

Original Article

## Examining the Relationship between Demographic Characteristics and Oral Health of the Elderly

Tamires Carneiro de Oliveira<sup>1\*</sup>, Diviane Alves da Silva<sup>1</sup>, Yan Nogueira Leite de Freitas<sup>1</sup>, Romerito Lins da Silva<sup>2</sup>, Carla Patrícia de Castro Pegado<sup>2</sup>, Kenio Costa de Lima<sup>1</sup>

<sup>1</sup>Postgraduate Public Health Program (PPGSCol-UFRN), Department of Dentistry, Federal University of Rio Grande do Norte (UFRN), Av. Senador Salgado Filho, 1787, Lagoa Nova, Natal, RN 59056-000, Brazil.

<sup>2</sup>Department of Dentistry, Federal University of Rio Grande do Norte (UFRN), Av. Senador Salgado Filho, 1787, Lagoa Nova, Natal, RN 59056-000, Brazil.

\*E-mail ✉ [tamires.carneiro@hotmail.com](mailto:tamires.carneiro@hotmail.com)

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### ABSTRACT

The oral and dental health of the elderly in the field of public health is an important issue that requires increasing attention all over the world. This study aimed to determine the relationship between demographic characteristics and oral health of the elderly. This descriptive-analytical research was conducted on 158 elderly people over 60 years old by random sampling method. The data was collected directly by direct interview. The data collection tool included the demographic characteristics questionnaire and the oral health index questionnaire of the elderly. After data collection, data analysis was done through SPSS version 23 statistical software. The significance level in this study is considered to be p less than 0.05. According to the results, 57% (90 people) of the elderly respondents were male and 43% (68 people) were female. The average age of the studied elderly was 78.68 years. Oral health had a significant relationship with age, gender, and education ( $P < 0.05$ ). The oral and dental health condition of elderly men was better than elderly women. Considering the great importance of oral and dental health in increasing the quality of life of the elderly, it is necessary to pay attention to their demographic characteristics when designing interventions to improve the oral health of the elderly.

**Keywords:** Elderly, Oral health, Dental health, Demographic characteristics

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### Introduction

The world population is rapidly aging. Increasing health care services and reducing mortality can be considered one of the most important reasons for the aging of the population [1, 2]. There are about 600 million elderly people aged 60 and over in the world, and this amount will double by 2025 and reach two billion people by 2050 [3]. Statistical forecasts of the

United Nations show that the growth of the population over 60 will increase rapidly in the next few years [4]. Oral and dental hygiene is an integral part of a person's general health and affects all aspects of the personal, social, and psychological lives of people, especially the elderly [5]. Oral and dental health directly affects the body and mind of people. Weakness in oral and dental hygiene plays a big role in the quality of life of the elderly and their health. Social interactions, type of diet, people's weight, how they speak, people's appearance, and the ability to eat are all affected by oral

and dental health, and not only the elderly but also their caregivers and those around them are involved [6-8].

With the increase in life expectancy and longer life of humans, the prevalence of oral and dental problems may increase [9, 10]. Studies have shown that poor oral and dental hygiene in the elderly population can lead to threats such as dehydration, heart diseases, joint infections, pneumonia, and malnutrition [11-14]. The relationship between oral and dental problems and coronary heart disease has been reported in several studies [15, 16]. A longitudinal study by Lee *et al.*, aimed to investigate the duration and number of metabolic disorders such as high blood pressure, diabetes, obesity, and high cholesterol in 399 People over 60 living in rural areas of South Korea were examined [17]. It was observed that people who have many oral and dental problems are more likely to suffer from metabolic disorders [17].

In addition, in a cross-sectional study by Sutherland *et al.*, which was conducted on 185 elderly people between the ages of 70 and 97 to evaluate the relationship between oral infections and high blood pressure in Brazil, the main finding was that the elderly with more severe oral and dental problems had higher blood pressure [18]. The reasons related to the condition of the mouth and teeth of the elderly are many and varied. Reasons such as lack of motivation to take care of the teeth, forgetfulness of the person, inability to do personal and daily tasks, financial poverty, as well as the simultaneous use of several drugs that affect the natural physiology of the glands and cells of the oral and dental system and the amount of saliva. It has a bad effect and can cause weakness in the oral and dental health of the elderly [19, 20].

