RESEARCH PAPER

Effect of Chronic Nail Biting and Non Nail Biting Habit On the Oral Carriage of Entero Bacteria

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Abstract

Background: Onychophagia, also recognized as compulsive habit of nail biting, is one of the prevalent behavioural practices seen among children & teenagers, especially those between the ages of 10 & 18. According to studies, its frequency can rise from around 30% in childhood to almost 45% in adolescence.

Aim: To evaluate the comparison of prevalence of Enterobacteriaceae, E coli & Enterobacter species, in the salivary specimens of individuals having a habit of chronic nail-biting with those without any oral habits.

Methods: The research comprised 120 individuals who were between the ages of 10 & 16. Of them, 60 had a persistent practice of chewing their nails, while the control group consisted of
60 people who had no oral habits. The oral rinse procedure was used to obtain saliva samples, which were then examined using microbiological techniques to look for Enterobacteriaceae. Relevant statistical test was used for doing the statistically analysis.

Results: Enterobacteriaceae were detected in salivary samples, with 39 out of 60 participants in the nail-biting group showing their presence. In comparison, only 5 of the 60 individuals within the control group exhibited the presence of these bacteria. This marked difference of prevalence among the two groups was found to be highly significant statistically.

Conclusion: The results show that the prevalence of Enterobacteriaceae in the oral cavity was considerably greater in those who have a chronic nail-biting habit than in people who does not. Additional research involving larger populations & different age groups is required to further understand the distribution of Enterobacteriaceae species.

Keywords: Enterobacteriaceae, Escherichia coli, nail-biting, orofecal contamination.

How to cite this article: Singh D, Bhargava M, Thind RBS, Jaswani G, Chauhan M, Zaheer MR. Effect of chronic nail biting and non nail biting habit on the oral carriage of Enterobacteria. Int J Drug Deliv Technol. 2026;16(75s): 1543-1546. DOI: 10.25258/ijddt.16.75s.164

Introduction: As the oral cavity is a moist/wet environment, it encourages the growth of wide range of microorganisms because it is kept at a relatively persistent temperature (34–36°C) & maintains pH near neutrality in almost all the places. Though oral cavity is sterile at birth, it quickly becomes colonised by the environmental bacteria, especially those from the mother at the time of first feed.[1]

By keeping out foreign microbes, the naturally acquired microflora supports the host's defences & is necessary for the appropriate development of the host physiology. Over 500 different kinds bacterium have been identified from the oral cavity, demonstrating the great diversity of the oral microflora.[2]

As a result of its specific biologic & physical characteristics, the inhabitant microflora of the oral cavity is diverse from that found within different place in the body. The majority of bacteria from other parts of the body does not colonise within the oral cavity. Although intestinal as well as skin bacteria are frequently transported into the mouth, they are quickly eradicated because they cannot successfully compete with oral microbes for attachment sites & nutrition.[3]

Commensalism is present in the majority of oral microorganisms. Pathological alterations in the oral cavity & other distant regions are caused by changes in the dynamics of the bacterial population. Microbial biofilms that occur on the hard & soft tissues of the mouth due to complex interactions between microbes along with the host tissues.[4] Oral health & diseases are determined by the relationship that occurs among host & the oral bacteria colonies.[5]

A disparity in the native microbiota, particularly raises the quantity of potentially dangerous bacteria, seems to be the cause of oral diseases.[6]

Both pathogenic & non-pathogenic enteric germs belong to the Enterobacteriaceae family of aerobic & anaerobic gram-negative bacteria. Members of the Enterobacteriaceae family are aerobic & facultative anaerobic, oxidase-negative & catalase-positive, gram-negative straight rods that are mostly found in soil, water, plants, animals, & human digestive tracts. They are the source of infections including food poisoning, typhoid, bacillary dysentery, & meningitis.

In children & teenagers, nail biting habit has been a widespread pathological oral habit practice. Most nailbiters have a habit of biting all 10 fingers equally than just some of them of them.[7]

Materials And Method

Source of Data and Sample Size: A sample of 120 participants from the Department of Oral & Maxillofacial Pathology at Santosh Dental College in Ghaziabad, Uttar Pradesh, participated in the current cross-sectional study. The participants of the were between the ages of ten & sixteen. The subjects were chosen at random, irrespective of gender. The Institution's Ethical Committee granted ethical approval for the study's execution. The research was carried out from June 2024 to June 2025.

Methodology

Preparation of the Smears: Patients were informed about the procedure. After rinsing their mouths using the buffered saline for around one minute, individuals were asked to spit the rinse back into the container with the same label.

Using the conventional streak plate method, an entire loop of this concentrated solution was inoculated into MacConkey agar plates. For 24 hours, the inoculation plates were gestated at 37°C. Culture plates were under watch for any bacterial growth after incubation. Non-lactose-fermenting colonies were pale or colourless, whereas lactose-fermenting colonies were pink. (Figures 1, 2)

After lactose-fermenting colonies were selected employing a sterile straight wire loop, smears were created. These smears had been stained with Gram and examined under a microscope in order to identify gram-negative bacilli. When gram-negative bacilli were discovered, further biochemical tests were performed to identify the specific Enterobacteriaceae family members.

