Knowledge and Attitudes of Dental Students in Prescribing Antibiotics for Pediatric Dental Patients in Bhubaneswar City, Odisha: A Cross-Sectional Study

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Abstract

Background: Antibiotics are the most widely prescribed therapeutic agents in dentistry, hence it represents an important aspect of dental practice. The inept use of antibiotics for the treatment of dental infections in children is a leading cause of developing microbial resistance.

Objective: The objective of this study is to investigate the knowledge & attitudes of a group of dental students when prescribing antibiotics during the treatment of pediatric dental patients.

Method: This is a questionnaire-based cross-sectional study conducted in a group of 300 dental students from various dental colleges of Bhubaneswar city, Odisha. The questionnaire consisted of close-ended questions, structured under three main headings. Data collected were analyzed using SPSS statistics version 24.

Results: The prime findings were that amoxicillin is the most commonly prescribed antibiotic, most students had not received training on antibiotic prescribing and had treated more than 10 child patients per week & their concordance with guidelines on antibiotic prescribing was generally low.

Conclusion: This cross-sectional study shows there is a need to improve the knowledge on antibiotic prescribing for children.

Keywords: *Dental education, dental students. pediatric antibiotics, antibiotic prophylaxis, antibiotic resistance.*

Introduction

Antibiotics are the most extensively prescribed 'therapeutic & prophylactic' agents in dentistry, hence it represent an important aspect of dental practice.[1,2,3] Prophylactic antibiotics are used for the prevention of diseases caused by a number of the oral microflora, mostly in the case of endocarditis prevention.[4] Therapeutic antibiotics are used for the hard & soft tissue diseases in the oral cavity when local debridement is unsuccessful.[5] Antibiotics in dentistry are generally prescribed for surgical,endodontic & periodontal manifestations. The inept use of antibiotic in treating children has been observed in the treatment of dental infections, is a leading cause in developing microbial resistance.[6-9] "Dr. Thomas J. Pallasch, stated in his study that antibiotic misuse in dentistry mainly involves prescribing them in 'inappropriate situations' or for too long, which includes-giving antibiotics after a dental procedure is complete in an otherwise healthy patient

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to 'prevent' an infection, which in all likelihood will not occur".[10] So to avoid any unwanted complications, dental practitioners often prescribe the antibiotics.[11] This has led to developing microbial resistance, which is a serious health issue concern.

And this is a growing major health problem that contributes to treatment failure and development of antibiotic resistance by an individual.[12-15]

Method

This is a questionnaire-based study conducted in a group of 300 dental students from various dental colleges of Bhubaneswar city, Odisha to know the knowledge & attitudes of dental students in prescribing antibiotics for pediatric dental patients. A structured pre-prepared questionnaire was distributed to all participants via email (using google forms). The questionnaire consisted of close-ended questions & open-ended questions, structured under 3main headings are as follows:

1. Details about dental student participants based on their gender & qualification.
2. General knowledge about antibiotics prescription in pediatric dentistry.
3. Knowledge of dental student participants on prescribing antibiotics for various clinical situations.

Statistical Analysis: Data collected under the study was scrutinized, codified and entered into the IBM SPSS Statistics, 24.0 software, for analysis. The following statistics procedure was used for the analysis of data. There were 10 different questions canvassed to the respondents. The association of response with gender, qualification and training was studied using the Chi-square test of independence. The significant p-value was <0.05.

Results

In this cross-sectional study of knowledge and attitude of 300 dental final year and interns for prescribing antibiotic during the treatment of pediatric dental patients, 148 (49.3%) were BDS final year students and 152 (50.7%) BDS interns, of which 110 (36.6%) were males and 190 (63.4%) females. Besides the sample has 36 (12%) students who have taken any course/training in antibiotics in the past 2 years. The response of the sample students have been analyzed for association with gender, qualification (interns or final year students) and training on antibiotics.

Table 1 revealed that 117 (39.0%) update their knowledge about antibiotics through textbooks, only 44 (14.7%) through online resources and a maximum of 139 (46.3%) through both textbooks & online resources. The majority of the sample students i.e. 182 (60.7%) practiced more than or equal to 10 therapeutic antibiotic prescriptions per week and the remaining 39.3% practiced less than 10 prescriptions per week. The most commonly prescribed antibiotic for the treatment of pediatric dental patients was a combination of Amoxycillin + Clavulanic acid as stated by 82.3% of the students followed by Amoxycillin (7.0%). About 81% of students stated that the most common number of daily dose prescribed was BID while 16.7% of students stated that to be TID. About 2/3rd students said that the duration of antibiotics should be for 5 days, while 17.3 stated it to be 3 days and 16.7% said it to be for more than 5 days. Little above 2/3rd of sample students (68.7%) viewed that the most favourable antibiotic for penicillin-sensitive patients was Erythromycin while 31.3% preferred to Clindamycin. All the sample students preferred that the most common route of antibiotic administration was "Oral". About 77% of students preferred to see the patients before prescribing antibiotics for dental pain. About 3/4th students opined that they would prefer to prescribe antibiotics in carious primary tooth for pain, localized swelling after evidence of radiographic pathology. In the case of deep caries in primary teeth half of the students (50%) prefer antibiotics for pain, draining fistula, localized swelling only after the radiographic evidence confirmation(p=0.001).

