaburagi, regarding antibiotic prophylaxis to prevent IE in cardiac patients receiving dental treatments (According to 2007 AHA guidelines for endocarditis Prophylaxis) through questionnaires.

METHODS

A cross-sectional questionnaire-based study conducted on 159 dental students, interns and PGs of S.N. Dental College, Kalaburagi, from June 2015 to August 2015. Prior approval was taken from the Institutional Ethics Committee to conduct the study. Structured questionnaire was designed and developed on the basis of a thorough literature reiew.[6,12] Questionnaire was divided into four sections: demographic data including age, gender, student or intern or PGs; participant's knowledge about the necessity of prescribing antibiotics for different cardiac conditions; participant's knowledge on dental procedures that need antibiotic prophylaxis; practice of the type, dose and regime of antibiotic to be prescribed. In addition, space was provided to give suggestions and furnish any additional information. Participants were explained the purpose of study and were requested to complete and return the questionnaire. The AHA guidelines were used as a reference to compare out results, because the faculty of S. N. Dental College, Kalaburagi follows these international guidelines.[6] Verbal informed consent was obtained before study initiation. Data were entered into the Statistical package SPSS 21.00 for Windows (SPSS Inc., Chicago, IL). To simplify the results, some categories were grouped as correct and incorrect answers. Descriptive statistics in the form of frequencies and means were calculated for all study variables.

RESULTS

Of the 159, about 135 gave response. But 6 questionnaires had one or more incomplete responses and were excluded. Eventually, 129 completed questionnaires were included in the study. Of the 129 participants, 56 were male (43.4%) and 73 were female (56.5%). There were 36 (27.9%) interns and 30 (23.2%) were in PGs. Among the students, 33 (25.5%) were in their third year and 30 (23.2%) were in their fourth year. The participant demographic characteristics are summarized in Table 1.

Table 1: Participant demographic characteristics.

	n	Percentage
Gender		
Male	56	43.4%
Female	73	56.5%
Educational year		
3rd	33	25.5%
4th	30	23.2%
Interns	36	27.9%
PGs	30	23.2%

The response rate (85%) was very high since questionnaire was short and simple. Apart from demographic section, the questionnaire had three main sections: The first section included the 10 cardiac conditions that are common in Kalaburagi and asked whether they require antibiotic prophylactic according to the current AHA guidelines; the second section we included 15 dental procedures that are commonly carried out in S. N. Dental College and asked whether they require prior antibiotic prophylaxis in cardiac patients; and the third section we asked about antibiotic type, doses and alternatives (in case of allergy to primary drug) prescribed for prophylaxis.

The results of Table 2 were divided according to cardiac conditions requiring or not requiring antibiotic prophylaxis according to the AHA guidelines. The total percentages of correct, incorrect and "I don't know" responses were calculated for each condition. An average of 47.3% (34.8%-55%) of the participants clearly lacked knowledge regarding the conditions that require antibiotic prophylaxis, while 62% (48%-73.6%) provided correct answers regarding to the conditions that do not require prophylaxis.

The results of Table 3 shows that majority of response for procedure that do not require antibiotic prophylaxis were correct except for bleeding from trauma to the lips or oral mucosa question for which response was only 38% correct. 78% responded correctly to questions regarding procedures that require prophylaxis.

In third section, 66.6% (86) of the participants prescribed amoxicillin as a first-line antibiotic but in that only 37.2% (48) know correct dosage and regime of antimicrobial prophylaxis for IE.

Table 2: Participant's responses to cardiac conditions that require prophylactic antibiotics.

Cardiac conditions included in study	Response					
	Yes		No		Don't Know	
	n	Percent	n	Percent	N	Percent
Conditions that require prophylactic antibiotics according to the AHA guidelines						
Prosthetic cardiac valves	80	62%	45	34.8%	4	3.1%
Previous infective endocarditis	76	58.9%	48	37.2%	5	3.8%
Untreated cyanotic congenital heart disease	70	54.2%	58	44.9%	1	0.7%
Completely repaired CHDs with prosthetic materials or devices during the first 6 months after the procedure	69	53.5%	57	44.1%	3	2.3%
Residual defects after repair of CHDs	50	38.7%	71	55%	8	6.2%
Cardiac transplantation recipients who develop cardiac valvulopathy	62	48%	63	48.8%	4	3.1%
Conditions that do not require prophylactic antibiotics according to the AHA guidelines						
Repaired CHDs with no residual defects at the site	91	70.5%	35	27.1%	3	2.3%
Heart murmurs	95	73.6%	31	24%	3	2.3%
Patent ductus arteriosus	92	71.3%	36	27.9%	1	0.7%
Heart failure	62	48%	65	50.3%	2	1.5%

Table 3: Participant's responses to dental procedures requiring prophylactic antibiotics.

