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The Effects of a Chronic Nail Biting Habit on the Oral Carriage of Enterobacteriacae and the Study of the Antibiotic Resistance Pattern of the Isolates.

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ABSTRACT

Background: Nail biting is a common oral habit, prevalent among children and some young adults. The main sequele of chronic nail biting is the transportation of germs from hands to mouth and vice versa leading to the autoinnoculation of the pathogens. E coli is the most frequently encountered pathogen in clinical microbiology and potent enough to cause infections in almost all parts of the body. Aims: To compare the prevalence of Enterobacteriacae members in the oral cavity of chronic nail biters and non-nail biters, isolation and identification of Enterobacteriacae from the saliva samples of both groups and to study the antibiotic susceptibility pattern of the isolates. **Methods**: 100 saliva samples from each group,chronic nail biters and non-nail bitters were tested. **Results**: In the test group, Enterobacteriacae was detected in 58 of 100 subjects (58%) and among the 58 positive samples, 27 samples yielded single type of growth and 31 samples of mixed growth suggestive of Enterobacteriacae along with normal flora. In the mixed growth pattern 23 samples were of two type of colonies and 10 samples of three types of colonies. In the control group only 16 subjects exhibited the presence of Enterobacteriacae (16%). The prevalence of enterobactereacea in chronic nail biters and non-nail biters were compared using Pearson chi-square test. **Conclusion**: The results of the study indicate that there is a significant difference in the prevalence of Enterobacteriaceae between subjects with and without a nail biting habit. Hence it can be considered that chronic nail biters have a higher contamination risk and can result in debilitating systemic diseases.

Keywords: Nail biting, oral flora , enterobacteriacea , contamination.

INTRODUCTION

Nail biting also called as onychophagia or onychophagy, is an oral parafunctional habit. The habit begins in childhood and may decline with age or continue into adulthood. Nail biting is
Usually rare before the age of 3. According to the previous studies 30 percent of children with nail biting habit is between 7 and 10 years of age.[1] The prevalence of nail biting among teenagers is 45 percent. Finally, the prevalence decreases in adults. Various etiologies are suggested to explain the existence of this habit, which include stress, imitation of the family members, heredity, transference from thumb sucking habit etc. Geographic and cultural differences also contribute to the prevalence of the habit.
Chronic nail biting induce the complications like cuticle bleeding , malocclusion, tooth root resorption, nail deformities, infection of gingival tissues and nail bed, intestinal parasitic infestations, alteration of normal flora. The main sequel is the transportation of germs from hands to mouth and vice versa leading to the autoinnoculation of the pathogens.
Members belonging to the family Enterobacteriacae are the most frequently isolated bacterial pathogens in clinical microbiology. The family consists of gram negative, non sporing , rod shaped bacteria widely spread in nature – soil, water, plant sewages, and as the name suggests within the intestinal tract. The family includes many genera like Escherichia, Enterobacter, Klebsiella, Citrobacter, Proteus, Serratia, etc. these organisms can cause wide range of diseases like diarrhea, bacteremia, septicemia, pneumonia, urinary tract infections, and food poisoning. In the afore mentioned group, E coli is the most frequently encountered pathogen in clinical microbiology and potent enough to cause infections in almost all parts of the body. The indiscriminate use of antibiotics often results in the establishment of antibiotic resistance. Thus E coli or any enteric bacteria ingested through a chronic nail biting habit could cause local or systemic infections.

The present investigation was an attempt to study the effect of a chronic nail biting habit on the oral carriage of Enterobacteriacae. Enterobacteriacae from the saliva samples of both groups, chronic nail biters and non-nail biters, were identified and isolated. The antibiotic susceptibility pattern of the isolates were also evaluated.

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MATERIALS AND METHODS

The subjects were selected from the patients in the department of Oral Medicine and Radiology, Govt Dental College, Kottayam, Kerala. 100 saliva samples each from the chronic nail biters and non-nail bitters were tested. They were categorized as test group and control group respectively. Patients with a history of Antibiotic therapy within past three months, those using antiseptic mouthwashes and patients with acute oral infections were not included in the study. The aim and procedure of the study was explained to the patients, data recorded and saliva samples taken with written consent from the subjects.

Oral rinse technique was employed for the collection of the samples. Patients were asked to rinse their mouth with 10 ml phosphate buffered saline (0.1 ml, pH 7.2) for 60 seconds. The rinse was then expectorated back to a universal sterile container and concentrated by centrifugation. The sediment was inoculated to a microbiological plating media – Blood Agar and Mac Conkey agar and incubated overnight at 37 degree Celsius. The plates were examined on the very next day for the presence of gram negative bacteria suggesting the presence of Enterobacteriacae members. Plates that contained scanty growth of gram negative bacteria were ignored because of the presence of transient flora. Those with significant growth were considered forthe further proceedings. Suspected colonies were purified by subculture on to Mac Conkeys agar and the organisms were identified by standard biochemical reactions. The antibiotic sensitivity was tested using Kirby Baeur's standard disc diffusion tests and various resistance mechanisms.

Statistical analysis was done using SPSS version 20.

