Original Research Article Journal of College of Medical Sciences-Nepal, Vol-15, No 2, Apr-Jun 2019

ISSN: 2091-0657 (Print); 2091-0673 (Online) **Open Access**

Awareness among the Dental Students and Dental Interns of Kantipur Dental College and Hospital regarding Antibiotics Prophylaxis for Infective Endocarditis

Prenit Kumar Pokharel,[1] Shrijana Chapagain[1]
[1]Kantipur Dental College and Hospital, Basundhara, Kathmandu, Nepal.

ABSTRACT

Background: Infective Endocarditis is relatively a rare disease and is believed to be caused by the vegetative growth on the previously damaged or congenitally malformed cardiac valves or endocardium. Several factors determines that the dentist practicing prophylaxis measures, the foremost important one is the knowledge which is taught to them during dental school, which is the main reason to conduct this study to test the awareness among the dental students of Kantipur Dental College and Hospital, Kathmandu regarding the prophylaxis guideline awareness. **Methods:** BDS Third, Fourth, Fifth year students and Dental Interns of Kantipur Dental College and Hospital were asked to fill the self-answered questionnaires. The questions were divided into two parts each part containing ten questions each. The first part was to access the knowledge of participants regarding the cardiac conditions that require antibiotics prophylaxis, the second part was to access the knowledge of participants regarding the dental procedures that requires antibiotics prophylaxis. **Results:** Thirty two percentage of our participants responded that forceps extraction does not require antibiotics prophylaxis which is not true as per AHA guideline, so the participants should be taught regarding the risk of forceps extraction leading to infective endocarditis if the prophylaxis is not administered. We postulated that majority of the Dental Students and Interns have heard about AHA 2007 guideline and will follow it when necessary. **Conclusions:** The participants who are the Dental Students and Dental Interns in a Dental School at Kathmandu, Nepal will be practicing Dentistry in near future, the knowledge they acquire during their learning period will help them to prevent the Infective endocarditis among the risk population whom they will be treating in near future. Measures should be taken to prevent the incidence of Infective Endocarditis with dental origin.

Keywords: antibiotics prophylaxis; dental procedures; infective endocarditis.

INTRODUCTION

Infective Endocarditis is relatively a rare disease and is believed to be caused by the vegetative growth on the previously damaged or congenitally malformed cardiac valves or endocardium. The incidence is believed to be 10 per 100,000 population per year. With lack of research and proper documentation regarding the number of people with cardiac disease in developing country like Nepal the incidence may be higher. Infective Endocarditis is a life threatening condition with the mortality rate of 30 % even with antibiotic therapy.[1] Hoen published that half of the incidence of reported cases of Bacterial Endocarditis had no known previous cardiac diseases. This finding is significant in that it shifts the traditional belief that all bacterial endocarditis were supposed to have preexisting cardiac defects. Various studies have suggested that use of Amoxicillin will not eliminate bacteremia though it statistically reduce the incidence, nature and duration of bacteremia.[1-4] Robert et al concluded that tooth brushing twice day for a year have 154,000 times greater risk to bacteremia exposure than that of single tooth extraction.[5] Not a single data published till these date accurately demonstrate the absolute risk of infective endocarditis, from any of the specific dental procedures. Strom and colleagues reported that Dental procedures were not risk factor for Infective Endocarditis despite patient having rheumatic heart disease.[6] Any patients with underlying cardiac conditions cannot be placed under lifelong Antibiotic therapy to prevent infective Endocarditis resulting from everyday routine procedures that may cause bacteremia.[7] There is a study published correlating with preceding dental procedures and infective

Correspondence: Dr. Prenit Kumar Pokharel, Department of Oral and Maxillofacial Surgery, Kantipur Dental College and Hospital, Basundhara, Kathmandu, Nepal. Email: pokhrelprenit@gmail.com. Phone: +977-9841369202.
DOI: 10.3126/jcmsn.v15i2.22162. **Article received:** 2018-12-30. **Article accepted:** 2019-03-29.

endocarditis where the results show 10 to 20 % of patients had IE due to oral microbial flora.[8] Several factors determines the prophylactic measures practiced by dentist, the foremost important is the knowledge which is taught during Dental School. The aim of the present study was to assess the awareness regarding the prophylaxis guideline awareness among the dental students of Kantipur Dental College and Hospital, Kathmandu.