Figure 1: Lactose Fermenting Colonies on MacConkey Agar

Figure 2: Non-Lactose Fermenting colonies seen over the MacConkey Agar

Results

Prevalence of Enterobacteriaceae Among Study Groups: In contrast to 65% (39) of the specimens retrieved from the study group, only 8.3% (5) of the samples gathered from the control group included Enterobacteriaceae. The most common isolated organism was E. coli, which was found in saliva samples from 13.3% of the control group and 51.7% of study participants. With a $P < 0.001$, the Enterobacteriaceae frequency difference between the study and control groups was highly significant (Table 1). Enterobacter spp. was found in the salivary samples of just over seven percent of research participants and 1.6% of control group individuals.

The research participants who were 12 years old had the greatest prevalence of Enterobacteriaceae. Enterobacteriaceae isolation rates among study participants aged 10, 11, 12, 13, 14, 15, & 16 years were 64, 56.3, 67.6, 75, 32, 41, & 72.7%, respectively. In control participants aged 11, 13, & 14 years, the isolation rates of Enterobacteriaceae were 11.1, 14.3, & 6.3%, respectively. No participants in the control group between the ages of 14 & 15 had Enterobacteriaceae identified from them. (Table 2)

In the study group, 60.7% of the total of 30 female subjects & 69.7% of the thirty male subjects had Enterobacteriaceae isolated from them. In the control group, Enterobacteriaceae were recovered among 7.4% of the 30 male individuals & 9.3% of the 30 female subjects.

Table 1: Prevalence of the Enterobacteriaceae among study Groups				
	Group 1	**%**	**Group 2**	**%**
E. Coli	31	51.7	4	6.7
Entero. Sp	8	13.3	1	1.6
Total	39	65	5	8.3

Table 2: Age Group Wise Distribution of Enterobacteriaceae						
Age Group (Years)	**Group 1 (Study)**			**Group 2 (Control)**		
	E. Coli.	Entero. Sp.	Total	E. Coli.	Entero. Sp.	Total
10	7	2	9	1	1	2
11	5	2	7	1	0	1
12	6	1	7	1	0	1
13	2	1	3	0	0	0
14	1	0	1	0	0	0
15	6	1	7	0	0	0
16	4	1	5	1	0	1
Total	**31**	**8**	**39**	**4**	**1**	**5**

Discussion: The oral microbiota's composition is formed in early childhood & is influenced by behavioural, physiological, & environmental variables throughout life. Oral ecosystem remains stable because of complex interactions among resident microorganisms, including mechanisms such as microbial competition & antagonism that help maintain ecological balance & prevent excessive growth of certain species. Environmental conditions & microbial populations maintain a close & dynamic relationship even within specific oral microhabitats.[8]

When this microbial equilibrium is disturbed, opportunistic or pathogenic organisms may proliferate & lead to disease. Factors such as dietary changes, alterations in dentition, decreased salivary flow, & parafunctional oral habits can disrupt the normal microbial balance of the oral cavity.[9]

The occurrence of Enterobacteriaceae in people with systemic disorders has also been the subject of several investigations. Back-Brito et al. examined

45 HIV-positive individuals as well as 45 HIV-negative people. They found that their oral cavities of HIV-positive subjects had noticeably greater concentrations of Enterobacteriaceae & Pseudomonas species. In both groups, Enterobacter cloacae were the most often isolated bacterium. Studies involving individuals with HIV-1 infection while those with burning mouth syndrome have revealed similar findings.[10,11]

The current study's findings indicated that

Enterobacteriaceae were isolated from 39 of the 60 participants who bit their nails, while only 5 of the 60 people in the control group had these germs. Only nine people without the tendency had E. coli, compared to 65 (53.3%) participants with chronic nail-biting tendencies. The frequency of Enterobacteriaceae varied significantly between the two groups, according to statistical analysis. In the nail-biting group, the frequency was 65.6%, whereas in the control group, it was only 8.1%. These findings are in line with those of Baydaş et al., who likewise found that nail-biters had a greater prevalence (76%) than controls (26.5%).[12]

It is evident from both the current study & the results of Baydaş et al. that those who bite their nails have a far greater oral carriage of Enterobacteriaceae than people who don't. The fecal-oral transfer of enteric bacteria through contaminated hands & inadequate personal hygiene habits may account for this increasing occurrence.

To ascertain the precise incidence of Enterobacteriaceae species in various age groups & to assess any potential correlation between microbial carriage & oral hygiene level, more research is needed. Furthermore, research evaluating the relationship between Enterobacteriaceae colonisation in the mouth & perianal regions & the possible systemic side effects of autoinoculation is required.

Early detection & treatment of nail-biting behaviours are crucial. To lessen microbial contamination & avoid infections, those who demonstrate persistent nail biting should getappropriate counselling, behavioural treatment, & reinforcement of good hygiene behaviours. Additionally, dental practitioners should be aware of the higher incidence of Enterobacteriaceae among individuals who bite their nails, & they should think about consulting medical experts as needed, especially before to undertaking surgeries that might raise the risk of systemic problems.**Conclusion:** The current investigation led to the following conclusions:

Enterobacteriaceae is undoubtedly more common among nail-biters than in non-biters. The orofecal route of Enterobacteriaceae transmission & inadequate general hygiene maintenance may be the cause of the greater incidence of Enterobacteriaceae among patients who bite their nails.

To determine the accurate frequency of Enterobacteriaceae species in various stage of

developmental groups & to study any correlation among oral hygiene as well as bacterial prevalence, more research is required.

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