RESULTS

Enterobacteriacae was detected in 58 of 100 subjects (58%) in the test group [Table 1]. In the control group only 16 subjects exhibited the presence of Enterobacteriacae (16%). Among this 13 samples yielded single type of growth and 3 of mixed growth. [Table 2]

Among the 58 positive samples in the test group, 27 samples yielded single type of growth and 31 samples mixed growth, suggestive of Enterobacteriacae along with normal flora. In the mixed growth pattern 23 samples were of two type of colonies and 10 samples of three types of colonies.

Table 1: Showing percentage of enterobacteriacea positive sample in the test group.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	negative	42	42.0	42.0	42.0
	positive	58	58.0	58.0	100.0
	Total	100	100.0	100.0	

Table 2: Showing percentage of enterobacteriacea positive sample in the control group.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	negative	84	84.0	84.0	84.0
	positive	16	16.0	16.0	100.0
	Total	100	100.0	100.0	

[Table 3, 4] shows the frequency of Enterobacteriaceae members isolated from test group and control group respectively.

Table 3: showing the frequency of enterobacteriacea members isolated from test group.

	Frequency	Percent	Valid Percent
Citrobacter species	8	7.6	7.6
Ecoli	39	37.14	37.14
Enterobacter species	21	20	20
Klebsiella species	27	25.7	25.7
Proteus species	10	9.5	9.5
Total	105	100.0	100.0

Table 4: Showing the frequency of enterobacteriacea members isolated from control group.

	Frequency	Percent	Valid Percent
Ecoli	7	47.36	47.36
Enterobacter species	3	17.45	17.45
Klebsiella species	9	15.78	15.78

Pearson chi-squared test was performed to compare the prevalence of Enterobacteriaceae in the saliva

samples of the subjects with and without nail-biting habits. The higher prevalence of Enterobacteriaceae in chronic nail biting patients was statistically significant with a p value 0.000 [Table 5].

Table 5: shows the chi-square value of comparison of the prevalence of Enterobacteriaceae

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	121.759[a]	4	.000
Likelihood Ratio	71.318	4	.000

Antibiotic susceptibility pattern of each isolate from saliva samples of the test group was evaluated. [Figure 1- 7]

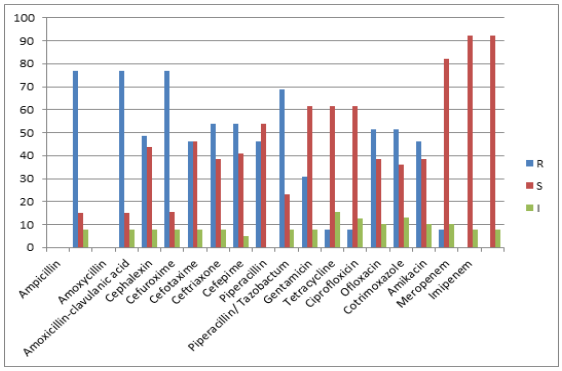

Figure 1: shows the antibiotic susceptibility of Ecoli isolated from test group [R- resistant, S-sensitive, I-intermediate]

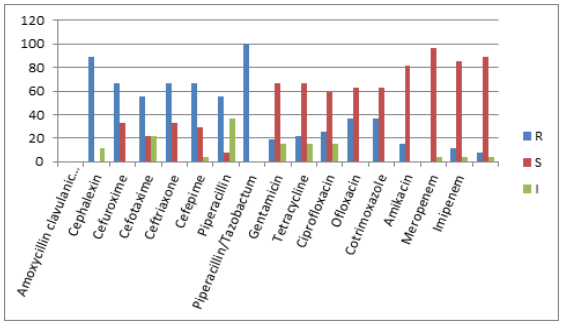

Figure 2: shows the antibiotic susceptibility of Klebsiella species isolated from the test group.

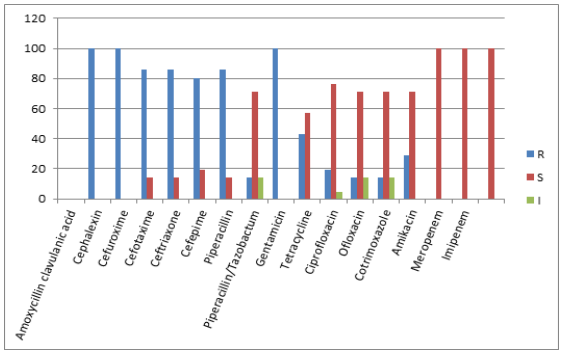

Figure 3: shows the antibiotic susceptibility of Enterobacter species isolated from the test group.

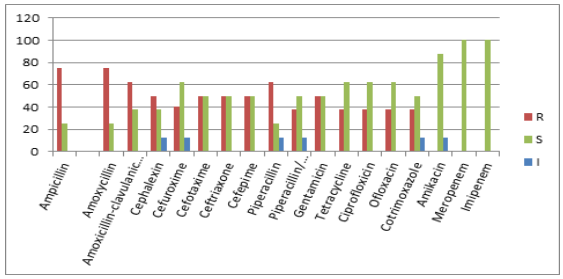

Figure 4: shows the antibiotic susceptibility of Citrobacter species isolated from the test group.