The factors related to the oral health status among the elderly in different communities are different and are caused by cultural, social, and economic differences among different communities. These factors affect the different reporting of oral health levels among different countries [21-23]. Some social and demographic factors are related to oral and dental diseases and problems and clinical patterns of these problems. The elderly are often considered to have poor oral health. The oral and dental health of the elderly in the field of public health is an important issue that requires increasing attention all over the world. In our country, there is little information about the relationship between oral health and demographic characteristics, so the purpose of this study was to determine the relationship between oral health and demographic characteristics of the elderly.

## Materials and Methods

This study was cross-sectional and 158 elderly people were included in the study. The inclusion criteria in this study included the following: willingness to participate in the study, age 60 or older, ability to answer questionnaire questions, and communication. In addition, the exclusion criteria from the research included questionnaires that were not completely completed and people who died after random selection. To investigate the relationship between oral and dental health and demographic factors, a researcher-made questionnaire was used that included personal and health information such as gender, age, marital status, and level of education. Before using this questionnaire, its validity was confirmed by professors. The oral health information of the elderly was collected with the oral health evaluation index of the elderly. Dolan and Atchison presented the GOHAI tool in 1990 [24]. So far, the validity and reliability of this tool have been determined in many studies and it has been used as a tool for measuring the condition of the mouth of the elderly [25, 26]. The scoring method of this questionnaire is such that the answers to 12 Likert items are recorded in the form of five options: never, rarely, sometimes, often, and always. The total score of each person is obtained from the sum of the figures related to 12 items and the number is between 12 and 60. In this way, never given a score of 5 and always given a score of 1, and at the end, the lower the sum of the numbers is reported, it indicates a lower level of oral health of the person, and the higher the sum of the numbers indicates the better oral health in life. It is individual. The researcher completed the questionnaires face-to-face.

After data collection, data analysis was done through SPSS version 23 statistical software. The significance level in this study is considered to be  $p$  less than 0.05.

## Results and Discussion

The sample size of the research was 158 people; most of them (90 people) were men (57%). In terms of marital status, 87 (55.1%) of the participants were married and 58 (36.7%) had their spouses dead. The average age of the participants in the research was  $68.78 \pm 5.45$  years. The lowest age is 60 years and the highest age is 85 years.

In terms of literacy, 27 people (17.1%) had no formal education, 52 people (32.9%) had primary education, 37 people (32.4%) had middle school education, 26 people (16.5%) had a diploma, 8 people (5.1%) had a post-graduate degree, and 8 people (5.1%) had a bachelor's degree or higher, and the results showed that most of the respondents had primary education.

In response to the question of how many times an elderly person brushes their teeth during a day, 56 of the elderly (35.4%) stated that they brush their teeth 3 times a day. In addition, 47 elderly people stated that they only brush their teeth once a day (**Table 1**).

**Table 1.** Frequency distribution and percentage of the number of mouthwashes per day

| Type and quantity of responses | Once | Twice | Three times | More than three times | No washing | Total |
|--------------------------------|------|-------|-------------|-----------------------|------------|-------|
| Abundance                      | 29   | 47    | 56          | 18                    | 8          | 158   |
| Percentage                     | 18.4 | 29.7  | 35.4        | 11.4                  | 5.1        | 100   |

Regarding the duration of brushing the mouth and teeth each time, 55.1% of the elderly stated that they spend less than 2 minutes each time brushing their teeth, and 30.4% stated that it is between 2 and 5 minutes.

The average score of the respondents about the oral health status of the elderly was 37.44 and its standard

deviation was 7.24. Considering that the upper limit of the questionnaire score is 60 and the lower limit is 12, the value of this test is 36. Based on the findings of this research, it can be seen in **Table 2** that the average oral health in the elderly is 37.44, which is more than the value of the test.