METHODS

A quantitative descriptive research approach was chosen. The proposal was submitted to Institutional Review committee on 27th December 2016 and was accepted on 30th December 2016. The study was completed three months after the ethical clearance on 15th March 2017. Population consisted of all BDS Third, Fourth, Fifth Year students and Dental Interns of Kantipur Dental College and Hospital. Convenience non- probability sampling technique was used to include 107 participants who satisfied the inclusion criteria. Data were collected through self- administered, structured questionnaires. The questionnaire was divided into two parts each containing ten questions. The first part consisted of questions regarding the knowledge on cardiac conditions that require antibiotics prophylaxis and the second part consisted of questions regarding the knowledge on the dental procedures that requires antibiotics prophylaxis. A single examiner conducted the procedure going from class to class and asking the participants to fill the form in her presence, no two participants were allowed to discuss and fill the questionnaires and to reduce the biasness consent signed paper was separated before starting the analysis of the result. There was no answer for part A from a single participant. 3 participants ticked all option in question number 10 section A. More than one option was ticked in section A question number 10 by 4 participants the combination were A&B&C , A&B&D , A&C , A&D. Similarly 2 participants ticked more than one option in section B question number7, the combination was A&C and B&C. Similarly section B question number 6, 2 participant clicked more than one option the combination was A&B. Similarly section B question number 8, 2 participant clicked more than one option the combination was A&B. 3 participants did not answered section A question number 7.

RESULTS

Quantitative and descriptive statistical analysis was used. Question number 10 of Section A could not be analyzed by this method so was only analyzed descriptively. Table 1 shows knowledge among participants regarding the cardiac conditions that require antibiotics prophylaxis and table 2 accesses the knowledge of participants regarding the dental procedures that requires antibiotics prophylaxis, 32

Table 1: Knowledge among participants regarding the cardiac conditions that require antibiotics prophylaxis

S.N	Question	No	I don't know	May be	Yes
1.	Do you think patient with prosthetic valve and those with prosthetic materials for cardiac valve require antibiotic prophylaxis	2 (1.90%)	1 (0.90%)	2 (1.90%)	102 (95.30%)
2	Do you prescribe antibiotics to patient with previous-infective endocarditis or completely repaired CHDs with prosthetic materials?	7(6.50%)	0.00%	8(7.50%)	92(86%)
3	Do you prescribe antibiotics for residual defect after repair of CHDs?	10 (9.50%)	8 (7.50%)	19(17.60%)	70 (65.40%)
4	Do you think untreated cyanotic heart disease require antibiotic prophylaxis	11 (??)	10 (9.5%)	16(??)	69(??)
5	Do you think thecardiac transplantation recepients who develop cardiac valvulopathy require antibiotic prophylaxis?	7(6.50%)	0	6(5.60%)	94(87.50%)
6	Do you think antibiotic prophylaxis is required incase of heart murmurs and heart failures?	4(37.60%)	7(6.50%)	28(26%)	32(29.90%)
7	Do you prescribe antibiotics for untreated cyanotic heart diseases?	18 (16.8%)	2(1.90%)	22(20.6%)	65(60.705)
8	According to AHA guideline, first-line antibiotic for prevention of bacterial endocarditis in dental practice is : Amoxycillin	5(4.70%)	0	2(1.90%)	100
9	The recommended regimen for antibiotic prophylaxis using amoxicillin is:	7 (6.505)	96(89.70%)	4(3.70%)	0
10	Knowledge source of antimicrobial prophylaxis for infective endocarditis				

Table 2: Assessment of knowledge of participants regarding the dental procedures that requires antibiotics prophylaxis

S.N.	Questions	NO	Don't know	May be	Yes
1	Do you prescribe antibiotics for supra-gingival scaling?	105 (98.10%)	0	2(1.90%)	0
2	Do you think antibiotic prophylaxis is required for class II fillings and in case of root canal treatment?	69 (64.60%)	0	29(27%)	9(8.40%)
3	Do you think crown preparation requires antibiotics?	98(91.60%)	1(0.9%)	7(6.60%)	1(0.90%)
4	Do you think root canal treatment requires antibiotic prophylaxis?	51(47.70%)	2 (1.90%)	38 (35.50%)	16 (14.90%)
5	Is antibiotic necessary for routine anesthetic injections through non-infected tissue and dental radiography requires antibiotic prophylaxis?	98(91.60%)	5 (4.70%)	3 (2.80%)	1(0.90%)
6	Do you prescribe antibiotics for placement, adjustment and removal of orthodontic appliances?	98(91.60%)	1(0.90%)	0	8(7.50%
7	Do you think antibiotic prophylaxis is required for forceps extraction?	32(29.90%)	0	32(29.90%)	43(40.20%)
8	Do you think dental implant placement requires antibiotic prophylaxis?	12 (11.20%)	0	30(28%)	65(60.80%)
9	Does subgingival scaling require antibiotic prophylaxis?	23(21.50%)	2(1.90%)	32(29.90%)	50(46.70%)
10	Do you think antibiotic prophylaxis is required for surgical extractions?	12(11.20%)	0	13(12.10%)	82(76.70%)