Table 1 further revealed that the source of updating the knowledge has a significantly higher proportion of male students who are using both the sources to update the knowledge of antibiotics (p= 0.010). As regards most commonly prescribed antibiotic- 9.1% male stated three-drug therapy & 3.1% female stated so, a number of daily doses – TID Male 25.5% and female 11.6%, duration in days- 5 days 57.3% males & 71.1% females., most favorable penicillin-sensitive antibiotic- male: erythromycin- 60% & clindamycin- 40% for female the proportions were 73.7% & 26.3% respectively, preferring to see patients before prescribing antibiotics for dental pain- male 62.7% & female 85.3% and preferring to prescribe an antibiotic in the carious primary tooth for pain, localized swelling with evidence of radiographic pathology- male 60% & female 84.2% have a significant association with gender (p<0.05).

Table 2 revealed that the source of updating the knowledge- interns have significantly higher proportion who are using both the sources to update the knowledge of antibiotic (p= 0.000). As regards number of daily dose – Interns: BID-94.7%,TID-3.9%, BDS final year student: BID-66.9%,TID-29.7%, duration in days- BDS final year - 5 days 54.1%, 3 days 21.6%, the corresponding proportion for interns were 77.6% & 13.2% respectively, and most favourable penicillin-sensitive antibiotic- BDS final year: erythromycin 60.8% & clindamycin 39.2% for Interns the proportions were 76.3% & 23.7% respectively, have significant association with qualification (p<0.05).

Table 3 revealed that the students who have received training in antibiotics in the past 2 years mostly refer to the textbook (66.7%) while students without training refer to both textbooks and online resources for updating the knowledge about the use of antibiotics (p=0.000). Students with training prescribed single drugs like Amoxicillin (44.4%) and a combination of drugs Amoxicillin+Clavulanic acid (50.0%) but students without training mostly prescribed combination drugs Amoxicillin+Clavulanic acid (86.7%) (p=0.000). Students with training never have prescribed TID while (18.9%) students without training have prescribed TID (p=0.000). Students with training usually prescribed antibiotics either for 3 days (58.3%) or 5 days (41.7%) and none prescribed for more than 5 days. However (18.9%) students without training prescribed antibioticsfor more than 5 days (p=0.000). All the students with training prescribed Erythromycin while (64.4%) students without training prescribed Erythromycin while (35.6%) prescribed Clindamycin (p=0.000). All the students with training prefer to see patients before prescribing antibiotics for dental pain while (26.1%) students without training did not prefer to see before prescribing antibiotics (p=0.000). All the students with training prefer to prescribe antibiotics in carious primary tooth for pain, localized swelling with evidence of radiographic pathology while (72.0%) of students without training prefer to do so (p=0.000).In the absence of fever, 41.7 % of students with training prefer to prescribe antibiotics in deep carious primary tooth for pain, draining fistula, localized swelling without confirming with a radiograph (p=0.000).

Table 1: Association of Response to different questions with gender

Questions/Response	Gender		Total	c2, p
	Male	Female		
	No. (%)	No. (%)	No. (%)	
Updating knowledge about the use of antibiotics in paediatric dentistry?				
Text book	39(35.5)	78(41.1)	117(39)	c2=9.311 p=0.010
Online resources	9(8.2)	35(18.4)	44(14.7)	
Both of the above	62(56.4)	77(40.5)	139(46.3)	
No. of therapeutic antibiotic prescriptions per week				
Less than 10	48(43.6)	70(36.8)	118(39.3)	c2=1.348 p=0.246
More than 10	62(56.4)	120(63.2)	182(60.7)	
Most commonly prescribed antibiotic				
Amoxicillin	0(0)	21(11.1)	21(7)	c2=18.156 p=0.001
Metronidazole	2(1.8)	3(1.6)	5(1.7)	
Amoxicillin +Clavulanic acid	92(83.6)	155(81.6)	247(82.3)	
Amoxicillin +Metronidazole	6(5.5)	4(2.1)	10(3.3)	
Amoxicillin+ Clavulanic acid + Metronidazole	10(9.1)	7(3.7)	17(5.7)	
Number of daily dose				
Once	0(0)	7(3.7)	7(2.3)	c2=12.994 p=0.002
BID	82(74.5)	161(84.7)	243(81)	
TID	28(25.5)	22(11.6)	50(16.7)	