**Table 2.** Descriptive statistics related to the sample t-tech exam about the research question

| Agent       | Number | Mean  | Standard deviation | Standard error of the mean |
|-------------|--------|-------|--------------------|----------------------------|
| Oral Health | 158    | 37.44 | 7.236              | 0.576                      |

In **Table 3**, according to the T-test value (2.507) and the obtained significance level ( $P = 0.013$ ) which is less than 0.05, the main question is accepted and with a confidence of 0.95 it can be claimed said that the oral health of the elderly is relatively favorable.

**Table 3.** Inferential results of a sample T-Tech test to test the research question (Value of test = 36)

| Agent       | T-test | Degree of freedom | Significant level | Mean difference | 95% confidence interval for the difference of means |             |
|-------------|--------|-------------------|-------------------|-----------------|-----------------------------------------------------|-------------|
|             |        |                   |                   |                 | Lower limit                                         | Upper limit |
| Oral Health | 2.507  | 157               | 0.013             | 1.443           | 0.306                                               | 2.58        |

Pearson's correlation coefficient was used to measure the relationship between the oral and dental health of the elderly and their age, the results of which are presented in the table. As can be seen in **Table 4**, at the two-range significance level, the significance level of Pearson's  $r$  correlation test to examine the relationship between the two variables of oral and dental health of

the elderly and age is 0.004. In other words, there is an inverse and significant relationship between the oral and dental health of the elderly and their age; that is, with increasing age, the level of oral health in the elderly decreases, and vice versa, the lower the age of the elderly, the level of oral and dental health increases.

**Table 4.** Pearson's R correlation test to investigate the relationship between oral and dental health of the elderly with age

| Variables                                     | Correlation coefficient | Significant level | Number |
|-----------------------------------------------|-------------------------|-------------------|--------|
| Oral and dental health of the elderly and age | - 0.230**               | 0.004             | 158    |

\*\*  $P < 0.01$

Independent samples t-test was used to investigate the relationship between oral and dental health and the gender of the elderly. According to the findings of this research, the results of **Table 5** show that according to the assumption of homogeneity of variances ( $P = 0.499$ ) and considering that the calculated  $t$  is

significant at the 0.05 level ( $P \leq 0.05$ ), it can be concluded that the level of oral and dental health of the elderly is different based on gender. As shown in **Table 5**, this average is higher among elderly men (38.5) than among elderly women (36.04).

**Table 5.** The results of the t-test of two independent samples regarding the comparison of oral and dental health of the elderly according to gender

| Variable    | Gender | N  | Mean  | Standard deviation | F Lon | The significance level of F | T-test | Degree of freedom | Significant level |
|-------------|--------|----|-------|--------------------|-------|-----------------------------|--------|-------------------|-------------------|
| Oral Health | Male   | 90 | 38.50 | 7.263              | 0.458 | 0.499                       | 2.136  | 156               | 0.034             |

|        |    |       |       |
|--------|----|-------|-------|
| Female | 68 | 36.04 | 7.011 |
|--------|----|-------|-------|

According to the significance level value obtained ( $P = 0.0001$ ) and the  $F = 14.306$  statistic in **Table 6**, we see that since the significance level value is less than 0.001, with confidence of 0.99 it can be claimed that there is a significant relationship between the oral and dental health of the elderly and the level of literacy. More

precisely, the minimum average oral and dental health of the elderly in one of the education level groups is significantly different from the rest. We performed Dunnett's post hoc test to find out which group's mean is different from the rest.

**Table 6.** One-way analysis of oral and dental health of the elderly with literacy variable.

| Variable | Categories       | Sum of squares | Degree of freedom | Mean square | F statistic | Significant level |
|----------|------------------|----------------|-------------------|-------------|-------------|-------------------|
| Literacy | Between groups   | 2630.77        | 5                 | 526.155     | 14.306      | 0.0001            |
|          | Within the group | 5590.212       | 152               | 36.778      |             |                   |
|          | Total            | 8220.987       | 157               | -           |             |                   |

As can be seen in **Table 7**, using Dunnett's C test, there is a significant difference in the average oral health between the educational group without formal education and the educational groups of middle school, diploma, and bachelor and above. In addition, there is a significant difference in the average oral and dental health between the elementary education group and the middle school, diploma, post-diploma, and bachelor's education groups, but there is no significant difference in other comparisons. In fact, in the group where the

elderly are without formal education, the level of oral and dental health is lower than the educated groups with middle school, diploma, bachelor's, and higher education. In addition, the level of oral and dental health in people with primary education level is far lower than the educational groups of middle school, diploma, post-diploma, and bachelor and above. In other words, with the increase in the literacy level of the elderly, their oral and dental health has improved.