Dental procedures	Response					
	Yes		No		I don't know	
	n	Percent	n	Percent	n	Percent
Procedures that do not require antibiotic prophylaxis according to the AHA guidelines						
Bleeding from trauma to the lips or oral mucosa	50	38.7%	76	58.9%	3	2.3%
Shedding of deciduous teeth	95	73.6%	28	21.7%	6	4.6%
Dental radiography	93	72%	31	24%	5	3.8%
Supra-gingival scaling	112	86.8%	15	11.6%	2	1.5%
Root canal treatment	46	35.6%	80	62%	3	2.3%
Crown preparation	81	62.7%	42	32.5%	6	4.6%
Class II fillings	91	70.5%	32	24.8%	6	4.6%
Local anaesthetic injections	123	95.3%	4	3.1%	2	1.5%
Placement of removable prosthodontic or orthodontic appliances	105	81.3%	21	16.2%	3	2.3%
Adjustment of orthodontic appliances	93	72%	32	24.8%	4	3.1%
Placement of orthodontic brackets	82	63.5%	39	30.2%	8	6.2%
Procedures that require antibiotic prophylaxis according to the AHA guidelines						
Sub-gingival scaling	86	66.6%	33	25.5%	10	7.7%(10)
Forceps extractions	94	72.8%	32	24.8%	3	2.3%
Surgical extractions	115	89.1%	5	3.8%	9	6.9%
Implant placement	96	74.4%	25	19.3%	8	6.2%

Participants knowledge and practice regarding drug, dose and regimens for pencillin allergic patients was unsatisfactory.

DISCUSSION

Infective endocarditis continues to remain a serious disease despite advances in its recognition and treatment modalities. Antibiotic Prophylaxis is provided to prevent the development of bacterial endocarditis as a consequence of odontogenicbacteraemia.[13] Two mechanisms are thought to be responsible. First a reduction in the numbers of organisms in the blood and second a reduction in the adhesion of organisms to the non-bacterial thrombotic vegetation. So, dentists should have thorough and accurate knowledge of preventive measures. Different antibiotic prophylaxis guidelines have been followed in different countries, with the most followed international guidelines being the AHA guidelines and the National Institute of Clinical Excellence (NICE) guidelines.[6,12] The S. N. Dental College, Kalaburagi follows the AHA guidelines and ensures that all employees and students follow the same guideline. In the present study, we assessed the knowledge, attitude and practice of

antibiotic prophylaxis for IE among third, final year dental student, dental interns and PGs, who see and treat patients on a daily basis. All participants were students or interns or PGs at S. N. Dental College, Kalaburagi. The number of female participants in this study was higher (56.5% vs. 43.3%), because the number of female students in all academic years in S.N. Dental College, Kalaburagi was higher. In first section of our questionnaire, half of the participants were aware that patients with prosthetic heart valves, previous infective endocarditis, completely repaired CHDs with prosthetic materials or devices during the first 6 months after the procedure and untreated cyanotic congenital heart disease do need antibiotic prophylaxis prior to dental treatment, while only 38.7%-48% had awareness regarding the need of prophylaxis for cases of residual defects after repair of CHDs and cardiac transplantation recipients who develop cardiac valvulopathy. Two third of participants answer correct on heart murmurs, corrected CHD with no residual defect and PDA as these conditions do not need prophylaxis. While only 48% provided correct answers with regard to heart failure, probably because of revision of the old guidelines.

In second section, the majority of participants (66.6%-89.1%) correctly answered that forceps extractions, implant placement, sub-gingival scaling, and surgical extractions require antibiotic prophylaxis. However, several provided incorrect answer for root canal treatment (35.7%), possibly because of confusion regarding periapical involvement and pulp exposure.

In third section, 66% participants answer correctly about primary drug used for prophylaxis but only 37.2% of participants knew correct drug, dosage and duration of prophylaxis. Parcticipants knowledge on alternative drug for prophylaxis (in case of patient is allergic to primary drug) was very poor. According to AHA guidelines, Oral Amoxicillin 500mg, 30 to 60 min before procedure is recommended. If patient is unable to take oral, IV or IM Ampicillin 2gm, 30 to 60 mg before procedure is adviced. In case of patient allergic to pencillin, Azithromycin 500mg is recommended.[6]

Dentist must have up to date knowledge on changes made in antibiotic prophylaxis guidelines for IE and should follow the guidelines. The authors recommended that nationally standardized guidelines should be discussed and implemented across the India to ensure that all patients receive the most appropriate and acceptable treatment modalities.

The main limitation of the present study is small number of participants and these individuals may not represent all dentist. Early researches have revealed that a following of the guidelines for IE prophylaxis in cardiac patients, receiving dental treatments, may have been overlooked by dental professions, during their education.[14] This negligencein dental education is mainly due to insufficient information about patient' scardiac disease or even concerning no updates of guidelines. Giving importance to antibiotics prophylaxis for IE in dental curriculum as well as additional educational programs in the form of posters, seminars, and continuing education programs for graduates should be introduced. We suggest further clarification and education of the current antibiotic guidelines

CONCLUSION

The results of the current study shows that dental students, interns and PGs has average level of knowledge about antibiotic prophylaxis for IE. This poor knowledge may lead to the misuse of antibiotics and increased risks of the emergence of resistant strains. Although most of the participants knew about AHA IE prophylaxis guidelines, many were not up to date on the guidelines. Since IE is serious disease and has poor prognosis,100% accurate knowledge should be mandatory for all dental students, interns and PGs who deal with patients on a daily basis. Guidelines should be reinforced several times in the under-graduate years as well as during internship through continuous lectures or seminars.

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