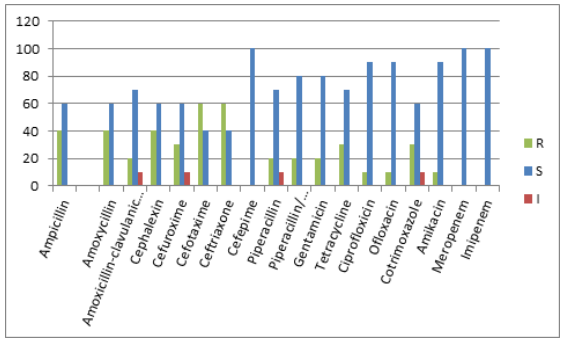

Figure 5: shows the antibiotic susceptibility of Proteus species isolated from the test group

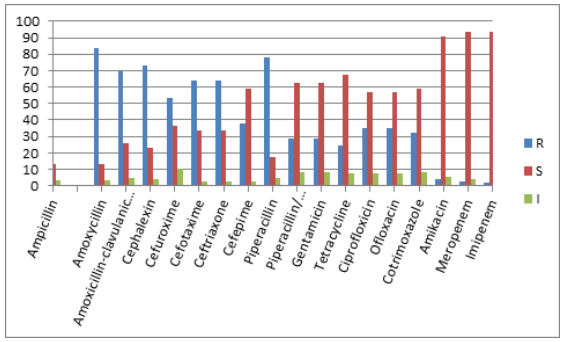

Figure 6: shows the general antibiotic susceptibility of Enterobacteriacea species isolated from the test group.

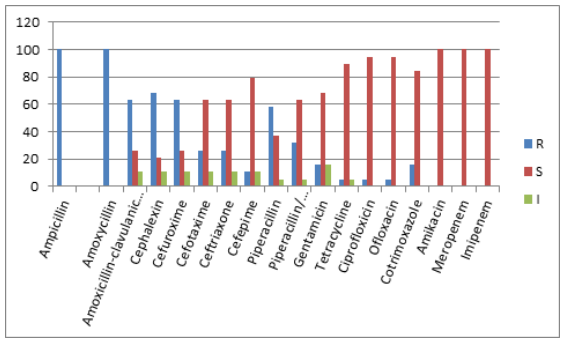

Figure 7: shows the general antibiotic susceptibility of Enterobacteriacea species isolated from the control group.

DISCUSSION

Nail biting is an unintentional habit associated with psychological disturbances such as stress ,anxiety or low mood.[2,3] This parafunctional habit is infact

a coping mechanism in stressful situations and can cause distress in patients with an addiction for nail biting while refraining from the habit.[4] The complications of nail biting are mainly cosmetic but if severe can affect the quality of life.[5-8] Onychophagia can thus affect the mental and physical health of the individual. Bacterial infections of the nail, alteration in oral microbial flora and gastric flora can also result from chronic nail biting.[9,10]

Enterobacteria are transient organisms of oral cavity. It is pathogenic and can cause various systemic manifestations. The organism gain entry to the oral cavity through oral pernicious habits such as nail biting.[11,12] Studies suggest that enterobacteria can cause post extraction cellulitis, osteomylitis and also bacteremia resulting in morbidity and mortality.[13-15] Baydas et al reported that surgical manipulation in these patients can lead to localized infections such as gingivitis and systemic infections,[7] even leading to infective endocarditis.

The study analyzed the prevalence of enterobacteria in the oral cavity of chronic nail biting and non-nail biting patients. Statistically significant results were obtained with a higher prevalence in chronic nail biting patients. Similar study was done by Firoz et al and a higher prevalence of enterobacteria was obtained in chronic nail biting patients.[16]

The enterobacteria isolated from the saliva of chronic nail biting patients were Citrobacter, Ecoli, Enterobacter, Klebsiella, and Proteus. There was higher prevalence of Ecoli (37%) followed by Klebsiella (25%). These results were consistent with that of Sushama et al.[17]

The antibiotic susceptibility of the enterobacteria of the test group revealed resistance to amoxycillin, piperacillin, cephalexin, amoxycillin- clavulanic acid cefotaxime and ceftrioxone. The organisms showed increased sensitivity to amikacin, imipenem, meropenam,tetracycline, gentamycin, ofloxacin and ciprofloxacin. These organisms are resistant to empirical antibiotics commonly prescribed. Thus patients with nail biting habit can exhibit alteration in the normal oral microflora and the antibiotic susceptibility pattern. Culture and sensitivity test is thus advisable on a routine basis while treating infections in patients with chronic nail biting habit.

CONCLUSION

The results of the study indicate that there is a significant difference in the prevalence of Enterobacteriaceae between subjects with and without a nail biting habit. Hence it can be considered that chronic nail biters have a higher contamination risk than patients without the habit. Dental Specialists should take into consideration the risk of high prevalence of Enterobacteriaceae in nail biters and should refer such patients for a medical evaluation prior to dental treatment/procedures for the assessment any systemic manifestations.

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