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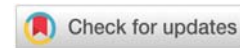
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## Research Article

# Oral impacts of number of natural teeth and posterior occluding pairs on daily performance of geriatric population of Bareilly city: A cross-sectional study

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## Abstract

**Background:** Poor oral health among the elderly has been measured in terms of tooth loss, dental caries, high prevalence rates of periodontal disease, xerostomia, and oral precancer/cancer around the world.

**Aim:** The study's goal is to see how posterior occluding pairs and the total number of natural teeth in the mouth affect everyday activity in the elderly.

**Materials and methods:** It was cross-sectional research with 300 participants drawn from a physiotherapy hospital by convenience sampling. The participants were asked about their age, gender, cigarette usage, oral hygiene practices, regularity of use, type of materials utilized, quality of life dental health and other xerostomia symptoms. The oral influences on the daily performance index were used to measure the effects on daily performance. The number of NT and POPs was counted during a clinical evaluation.

**Results:** The studied population's general average age was 63.81 4.50, with no statistically significant differences between men and women. Overall, the research sample had a mean number of NT of 24.76 7.21, with men having 25.90 6.29 and women having 23.32 8.03.

**Conclusion:** The number of NT and POPs was discovered to be important determinants of daily performance among the geriatric population.

## Introduction

The demographic pattern worldwide indicates that countries' populations are aging with time. The life expectancy of India's senior population has grown. There has been a significant drop in mortality in society consequently to improved economic conditions, a better healthcare system, improved medicines, and so on. Decreased mortality has also resulted in a decrease in fertility. These factors taken together

have increased the proportion of elderly individuals in the population. The older population is a demographic trend that affects the entire world. Oral problems are just one of the many illnesses and disorders that come with getting older.

Based on tooth loss, dental caries, high prevalence rates of periodontal disease, xerostomia, and oral precancer/cancer around the globe, poor oral health amongst the elderly has been assessed [1].

A lot of epidemiological research shows that as people get older, their oral health deteriorates in terms of tooth loss, higher prevalence of dental caries, poor oral hygiene, calculus, gingival recession, and deep probing depth [2]. Furthermore, research suggests that the percentage of people who are edentulous increases as they get older [3].

When a tooth is lost, the functionality of the dentition is disrupted. Molars are the tooth form most afflicted by caries and periodontal disorders, according to epidemiological data [4]. Furthermore, molars have the lowest bone height and attachment levels of all the teeth. As a result, molars, premolars, and lower anterior are the most often extracted teeth [5]. Tooth loss has been proven in studies to have a significant impact on oral function [6]. Although much epidemiologic research characterizes oral functionality in terms of the number of teeth, it is debatable whether the number of teeth is sufficient to define the functional status of the dentitions. The occluding pairs of NT are said to be substantially connected with oral functional status [7].

A recent systematic review found that, in addition to the number of teeth, the kind of teeth, tooth placement, and the number of occluding pairs all influence functionality [8]. A high proportion of patients visit a dental clinic for extractions after they have already lost one or more teeth, leading to a dentition that is disrupted (interrupted dental arch). However, there is minimal demand for tooth replacement.

The minimum number of posterior occluding pairs (POPs) needed for optimum chewing action would be nice to know. The ability to chew is not just a crucial aspect of dental health [9], but it is also becoming more well recognized as being linked to general health status, because the ability to chew food influences dietary choices and nutritional intake, and so has implications for overall health [10].

A person's dentition must be satisfactory for them to feel accepted and socially accepted. Several groups have set targets for the number of older people who retain their NT. People should have at least 20 NT, according to the WHO. According to the World Dental Federation (FDI), 50 percent of those aged 65 and up should have twenty or more teeth [9].

As a result, the current study aimed to compare the effects of the total quantity of NT and POPs regularly found in the oral cavity performance in the older population.

## Materials and methods

A cross-sectional epidemiological study was conducted in Bareilly city to examine the effects of the total quantity of NT and POPs present in the oral cavity on daily performance among the aged. The Institutional Ethical Committee accepted the study protocol 3138 A Dated June 2, 2022. Before enrolling anyone in the study, they had to give their verbal consent. The geriatric population of Bareilly city was used as the study's sampling frame. A convenience sample of 300 people was taken from a physiotherapy institution. The study comprised participants who were at least 60 years old, were healthy or had well-controlled systemic disorders, and did not have

psychological issues. Participants who were entirely edentulous and unable to participate in the study, as well as those with third molars, were excluded.

A pilot study was carried out to see if the proposed methodology was feasible. It was carried out on 50 people who met the study's inclusion criteria. The information was gathered through a structured interview and a clinical examination of the subjects. It was recorded on a specially constructed pro forma for the study during a face-to-face survey, participants were asked about their demographic trends, including their age and gender, smoking habits, oral hygiene routines, OHRQoL and other xerostomia manifestations.