**Table 7.** Pair-by-pair comparison results by Dunnett's C post hoc test (dependent variable: Oral and dental health)

| Literacy level      | Mean  | Standard deviation | No formal education | Elementary | Middle | Diploma | Associate degree |
|---------------------|-------|--------------------|---------------------|------------|--------|---------|------------------|
| No formal education | 33.37 | 8.11               | -                   | -          | -      | -       | -                |
| Elementary          | 33.56 | 4.45               | NS                  | -          | -      | -       | -                |
| Middle              | 39.97 | 6.28               | *                   | *          | -      | -       | -                |
| Diploma             | 42.27 | 3.95               | *                   | *          | NS     | -       | -                |
| Associate degree    | 42.25 | 6.16               | NS                  | *          | NS     | NS      | -                |
| Bachelor and above  | 44.25 | 6.41               | *                   | *          | NS     | NS      | NS               |

NS: Non-significant difference between two means; \*: Significant difference using Dunnett's C method

This research was conducted to determine the relationship between oral health and demographic characteristics of the elderly. According to the results of this research, there was an inverse and significant relationship between the oral and dental health of the elderly and their age; That is, with increasing age, the level of oral health in the elderly decreases, and on the contrary, the lower the age of the elderly, the better their oral and dental health. Shah in India also showed in his study that with increasing age, the number of elderly with decayed teeth increases. The result of Nicolau *et al.*'s research was also in line with the results

of our research [27]. With increasing age in the old age period, factors such as physical limitations and reduced social relationships cause the elderly to pay less attention to their oral health, and these factors provide the basis for the decline of oral and dental health in the elderly.

According to the results of this research, the level of oral and dental health of the elderly is different based on gender. By examining the data of this study, it was observed that the oral and dental health status of elderly men is better and more satisfactory than that of elderly women. Women face difficult mental and physical

conditions throughout their lives, which have a great impact on their oral and dental health, and one of these conditions is fertility and multiple births. During this period, women's oral and dental health is greatly affected. The decrease in oral and dental health in women begins at the beginning of the reproductive period and becomes more serious with the increase in the number of pregnancies. There is evidence that many factors that increase the risk of caries are more common in women than in men [28, 29]. Among the most important of these factors, we can mention hormonal fluctuations, eating habits, and the special social role of women in the family, which can disturb the oral and dental health of women. A significant decrease in oral and dental health during pregnancy hurts the quality of life of women [30]. Shah and Sundaram's study in India showed that gender differences do not affect the oral and dental health of the elderly [31].

In this study, the oral and dental health status of the elderly had a significant relationship with their educational status. In this regard, Hernández-Palacios *et al.*'s research was in line with the results of this research [32]. In his study in Sweden, Paulander *et al.* showed that the number of missing teeth in the elderly with a lower literacy level is significantly higher than the number of missing teeth in literate people [33]. Tsakos *et al.* in England showed in their study that there is a direct relationship between oral and dental health status and education level based on the oral and dental health assessment index in the elderly [34]. Therefore, according to the results and various studies, it can be concluded that the higher the level of literacy, the better the oral and dental health status of people, which the results of this study also confirm.

## Conclusion

This study aimed to determine the relationship between demographic characteristics and oral health of the elderly. According to the results of this research, the amount of oral and dental problems of the elderly increases with age. In addition, the prevalence of oral and dental problems was lower in men than in women. Most of the participants in this research had primary education. The results of this research show that increasing the level of literacy and education can play an important role in reducing the oral and dental problems of the elderly. Considering the great importance of oral and dental health in increasing the quality of life of the elderly, it is necessary to pay attention to their demographic characteristics when designing interventions to improve the oral health of the elderly.