(29.9%) of our participants responded that forceps extraction does not require antibiotics prophylaxis which is not true as per AHA guideline, so the participants should be taught regarding the risk of forceps extraction leading to infective endocarditis if the prophylaxis is not administered.

DISCUSSION

In the early days RHD was the most common cause believed to be associated with Infective Endocarditis and still today RHD prevalence is high in developing countries.[9] As Nepal is a developing country correlation of RHD with Infective Endocarditis cannot be ignored. Dentists of developing countries need to be more aware regarding this subject. Henceforth our study is first of its kind in Nepalis an attempt to make the future dentist of Nepal understand the importance of infective endocarditis and the role they can play to prevent it. The results of our study is promising regarding the knowledge about antibiotics prophylaxis to be administer before dental treatments to prevent Infective endocarditis among the dental Students of a school in Kathmandu Valley of Nepal. Similar studies should be conducted in all the dental school of the country so that the awareness among the dental students who are the future dentists working in Nepal be assessed. 100 percent of the participants agreed that Amoxicillin is the first line of antibiotics used for the prophylaxis against Infective endocarditis. However, 6.5 % of the participants in our study answered that they use 1gm of Amoxicillin per oral 2 hour before the procedure and 3.7% of the participants answered that they use 3 gm of Amoxicillin per oral 1 hour before the procedure which is not according to AHA 2014 guidelines. Our results shows that most of the participants are still following the AHA 2007 guideline, as our participants are students and most of them reported that they got the knowledge through lectures and discussion in the class the onus falls on the teachers to update themselves and teach about AHA 2014 guidelines. 95.3 percentage of our participants responded that they will prescribe antibiotics prophylaxis for the patients with prosthetic heart valve which is as per the norms of AHA 2014 guideline. Also,98.3% of our participants responded that there is no requirement for antibiotic prophylaxis during crown preparation which is correct as per AHA 2014 guidelines. 35.5% of the participants were confused regarding the administration of antibiotics prophylaxis during root canal treatment, as root canal treatment results in extirpation of the pulp which is highly vascular connective tissue antibiotic prophylaxis is needed as per AHA guideline 2014.[1] Also, 32% of our participants responded that forceps extraction does not require antibiotics prophylaxis which is not true as per AHA guideline, so the participants should be taught regarding the risk of forceps extraction leading to infective endocarditis if the prophylaxis is not administered. The conclusion from the study conducted by Steckelberg and Wilson[6] and many others was that patients with underlying cardiac conditions have in their life time high chances of acquiring IE compared to the patients who have no underlying Cardiac conditions.[10] Endocarditis during preantibiotic era was a well-known fatal condition, with the development of newer generation of antimicrobial agents and prompt diagnosis and aggressive treatment the mortality

and morbidity of endocarditis has come down. Antibiotics that are used as prophylaxis should be administered in a single dose before the procedure.