The oral influences on daily performance (OIDP) Index were used to assess the effects on daily performance. The OIDP instrument will be utilized to assess the OHRQoL of the geriatric population in this study, and it was necessary to translate it into Hindi. Two Public Health Dentist professionals fluent in both English and Hindi translated the OIDP inventory into Hindi. Two different translators then re-translated it into English. Cronbach's alpha coefficient was used to assess internal consistency. The value was 0.804, which is considered decent. The corrected item values ranged from 0.345 to 0.590.

The subjects' oral health issues had a significant impact on their ability to perform eight daily activities, according to the data collected (eating and enjoying food, speaking and pronouncing, cleaning teeth, carrying out major work or social roles, sleeping and relaxing, maintaining usual emotional state without being irritable, smiling, laughing and showing teeth without embarrassment, and enjoying contact with other people).

The impacts' frequency values varied from 0 to 5. Depending on the prevalence of the issue, the frequency score of OIDP has two patterns. The frequency score will be measured by the frequency of the problem occurring if the difficulties occur routinely, repeatedly, and consistently within the last 6 months. It's known as a "regular pattern." Second, the frequency score will be determined by the duration of the problem occurs if the difficulties occur once and then disappear and do not recur within the previous 6 months. It's known as a "spell pattern." It should be noted that the OIDP frequency score can only be calculated using a "regular pattern" or "spell pattern."

The impact severity values varied from 0 to 5. Pain, discomfort, functional limitations, and unhappiness with appearance are one of the most prevalent signs. Tooth loss and pain are the most common oral problems. In the current study, the OIDP score for each activity was derived by multiplying the frequency score by the severity score (between 0 to 25). The overall score was calculated by adding the activity scores together (between 0 to 200). The lower the OIDP score, the worse the OHRQoL.

## Clinical examination

The American Diabetes Association recommended a Type III clinical examination with the aid of a plain mouth mirror,

and a community periodontal index probe was performed to measure the number of NT and POPs.

### Posterior occluding pairs

A tooth in the upper arch and the tooth it bites against in the lower arch make up an occluding pair of teeth. Following are the calculations and scores for the number of NT functional POPs:

1 = each pair of premolars

2 = each pair of molars.

If any of the participants were wearing removable dentures/ fixed bridges, the number of POPs was determined while the dentures were in place. The dentition status index (2013) was used to record NT and POPs. Tooth mobility was recorded according to Miller's classification. The oral mucosal lesion was recorded using codes given in the WHO, basic oral health survey, 1997 (4<sup>th</sup> edition) [11].

### Statistical analysis

SPSS program, 21 version was used to analyze the data (Statistical Package for the Social Sciences). Continuous variables were represented as means, whereas categorical variables were summarized as frequencies. Nonparametric tests, such as the Mann–Whitney U test and the Chi-square test, were utilized for bivariate analysis. The significance level was set at 0.05.

## Results

The study comprised a total of 300 old people from Bareilly City, of whom 167 were men and 133 were women. The overall mean age of the study cohort was 63.81 4.50, with no statistically significant differences between men and women (men = 63.82 4.13, women = 63.79 4.94;  $P > 0.05$ ). The average number of NT identified in the research sample was 24.76 7.21, with males having 25.90 6.29 and women having 23.32 8.03.

Men had a mean number of NT present that was noticeably higher than females. (Mann–Whitney U-test,  $P \leq 0.05$ ). Overall mean OIDP score was found to be 10.21 ± 18.18. Mean OIDP scores (among subjects having < 20 NT) were found to be 21.63 ± 23.36 and 7.82 ± 15.15 among subjects having < 20 NT and ≥ 20 NT, respectively. The score among subjects having < 20 NT was revealed to be significantly higher compared to those having ≥ 20 NT (Tables 1,2). The lower the OIDP score, the worse the OHRQoL.

The level of POPs and their oral effects on daily life were found to be 10.21 and 18.18 in the total mean OIDP score. Subjects with 4 POPs had mean OIDP scores of 22.13 24.04, whereas those with 5 POPs had mean OIDP values of 5.65 12.76. Participants with at least four POPs showed significantly better OHRQoL than those with fewer than four POPs. The distribution of the study population according to the impact on their daily performances based on the number of NT found that 10 (19.2%) of the subjects with fewer than 20 NT reported problems