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## References

1. Wilson J, Heinsch M, Betts D, Booth D, Kay-Lambkin F. Barriers and facilitators to the use of e-health by older adults: A scoping review. *BMC Public Health*. 2021;21(1):1556. doi:10.1186/s12889-021-11623-w
2. Pywell J, Vijaykumar S, Dodd A, Coventry L. Barriers to older adults' uptake of mobile-based mental health interventions. *Digit Health*. 2020;6:2055207620905422. doi:10.1177/2055207620905422
3. WHO. World report on aging and health. Geneva: World Health Organization; 2015.
4. United Nations. World population ageing: 1950-2050. New York: United Nations; 2015.
5. Rodakowska E, Mierzyńska K, Bagińska J, Jamiolkowski J. Quality of life measured by OHIP-14 and GOHAI in elderly people from Bialystok, north-east Poland. *BMC Oral Health*. 2014;14(1):106. doi:10.1186/1472-6831-14-106
6. Petersen PE, Kandelman D, Arpin S, Ogawa H. Global oral health of older people-call for public health action. *Community Dent Health*. 2010;27(4):257-67.
7. McGrath C. Oral health behind bars: A study of oral disease and its impact on the life quality of an older prison population. *Gerodontology*. 2002;19(2):109-14.
8. Locker D. Dental status, xerostomia and the oral health-related quality of life of an elderly institutionalized population. *Spec Care Dentist*. 2003;23(3):86-93. doi:10.1111/j.1754-4505.2003.tb01667.x
9. Ettinger RL. Oral health and the aging population. *J Am Dent Assoc*. 2007;138:S5-6. doi:10.14219/jada.archive.2007.0357
10. Poudel P, Paudel G, Acharya R, George A, Borgnakke WS, Rawal LB. Oral health and healthy aging: A scoping review. *BMC Geriatr*. 2024;24(1):33. doi:10.1186/s12877-023-04613-7
11. De Marchi RJ, Hugo FN, Hilgert JB, Padilha DM. Association between oral health status and nutritional status in South Brazilian independent-living older people. *Nutrition*. 2008;24(6):546-53. doi:10.1016/j.nut.2008.01.054