Questions/Response	Gender		Total	c2, p
	Male	Female		
	No. (%)	No. (%)	No. (%)	
Duration in days				
3 days	20(18.2)	32(16.8)	52(17.3)	c2=8.545 p=0.014
5 days	63(57.3)	135(71.1)	198(66)	
More than 5 days	27(24.5)	23(12.1)	50(16.7)	
Most favourable antibiotic for penicillin-sensitive patients?				
Erythromycin	66(60)	140(73.7)	206(68.7)	c2=6.063 p=0.014
Clindamycin	44(40)	50(26.3)	94(31.3)	
Most common route of antibiotic administration preferred				
Oral	110(100)	190(100)	300(100)	*
Intravenous	0(0)	0(0)	0(0)	
Preferring to see patients before prescribing antibiotics for dental pain?				
Yes	69(62.7)	162(85.3)	231(77)	c2=19.978 p=0.000
No	41(37.3)	28(14.7)	69(23)	
Do you prefer to prescribe antibiotic in carious primary tooth for pain, localized swelling with evidence of radiographic pathology				
Yes	66(60)	160(84.2)	226(75.3)	c2=21.975 p=0.000
No	44(40)	30(15.8)	74(24.7)	
Prefer to prescribe antibiotics for deep caries in primary teeth along with draining fistula with no fever?				
Pain with draining fistula only	0(0)	17(8.9)	17(5.7)	c2=15.652 p=0.001
Pain, draining fistula & local swelling without radiographic evidence	18(16.4)	15(7.9)	33(11)	
Pain, draining fistula & local swelling with radiographic evidence	51(46.4)	99(52.1)	150(50)	
Pain, draining fistula & facial swelling with radiographic evidence	41(37.3)	59(31.1)	100(33.3)	
Total	**110(100)**	**190(100)**	**300(100)**	

Table 2: Association of Response to different questions with Qualification

Questions/Response	Qualification		c2, p
	BDS Final Year	Interns	
	No. (%)	No. (%)	
How you updated your knowledge about the use of antibiotics in pediatric dentistry?			
Textbook	87(58.8)	30(19.7)	c2=51.463 p=0.000
Online resources	20(13.5)	24(15.8)	
Both of the above	41(27.7)	98(64.5)	
No. of therapeutic antibiotic prescriptions per week in pediatric dental patients			
Less than 10	61(41.2)	57(37.5)	c2=0.434 p=0.510
More than 10	87(58.8)	95(62.5)	

Questions/Response	Qualification		c2, p
	BDS Final Year	Interns	
	No. (%)	No. (%)	
Most commonly prescribed antibiotic			
Amoxicillin	12(8.1)	9(5.9)	c2=2.547 p=0.636
Metronidazole	3(2)	2(1.3)	
Amoxicillin +Clavulanic acid	121(81.8)	126(82.9)	
Amoxicillin +Metronidazole	6(4.1)	4(2.6)	
Amoxicillin+ Clavulanic acid+ Metronidazole	6(4.1)	11(7.2)	
No of daily dose			
Once	5(3.4)	2(1.3)	c2=38.453 p=0.000
BID	99(66.9)	144(94.7)	
TID	44(29.7)	6(3.9)	
Duration in days			
3 days	32(21.6)	20(13.2)	c2=19.692 p=0.000
5 days	80(54.1)	118(77.6)	
more than 5 days	36(24.3)	14(9.2)	
Most favourable antibiotic for penicillin-sensitive patients			
Erythromycin	90(60.8)	116(76.3)	c2=8.379 p=0.004
Clindamycin	58(39.2)	36(23.7)	
Most common route of antibiotic administration preferred by you			
Oral	148(100)	152(100)	*
Intravenous	0(0)	0(0)	
Preferring to see patients before prescribing antibiotics for dental pain			
Yes	111(75)	120(78.9)	c2=0.660 p=0.417
No	37(25)	32(21.1)	
Prefer to prescribe antibiotic in carious primary tooth for pain, localized swelling with evidence of radiographic pathology			
Yes	111(75)	115(75.7)	c2=0.017 p=0.895
No	37(25)	37(24.3)	
Would you prefer to prescribe antibiotics for deep caries in primary teeth along with draining fistula with no fever?			
Pain with draining fistula only	3(2)	14(9.2)	c2=27.129 p=0.000
Pain, draining fistula & local swelling without radiographic evidence	18(12.2)	15(9.9)	
Pain, draining fistula & local swelling with radiographic evidence	59(39.9)	91(59.9)	
Pain, draining fistula & facial swelling with radiographic evidence	68(45.9)	32(21.1)	
Total	**148(100)**	**152(100)**	