**Table 1:** Severity distribution of different oral products' effects on daily working life.

	Much less severe, n (%)	Less severe, n (%)	Moderately severe, n (%)	Severe, n (%)	Very severe, n (%)
Eating (n = 151)	31 (20.5)	53 (35.1)	40 (26.5)	26 (17.2)	1 (0.7)
Cleaning (n = 35)	19 (54.3)	7 (20.0)	7 (20.0)	2 (5.7)	-
Speaking (n = 28)	11 (39.3)	8 (28.6)	7 (25.0)	2 (7.1)	-
Physical activities (n = 10)	4 (40.0)	4 (40.0)	2 (20.0)	-	-
Sleep (n = 29)	9 (31.0)	12 (41.37)	7 (24.1)	1 (3.44)	-
Smiling (n = 58)	14 (24.1)	21 (36.2)	18 (13.1)	5 (8.6)	-
Emotional stability (n = 9)	6 (66.7)	1 (11.1)	2 (22.2)	-	-
Major role activity (n = 13)	3 (23.1)	6 (46.2)	4 (30.8)	-	-
Contact with people (n = 35)	4 (11.4)	19 (54.3)	10 (28.6)	2 (5.7)	-

**Table 2:** The relationship between the number of functional natural teeth and the oral impacts on daily performances scores.

OIDP items	Mean ± SD			Pc
	Number of natural teeth < 20 (n = 52)	Number of natural teeth ≥ 20 (n = 248)	Total (n = 300)	
Overall OIDP	21.63 ± 23.36	7.82 ± 15.15	10.21 ± 18.18	< 0.0001*
Eating	10.62 ± 7.98	3.37 ± 5.28	4.63 ± 6.44	< 0.0001*
Cleaning	1.35 ± 4.06	0.56 ± 2.62	0.70 ± 2.93	0.017*
Speaking	1.92 ± 4.60	0.33 ± 1.85	0.60 ± 2.61	< 0.0001*
Physical activities	0.42 ± 2.17	0.19 ± 1.37	0.23 ± 1.54	0.281#
Sleep	1.19 ± 3.99	0.53 ± 2.02	0.64 ± 2.48	0.547#
Smiling	2.90 ± 5.58	1.45 ± 3.93	1.70 ± 4.29	0.085#
Emotional stability	0.42 ± 2.18	0.12 ± 1.15	0.17 ± 1.39	0.03*
Major role activity	0.77 ± 3.19	0.29 ± 1.77	0.38 ± 2.09	0.545#
Contact with people	2.04 ± 4.66	0.98 ± 3.30	1.16 ± 3.59	0.058#

\*Mann–Whitney U-test, \*Statistically significant, #Statistically not significant. OIDP: Oral Impacts on Daily Performances; SD: Standard Deviation

maintaining social connections, while 25% of attendees with more than 20 NT revealed difficulty eating (10.1 percent). This difference failed to reach the Statistical significance value of  $P = 0.092$  (Tables 3,4).

## Discussion

Meanwhile, in developing countries, traditional oral self-care with chew sticks or powder is popular. When comparing genders in this research, the kind and frequency of mouth cleansing appeared as important indicators. Tobacco use was found to be barely 7% of the population. According to Shah and Sundaram's study [12,13], oral harmful habits were unexpectedly low, with only 19.5 percent of the elderly smoking and chewing tobacco. A study by Pang, et al. [14], found comparable results, with a total of 236 respondents who were current smokers (9.5 percent). Men made up the majority of senior tobacco consumers (88.1 percent). Marinho, et al. meta-analysis [15].s found a greater smoking prevalence among men, which is consistent with the findings of this study. Adults are generally aware of gender inequalities in tobacco



**Table 3:** Relationship between the number of posterior occluding pairs and the oral impacts on daily performances scores.

OIDP items	Mean $\pm$ SD			
	POP's < 4 (n = 83)	POP's $\geq$ 4 (n = 217)	Total (n = 300)	P <sub>c</sub>
Overall OIDP	22.13 $\pm$ 24.04	5.65 $\pm$ 12.76	10.21 $\pm$ 18.18	< 0.0001*
Eating	10.11 $\pm$ 7.49	2.53 $\pm$ 4.48	4.63 $\pm$ 6.44	< 0.0001*
Cleaning	1.73 $\pm$ 4.37	0.30 $\pm$ 2.01	0.70 $\pm$ 2.93	< 0.0001*
Speaking	1.40 $\pm$ 3.89	0.30 $\pm$ 1.82	0.60 $\pm$ 2.61	0.004*
Physical activities	0.48 $\pm$ 2.19	0.14 $\pm$ 1.19	0.23 $\pm$ 1.54	0.105 <sup>#</sup>
Sleep	1.64 $\pm$ 4.06	0.26 $\pm$ 1.31	0.64 $\pm$ 2.48	< 0.0001*
Smiling	3.14 $\pm$ 5.53	1.15 $\pm$ 3.57	1.70 $\pm$ 4.29	0.001*
Emotional stability	0.28 $\pm$ 1.73	0.13 $\pm$ 1.23	0.17 $\pm$ 1.39	0.06 <sup>#</sup>
Major role activity	1.05 $\pm$ 3.47	0.12 $\pm$ 1.11	0.38 $\pm$ 2.09	0.005*
Contact with people	2.30 $\pm$ 4.85	0.72 $\pm$ 2.86	1.16 $\pm$ 3.59	0.001*

<sup>a</sup>Mann-Whitney U-test, \*Statistically significant, <sup>#</sup>Statistically not significant. OIDP : Oral Impacts on Daily Performances; SD: Standard Deviation

**Table 4:** Distribution of the study population according to the impact on their daily performances based on the number of natural teeth.