The procedures and events that do not need prophylaxis are routine anesthetic injections through non infected tissue, taking dental radiographs, placement of removable prosthodontic or orthodontic appliances, adjustment of orthodontic appliances, placement of orthodontic brackets, shedding of deciduous teeth, and bleeding from trauma to the lips or oral mucosa.[1] Differing from Previous AHA guidelines regarding Antibiotics prophylaxis the present committee does not recommend Antibiotics prophylaxis in order to prevent risk of life time acquisition of Infective Endocarditis.[1] Even though the use of antibiotics prophylaxis to prevent Infective Endocarditis are for limited conditions the prophylaxis is being given empirically.[11] Okell and Elliott were the first scientists to observe 61 % of bacteremia in patients after 5 minutes completing tooth extraction under general anesthesia.11 Fiehn et all in 1995 first time demonstrated the oral microorganisms origin in the patients with Infective Endocarditis in two cases.[12] National Institute for Health and Clinical Excellence (NICE) surprised the clinicians all over the world by proposing the guidelines that recommended the cessation of antibiotics prophylaxis prior to any kind of dental procedure.[13] Two years after the introduction of NICE principle in UK there was found to be 78 % reduction in prescription of Penicillin drug and there was no reported increase in incidence of new cases and death due to Infective endocarditis.[13] A questionnaire based survey done by Dayeret all in UK after the introduction of NICE guideline found out that large number of Dental Surgeons believed that patients with Prosthetic Heart valve (25%) and previous history of IE (38%) should be prescribed with antibiotics prophylaxis.[14] They concluded that despite of introduction of NICE guidelines many patients believed to be at higher risks were receiving prophylaxis antibiotics. The risk of developing Infective endocarditis following dental procedures in the high risk individuals is more or less 10 per 10,700 cases.15Ni Riordain and McCreary did survey among the Dental Surgeons and Cardiologists in Ireland regarding the practice of NICE guidelines. Among 290 Dental Surgeons who participated in the survey 43 % of them replied the guidance was positive.[16] Ellervall et all in Sweden did the systematic review of the literature and concluded that there is lack of evidence to support that antibiotics prophylaxis is required in patients requiring dental treatment with cardiac conditions to prevent further complications.[17] AHA is recognized worldwide as major Authority and their recommendations are followed internationally and Nepal cannot be exceptional. Huei Jinn et al conducted a research in Singapore to find out the antibiotic prophylaxis prescription practice among Dental Practitioners of Singapore where there was no prior data available regarding the number of practitioners who prescribed prophylaxis, Among 458 dentists who took part in the study they found out that majority of them (39.8%) followed AHA guidelines and 30.2% followed cardiologist advice.[18] Lockhart PB suggested that maintaining oral health hygiene with prophylaxis before invasive dental procedure is more beneficial than antibiotic prophylaxis.[19] We postulated that majority of the Dental Students and Interns have heard about AHA 2007 guideline and will follow it when necessary. All Dental Students of BDS 3rd 4th and 5th year and Dental Interns of KDCH were given self-administered questionnaires, the questionnaires were divided into three parts for the purpose to access their knowledge about cardiac diseases requiring prophylaxis, dental procedures requiring prophylaxis and antibiotic regimen for endocarditis prophylaxis. Staphylococcus are highly invasive and thought to be involved in acute infective endocarditis which invade the healthy cardiac valve and unlike subacute form does not require pre-existing platelet-fibrin vegetation or a susceptible host. Eskandari A et al did the questionnaire based study to assess the knowledge among the General Dental Practitioner of Tabriz, Iran and found that the knowledge to be moderate so they recommended that the subject to be incorporated in dental school curriculum and be more of Continue dental education topic.[20] The fibrin that is collected in the exposed collagen due to the damage of the dysfunctional valve caused by turbulent blood flow protects the bacteria from leukocytes phagocytosis.[21] There are clinically two types of Endocarditis they are acute and subacute which describes the clinical progression of the disease. Streptococcus is the main bacteria found in subacute type which is most commonly associated with the dental procedures leading the Infective Endocarditis where as the Staphylococcus aureus is mainly associated with acute bacterial endocarditis and does not require vegetative growth in the valve.[22] Americal Heart Association first made public the antibiotics prophylaxis for prevention of Infective Endocarditis before dental procedures in 1960.[21] The prophylactic regimen helps to reduce the number of bacteria in blood after the dental procedure, helps the body defense mechanism to