12. Tuominen R, Reunanen A, Paunio M, Paunio I, Aromaa A. Oral health indicators poorly predict coronary heart disease deaths. *J Dent Res.* 2003;82(9):713-8. doi:10.1177/154405910308200911
13. Azarpazhooh A, Leake JL. Systematic review of the association between respiratory diseases and oral health. *J Periodontol.* 2006;77(9):1465-82. doi:10.1902/jop.2006.060010
14. Coleman P. Improving oral health care for the frail elderly: A review of widespread problems and best practices. *Geriatr Nurs.* 2002;23(4):189-98. doi:10.1067/mgn.2002.126964
15. Hung HC, Joshipura KJ, Colditz G, Manson JE, Rimm EB, Speizer FE, et al. The association between tooth loss and coronary heart disease in men and women. *J Public Health Dent.* 2004;64(4):209-15. doi:10.1111/j.1752-7325.2004.tb02755.x
16. Beck JD, Offenbacher S. The association between periodontal diseases and cardiovascular diseases: A state-of-the-science review. *Ann Periodontol.* 2001;6(1):9-15. doi:10.1902/annals.2001.6.1.9
17. Lee KS, Kim EK, Kim JW, Choi YH, Mechant AT, Song KB, et al. The relationship between metabolic conditions and prevalence of periodontal disease in rural Korean elderly. *Arch Gerontol Geriatr.* 2014;58(1):125-9. doi:10.1016/j.arch-ger.2013.08.011
18. Southerland JH. Periodontitis may contribute to poor control of hypertension in older adults. *J Evid Based Dent Pract.* 2013;13(3):125-7. doi:10.1016/j.jeb-dp.2013.07.016
19. Taylor GW, Loesche WJ, Terpenning MS. Impact of oral diseases on systemic health in the elderly: Diabetes mellitus and aspiration pneumonia. *J Public Health Dent.* 2000;60(4):313-20. doi:10.1111/j.1752-7325.2000.tb03341.x
20. Motallebnejad M, Mehdizadeh S, Najafi N, Sayyadi F. The evaluation of oral health-related factors on the quality of life of the elderly in Babol. *Contemp Clin Dent.* 2015;6(3):313-7. doi:10.4103/0976-237X.161867
21. Hassel AJ, Koke U, Schmitter M, Rammelsberg P. Factors associated with oral health-related quality of life in institutionalized elderly. *Acta Odontol Scand.* 2006;64(1):9-15. doi:10.1080/00016350500326211
22. Saarela RKT, Hiltunen K, Kautiainen H, Roitto HM, Mäntylä P, Pitkälä KH. Oral hygiene and health-related quality of life in institutionalized older people. *Eur Geriatr Med.* 2022;13(1):213-20. doi:10.1007/s41999-021-00547-8
23. Bianco A, Mazzea S, Fortunato L, Giudice A, Papadopoli R, Nobile CGA, et al. Oral health status and the impact on oral health-related quality of life among the institutionalized elderly population: A cross-sectional study in an area of southern Italy. *Int J Environ Res Public Health.* 2021;18(4):2175. doi:10.3390/ijerph18042175
24. Atchison KA, Dolan TA. Development of the geriatric oral health assessment index. *J Dent Educ.* 1990;54(11):680-7.
25. El Osta N, Tubert-Jeannin S, Hennequin M, Naaman NB, El Osta L, Geahchan N. Comparison of the OHIP-14 and GOHAI as measures of oral health among elderly in Lebanon. *Health Qual Life Outcomes.* 2012;10(1):131. doi:10.1186/1477-7525-10-131
26. Locker D, Matear D, Stephens M, Lawrence H, Payne B. Comparison of the GOHAI and OHIP 14 as measures of the oral health related quality of life of the elderly. *Community Dent Oral Epidemiol.* 2001;29(5):373-81. doi:10.1111/j.1600-0528.2001.290507.x
27. Nicolau B, Srisilapana P, Marcenes W. Number of teeth and risk of root caries. *Gerodontology.* 2000;17(2):91-6. doi:10.1111/j.1741-2358.2000.00091.x
28. Lukacs JR. Sex differences in dental caries experience: Clinical evidence, complex etiology. *Clin Oral Investig.* 2011;15(5):649-56. doi:10.1007/s00784-010-0445-3
29. Bertilsson C, Nylund L, Vretemark M, Lingström P. Dental markers of biocultural sex differences in an early modern population from Gothenburg, Sweden: Caries and other oral pathologies. *BMC Oral Health.* 2021;21(1):304. doi:10.1186/s12903-021-01667-0
30. Acharya S, Bhat PV, Acharya S. Factors affecting oral health-related quality of life among pregnant women. *Int J Dent Hyg.* 2009;7(2):102-7. doi:10.1111/j.1601-5037.2008.00351.x
31. Shah N, Sundaram KR. Impact of socio-demographic variables, oral hygiene practices, oral habits and diet on dental caries experience of Indian elderly: A community-based study. *Gerodontology.* 2004;21(1):43-50. doi:10.1111/j.1741-2358.2004.00010.x
32. Hernández-Palacios RD, Ramírez-Amador V, Jarillo-Soto EC, Irigoyen-Camacho ME, Mendoza-Núñez VM. Relationship between gender, income and education and self-perceived oral health among elderly Mexicans: An exploratory study. *Cien Saude Colet.*

2015;20(4):997-1004. doi:10.1590/1413-81232015204.00702014

33. Paulander J, Axelsson P, Lindhe J. Association between level of education and oral health status in 35-, 50-, 65- and 75-year-olds. *J Clin Periodontol.* 2003;30(8):697-704. doi:10.1034/j.1600-051X.2003.00357.x
34. Tsakos G, Sheiham A, Iliffe S, Kharicha K, Harari D, Swift CG, et al. The impact of educational level on oral health-related quality of life in older people in London. *Eur J Oral Sci.* 2009;117(3):286-92. doi:10.1111/j.1600-0722.2009.00619.x