	Total no of natural teeth < 20	Total no of natural teeth $\geq$ 20	
Eating	42 (80.80)	109 (44.00)	$\leq$ 0.0001*
Cleaning	11 (21.2)	24 (9.7)	0.03*
Speaking	12 (23.1)	16 (6.5)	0.001*
Physical activities	3 (5.8)	7 (2.8)	0.386 <sup>#</sup>
Sleep	6 (11.5)	23 (9.3)	0.608 <sup>#</sup>
Smiling	14 (26.9)	44 (17.7)	0.175 <sup>#</sup>
Emotional stability	4 (7.7)	5 (2.0)	0.052*
Major role activity	3 (5.8)	10 (4.0)	0.478 <sup>#</sup>
Contact with people	10 (19.2)	25 (10.1)	0.092 <sup>#</sup>

<sup>b</sup>Chi-square test, \*Statistically significant, <sup>#</sup>Statistically not significant

use, however recent cohorts have shown an upsurge in young women's consumption.

### Natural teeth

Many groups have set targets for the number of older people who retain their NT. People should have at least 20 NT, according to the WHO. According to the World Dental Federation (FDI), 50 percent of those aged 65 and up should have 20 or more teeth. Overall, the mean number of NT in the current study population was 24.76 7.21, which was greater than the 13.0 9.5 reported in a study conducted by Somsak and Kaewplung [16].

The average number of NT in men was 25.90 6.28, while the average number of NT in females was 23.32 8.03. The findings of the study differ from those of Somsak and Kaewplung [16], who discovered that the average number of teeth present was 13.0 9.5. According to the National Health and Nutrition Examination Survey of Seniors in the United States, the elderly over the age of 65 have an average of 18.90 teeth left, with 27.27 percent having none.

### Number of posterior occluding pairs

The count of POPs in NT was a pair of opposing premolars and molars. Overall, the mean number of POPs in the current study population was 6.86 4.25 pairs, which is higher than the average number of POPs found by Somsak and Kaewplung [16], who found 3.5 2.7 pairs. While the number of NT is a popular and commonly utilized indicator of oral health and function in this age group, the number of occluding pairs is a more refined clinical indicator that takes into account both the count and dispersion of NT. It is thus especially important in older adult populations with higher levels of tooth loss. The present study also showed that the participants who had at least 4 POP had significantly higher OHRQoL than those who had < 4 POPs which is under the study conducted by Somsak, et al. [16] and Tsakos, et al. [17].

The investigation of an older population revealed a significant incidence of oral impacts, with the most common impact being difficulties eating (53 percent), which is consistent with previous European studies by Montero, et al. [18] and African studies. [19,20] Physical activity and mental stability have the least impact on everyday performance. The percentage of research participants who had eating issues was approximately three times that of those who had sleeping problems, which was the second most common complaint. The prevalence of subjective dry mouth and lower stimulated salivary flow rate was found to be 25%, which confirms the results of Takeuchi, et al. [21], who found it to be 19.9%.

The average OIDP score for the participants in this study was 10.21 18.18. The prevalence of OIDP was quite high, with 55% of respondents reporting that at least one daily activity had been impaired in the previous six months. Kida, et al. [22], in Tanzania, Srisilapanan, et al. [23], in Thailand and Jung, et al. [24] in Korea have all undertaken similar investigations. The WHO set a goal in 1982 for 50 percent of persons aged 65 to 74 years to have a functional and aesthetic dentition featuring 20 or more NTs by the year 2000 Ribeiro, et al. [25] and there is a preference for preserving NT even among older people in specific locations [26].

The findings suggest that functional disability appears to be more prevalent than social disability in terms of OHRQoL. OHRQoL was found to have a strong and persistent relationship with clinical dental indices of function, such as the number of NT.

### Conclusion

Considering the significance of the study's findings, the examination is limited by its cross-sectional approach, which does not allow for the identification of causative relationships. To determine such connections, evidence from longitudinal research is required. The findings of this research are critical for Indian policymakers as they plan and implement public oral health programs for the elderly community.

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