fight against this bacteria and maintain that less number of bacteria reach the injured valves and vegetations.[23] SA Thompson et all after conducting the study among the Dentist of Wales regarding the antibiotic prophylaxis for cardiac patients concluded that there is always the potential for over and under prescription of antibiotics prophylaxis under the current guidelines and there still lies the confusion regarding the procedure that requires prophylaxis.[24] Only in the year 1995 two cases of endocarditis was correlated with oral origin of bacteria.25 Nomura et al isolated and characterized streptococcus mutans from the dental plaque specimen and heart valve of a patient with Bacterial endocarditis.[26] Thorntan et al and Tomas et al found that 75 % of bacterial endocarditis with oral origin were associated with streptococcus viridans.[27,28] Marrie et al postulated that bacteria trapped within thrombus if gets resistance to thrombocidin results in numbers of tightly packed micro colonies of the bacteria.[29] Heiro et al conducted cohort studies with other researchers and postulated that bacterial endocarditis causes 12 – 16 % of mortality.30 Fiehn et al for the first time used the molecular biological technique to demonstrate the oral origin of bacterial endocarditis in two cases.[31] Nomura et al used broad range polymerase DNA chain reaction technique at the heart valve to sequence the DNA strand and compared it with the DNA sequence of plaque specimen from a patient who was diagnosed as bacterial endocarditis and hence was able to isolate Streptococcus mutans.[32] The structured questions were designed after thoroughly going through literatures and different articles.[1,2,17,18,20,24] In the first section we tried to assess the knowledge of the participants regarding the cardiac conditions that requires antibiotic prophylaxis, the second section was to assess the knowledge of participants regarding the dental procedures that require antibiotics prophylaxis. Each section carried 10 questions each. Participants were BDS 3rd, 4th,5th year students and Dental Interns of Kantipur Dental College and Hospital. Ethical approval was taken for the study from the Ethical committee of the Dental College affiliated to the Kathmandu University. After the cessation of Antibiotic prophylaxis following the NICE guidelines Dayer et all noticed the significant increase in incidence of IE at England (0.11 cases per 10 million people per month).[33] Working in clinical practice and defending the scientific evidence is different, Clinicians who are into clinical practice find difficult at many instances to defend the scientific evidences, patients awareness and attitude does matter in many circumstances especially for Clinician practicing at developing Nations. There is wide agreement among many health workers regarding the efficacy of Amoxicillin as prophylaxis medicine to prevent bacteremia which will help to reduce the incidence of Infective endocarditis before dental procedures.[34] Dental Professionals are among the leading professionals who prescribe antibiotics routinely in general practice and prophylactically.[35] Though associated with high chances of morbidity and mortality infective endocarditis does not necessarily be associated with Dental treatment36and it has been found that antibiotics prophylaxis has not been successful in reducing the incidence of bacterial endocarditis.[37] Antibiotics prophylaxis necessarily does not prevent incidence of infective endocarditis among the patients visiting Dental clinic, there has been reported evidence that only 5.3 % of cases of infective endocarditis will be prevented by the prophylaxis antibiotics rendered at the Dental Clinic.[38] The antibiotics prophylaxis to prevent Infective endocarditis should not be made common practice and slowly should be stopped is being suggested by variousauthors.[39] Practitioners Dentist should be updated and must have sound knowledge regarding the change in prophylaxis guideline and current trends that are being used. Although we asked respondent not to consult with each other and take help from other media during answering we cannot assure that they did not did that. Studies reveals that still large number of dentist prescribed the antibiotics prophylaxis according to AHA guideline which was formulated earlier that 1990.[40] Strom et al conducted case control studies based on population and concluded that antibiotics prophylaxis is required for only two group of population, those with previous history of infective endocarditis and those with prosthetic heart valves, they further concluded that teeth extractions, gingival surgeries and removal of impacted teeth only redeem the prophylaxis antibiotics.[41,42]

CONCLUSIONS

The participants who are the Dental Students and Dental Interns in a Dental School at Kathmandu, Nepal will be practicing Dentistry in near future, the knowledge they acquire during their learning period will help them to prevent the Infective endocarditis among the risk population whom they will be treating in near future. This is the first of its kind of study, for the developing country like Nepal, where many non-communicable diseases like Infective Endocarditis goes without report, hence such study is valuable one. Similar studies in all the Dental Schools of Nepal and among the

Dental practitioners will be a useful measure to prevent the incidence of Infective Endocarditis with dental origin.