Table 3: Association of Response to different questions with Training

Questions/Response	Any courses/training in antibiotics in the past 2 years?		c2, p
	Yes	No	
	No. (%)	No. (%)	
How you updated your knowledge about the use of antibiotics in paediatric dentistry?			
Textbook	24(66.7)	93(35.2)	c2=27.506 p=0.000
Online resources	10(27.8)	34(12.9)	
Both of the above	2(5.6)	137(51.9)	

Questions/Response	Any courses/training in antibiotics in the past 2 years?		c2, p
	Yes	No	
	No. (%)	No. (%)	
No. of therapeutic antibiotic prescriptions per week in pediatric dental patients?			
Less than 10	34(94.4)	84(31.8)	c2=52.070 p=0.000
More than 10	2(5.6)	180(68.2)	
Most commonly prescribed antibiotic			
Amoxicillin	16(44.4)	5(1.9)	c2=94.529 p=0.000
Metronidazole	2(5.6)	3(1.1)	
Amoxicillin +Clavulanic acid	18(50)	229(86.7)	
Amoxicillin +Metronidazole	0(0)	10(3.8)	
Amoxicillin+ Clavulanic acid+ Metronidazole	0(0)	17(6.4)	
No of daily dose			
Once	6(16.7)	1(0.4)	c2=42.865 p=0.000
BID	30(83.3)	213(80.7)	
TID	0(0)	50(18.9)	
Duration in days			
3 days	21(58.3)	31(11.7)	c2=50.162 p=0.000
5 days	15(41.7)	183(69.3)	
More than 5 days	0(0)	50(18.9)	
Most favourable antibiotic for penicillin-sensitive patients?			
Erythromycin	36(100)	170(64.4)	c2=18.667 p=0.000
Clindamycin	0(0)	94(35.6)	
Most common route of antibiotic administration preferred by you			
Oral	36(100)	264(100)	*
Intravenous	0(0)	0(0)	
Would you prefer to see patients before prescribing antibiotics for dental pain?			
Yes	36(100)	195(73.9)	c2=12.220 p=0.000
No	0(0)	69(26.1)	
Do you prefer to prescribe antibiotic in carious primary tooth for pain, localized swelling with evidence of radiographic pathology			
Yes	36(100)	190(72)	c2=13.395 p=0.000
No	0(0)	74(28)	
Would you prefer to prescribe antibiotics for deep caries in primary teeth along with draining fistula with no fever?			
Pain with draining fistula only	9(25)	8(3)	c2=77.868 p=0.000
Pain, draining fistula & local swelling without radiographic evidence	15(41.7)	18(6.8)	
Pain, draining fistula & local swelling with radiographic evidence	12(33.3)	138(52.3)	
Pain, draining fistula & facial swelling with radiographic evidence	0(0)	100(37.9)	
Total	**36(100)**	**264(100)**	

Discussion

"Amoxicillin is the preferred 1st choice antibiotic for treatment of dental infections in children".[16,17] Combination of amoxicillin-clavulanic acid can also be used, as it has activity against the beta-lactamase.[18] But in this study, the majority of participants preferred amoxicillin-clavulanic acid followed by amoxicillin. Also a significant proportion of prescribes combination antibiotics like amoxicillin/clavulanic acid with metronidazole. Combined drug prescription is becoming more significant in the case of mixed infections. Most participants would prefer to prescribe for 5 days. "The ideal duration of antibiotic treatment is the shortest cycle capable of preventing both clinical & microbiological relapse. Most acute infections are resolved within three to seven days". Short courses are chosen mostly when treating children due to their poor cooperation.

The prime findings were that most students had not received training on antibiotic prescribing and had treated more than 10 child patients per week & their concordance with guidelines on antibiotic prescribing was generally low.Those who had received training and those with more clinical experience are more likely to be knowledgeable.

A similar studywas conducted,showing a similar result highlighting the need to improve education in antibiotic prescription among dental students.[19,20] Up-gradation of antibiotic prescribing guidelines among dental students is also important for the treatment of dental infections in children.Antibiotic prescribing education may be done through lectures, workshops, informal education in clinical practice & self-directed learning.

Such education will instill greater self-confidence in reducing antibiotic prescribing unnecessarily & will lead to a change in antibiotic prescribing behaviour.

Conclusion

This cross-sectional study indicates the necessity to improve the "knowledge on antibiotic prescribing for children".Besides, the study states that there is a requisite for short programs to update knowledge of dental practitioners on the antibiotics, which are currently used in pediatric dentistry.

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