Conflict of Interest : Nil

REFERENCES

1. Oliver R, Roberts GJ, Hooper L, Worthington HV. Antibiotics for the prophylaxis of bacterial endocarditis in dentistry. Cochrane Database Syst Rev. 2008 Jan 1;4.doi: 10.1002/14651858.CD003813.pub3.
2. Lockhart PB. An analysis of bacteremias during dental extractions: a double-blind, placebo-controlled study of chlorhexidine. Arch InternMed.
3. Lockhart PB, Brennan MT, Kent ML, Norton HJ, Weinrib DA. Impact of amoxicillin prophylaxis on the incidence, nature, and duration of bacteremia in children after intubation and dental procedures. Circulation. 2004;109:2878 –2884.DOI: 10.1161/01.CIR.0000129303.90488.29
4. Roberts GJ, Radford P, Holt R. Prophylaxis of dental bacteraemia with oral amoxycillin in children. Br Dent J. 1987;162:179 –182. doi: 10.1136/hrt.2004.046581
5. Roberts GJ. Dentists are innocent! "Everyday" bacteremia is the realculprit: a review and assessment of the evidence that dental surgical procedures are a principal cause of bacterial endocarditis in children.Pediatr Cardiol. 1999;20:317–325.
6. Strom BL, Abrutyn E, Berlin JA, Kinman JL, Feldman RS, Stolley PD, Levison ME, Korzeniowski OM, Kaye D. Dental and cardiac risk factors for infective endocarditis: a population-based, case-control study. AnnIntern Med. 1998;129:761–769.
7. Lockhart PB, Brennan MT, Fox PC, Norton HJ, Jernigan DB, Strausbaugh LJ. Decision-making on the use of antimicrobial prophylaxis for dental procedures: a survey of infectious disease consultants and review. Clin Infect Dis. 2002;34:1621–1626.
8. Van der Meer JT, Thompson J, Valkenburg HA, Michel MF. Epidemiology of bacterial endocarditis in The Netherlands, II: antecedent procedures and use of prophylaxis. Arch Intern Med. 1992;152:1869 –1873.
9. Tleyjeh IM, Steckelberg JM, Murad HS, Anavekar NS, Ghomrawi HM, Mirzoyev Z, Moustafa SE, Hoskin TL, Mandrekar JN, Wilson WR, Baddour LM. Temporal trends in infective endocarditis: a population-based study in Olmsted County, Minnesota. JAMA. 2005;293:3022–3028.
10. Pallasch TJ, Wahl MJ. Focal infection: new age or ancient history? Endodontic Topics. 2003;4:32– 45.
11. Diz Dios P. Infective endocarditis prophylaxis. Oral diseases. 2014 May;20(4):325-8.
12. Fiehn NE, Gutschik E, Larsen T, Bangsborg JM (1995). Identity of streptococcal blood isolates and oral isolates from two patients with infective endocarditis. J Clin Microbiol 33: 1399–1401.
13. National Institute for Health and Clinical Excellence (2008). Prophylaxis against infective endocarditis. Antimicrobial prophylaxis against infective endocarditis in adults and children undergoing interventional procedures. URL: 'http://www.nice.org.uk/ CG064
14. Dayer MJ, Chambers JB, Prendergast B, Sandoe JA, Thornhill MH. NICE guidance on antibiotic prophylaxis to prevent infective endocarditis: a survey of clinicians' attitudes. QJM: An International Journal of Medicine. 2013 Jan 3;106(3):237-43.
15. Duval X, Alla F, Hoen B, Danielou F, Larrieu S, Delahaye F, et al. Estimated risk of endocarditis in adults with predisposing cardiac conditions undergoing dental procedures with or without antibiotic prophylaxis. Clin Infect Dis 2006;42:e102–7.
16. Ríordáin RN, McCreary C. NICE guideline on antibiotic prophylaxis against infective endocarditis: attitudes to the guideline and implications for dental practice in Ireland. British dental journal. 2009 Mar;206(6):E11.
17. Ellervall E, Vinge E, Rohlin M, Knutsson K. Antibiotic prophylaxis in oral healthcare–the agreement between Swedish recommendations and evidence. British dental journal. 2010 Feb;208(3):E5.
18. Huei Jinn Tong, Shijia Hu, Betty Yuen Yue Mok, Intekhab Islam and Catherine Hsu Ling Hong, Antibiotic prophylaxis prescribing practices of dentists in Singapore. International Dental Journal 2014; 64: 108–114
19. Lockhart PB. Antibiotic prophylaxis for dental procedures: are we drilling in the wrong direction? Circulation 2012 126:11–12.
20. Eskandari A, Abolfazli N, Lafzi A. Endocarditis prophylaxis in cardiac patients: Knowledge among general dental practitioners in Tabriz. Journal of dental research, dental clinics, dental prospects. 2008;2(1):15.
21. Peterson LJ, Happ JR, Ellis E, Tucker MR.

Textbook of Oral and Maxillofacial Surgery, 6th ed.St. Louis: Mosby; 2002:412-16.
22. Goldman L, Ausiello D. Cecil Textbook of Medicine, 22nd ed. Philadelphia: WB Saunders;2004:958-967.
23. Karchmer AW. Infective Endocarditis, 15th ed. New York: McGraw-Hill; 2001:809-810.
24. Thompson SA, Davies J, Allen M, Hunter ML, Oliver SJ, Bryant ST, Uzun O. Cardiac risk factors for dental procedures: knowledge among dental practitioners in Wales. British dental journal. 2007 Nov;203(10):E21.
25. Fiehn NE, Gutschik E, Larsen T, Bangsborg JM (1995). Identity of streptococcal blood isolates and oral isolates from two patients with infective endocarditis. J Clin Microbiol 33:1399-1401.
26. Nomura R, Nakano K, Nemoto H, Fujita K, Inagaki S, Takahashi T, et al.(2006). Isolation and characterization of Streptococcus mutans in heartvalve and dental plaque specimens from a patient with infectiveendocarditis. J Med Microbiol 55:1135-1140.
27. Thornton JB, Alves JCM (1981). Bacterial endocarditis: a retrospective study of cases admitted to the University of Alabama hospitals from 1969 to 1979. Oral Surg Oral Med Oral Pathol 52:379-383.
28. Tomas I, Diz P, Limeres J, Gonzalez A, Martinez C, Castro A (2002). An update on infective endocarditis of dental origin. J Dent 30:37-40.
29. Marrie TJ, Cooper JH, Costerton JW. Ultrastructure of cardiac bacterial vegetations on native valves with emphasis on alterations in bacterial morphology following antibiotic treatment. Can J Cardiol 1987;3:275-280.
30. Heiro M, Helenius H, Makila S, Hohenthal U, Savunen T, Engblom E, et al.(2006). Infective endocarditis in a Finnish teaching hospital: a study on326 episodes treated during 1980-2004. Heart 92:1457-1462.
31. Fiehn NE, Gutschik E, Larsen T, Bangsborg JM (1995). Identity of streptococcal blood isolates and oral isolates from two patients with infective endocarditis. J Clin Microbiol 33:1399-1401.
32. Nomura R, Nakano K, Nemoto H, Fujita K, Inagaki S, Takahashi T, et al.(2006). Isolation and characterization of Streptococcus mutans in heartvalve and dental plaque specimens from a patient with infectiveendocarditis. J Med Microbiol 55:1135-1140.
33. Dayer MJ, Jones S, Prendergast B, et al. Incidence of infective endocarditis in England, 2000-13: a secular trend, interrupted timeseries analysis. Lancet. 2014;385:1219–1228.
34. Tomás Carmona, P. Diz Dios, and C. Scully, Efficacy of Antibiotic Prophylactic Regimens for thePrevention of Bacterial Endocarditis of Oral Origin, J Dent Res 86(12):1142-1159, 2007
35. Tong DC, Rothwell BR. Antibiotic prophylaxis in dentistry: a review and practice recommendations. J Am Dent Assoc 2000; 131 (6):366–74.
36. Epstein JB. Infective endocarditis and dentistry: outcome-based research. J Can Dent Assoc 1999; 65(2):95–6.
37. Agha Z, Lofgren RP, VanRuiswyk JV. Is antibiotic prophylaxis for bacterial endocarditis cost-effective? Med Decis Making 2005; 25 (3):308–20.
38. van der Meer JT, Thompson J, Valkenburg HA, Michel MF. Epidemiology of bacterial infective endocarditis in The Netherlands. II. Antecedent procedures and use of prophylaxis. Arch Intern Med 1992; 152(9):1869–73.
39. Pallasch TJ. Antibiotic prophylaxis: problems in paradise. Dent Clin North Am 2003; 47 (4):665–79.
40. Dajani AS, Bisno AL, Chung KJ, Durack DT, Freed M, Gerber MA,and others. Prevention of bacterial endocarditis. Recommendations by the American Heart Association. JAMA 1990; 264(22):2919–22.
41. Strom BL, Abrutyn E, Berlin JA, et al. Dental and cardiac risk factors for infective endocarditis. Ann Int Med 1998;129:761– 9.
42. Durack DT. Antibiotics for prevention of endocarditis during dentistry: time to scale back? Ann Int Med1998;129:829–31.

Citation: Pokharel PK, Chapagain S. Awareness Among the Dental Students and Dental Interns of Kantipur Dental College and Hospital regarding Antibiotics prophylaxis for infective Endocarditis. JCMS Nepal. 2019; 15(2):112-8.