

ORAL HEALTH AND HEALTH PROMOTION IN ELDERLY PRE-FRAGILE GROUP

SAÚDE BUCAL E PROMOÇÃO DA SAÚDE EM IDOSOS PRÉ-FRÁGEIS

SALUD BUCAL Y PROMOCIÓN DE LA SALUD EN EL GRUPO DE ANCIANOS PREFRÁGILES



<https://doi.org/10.56238/arev7n11-027>

Submission date: 10/05/2025

Publication Date: 11/05/2025

Maria Cecilia Ciaccio Vendola¹, Wilson Jacob Filho²

ABSTRACT

Objectives: to compare two groups of pre-frail elderly people from different outpatient clinics, in aspects of oral and systemic health.

Methods: this is a cross-sectional observational study with 36 pre-frail elderly people, from the Frailty (GPFF) and the Elderly Health Promotion (GPFG) Outpatient Clinic, undergoing the same protocol clinical-dentistry: number of teeth, type of dental prosthesis, soft tissue injuries, as well as number of diseases and the use of medications at the last consultation. They were also evaluated by the GOHAI (Geriatric Oral Health Assessment), an instrument that subjectively correlates oral health (three dimensional perceptions) with quality of life.

Results: in the total group, 55.5% were edentulous, while the others had 5,33 teeth on average. The GPFG is significantly older than the GPFF ($p = 0.02$). There was no significant difference in the use of prostheses or soft tissue injuries between the groups, but the GOHAI score was poor in the GPFF and the best results in the Physical and Psychic dimensions were from the GPFG ($p=0.005$ and $p=0.001$, respectively). The number of systemic diseases had a higher median in the GPFF ($p<0.001$), as well as the number of medications used ($p=0.037$).

Conclusion: even in patients classified as Pre-Frail, encouraging self-care with an emphasis on oral health, in an Elderly Health Promotion Program, showed interesting differences in health and quality of life parameters.

Keywords: Oral Health. Pre-Frail. Aging. Elderly. Health Promotion.

RESUMO

Objetivos: comparar dois grupos de idosos pré-frágeis de diferentes ambulatórios, em aspectos de saúde bucal e sistêmica.

Métodos: estudo observacional transversal com 36 idosos pré-frágeis, dos ambulatórios de Fragilidade (GPFF) e Promoção da Saúde do Idoso (GPFG), submetidos ao mesmo protocolo clínico-odontológico: número de dentes, tipo de prótese dentária, lesões de tecidos moles, além de número de doenças e uso de medicamentos na última consulta. Os

¹ Master of Science in Medical Sciences. Faculdade de Medicina da Universidade de São Paulo.

² Dr. Faculdade de Medicina da Universidade de São Paulo.

participantes também foram avaliados pelo GOHAI (Avaliação Geriátrica da Saúde Bucal), instrumento que correlaciona subjetivamente a saúde bucal (percepções tridimensionais) com a qualidade de vida.

Resultados: no grupo total, 55,5% eram edêntulos, enquanto os demais apresentavam, em média, 5,33 dentes. O grupo GPFG apresentou idade significativamente maior que o grupo GPFF ($p = 0,02$). Não houve diferença significativa no uso de próteses ou lesões de tecidos moles entre os grupos, mas a pontuação do GOHAI foi baixa no GPFF e os melhores resultados nas dimensões Física e Psíquica foram obtidos no GPFG ($p=0,005$ e $p=0,001$, respectivamente). O número de doenças sistêmicas apresentou mediana maior no GPFF ($p<0,001$), assim como o número de medicamentos utilizados ($p=0,037$).

Conclusão: mesmo em pacientes classificados como pré-frágeis, o incentivo ao autocuidado com ênfase na saúde bucal, em um Programa de Promoção da Saúde do Idoso, demonstrou diferenças interessantes nos parâmetros de saúde e qualidade de vida.

Palavras-chave: Saúde Bucal. Pré-Fragilidade. Envelhecimento. Idosos. Promoção da Saúde.

RESUMEN

Objetivos: comparar dos grupos de personas mayores en prefragilidad, procedentes de diferentes clínicas ambulatorias, en cuanto a su salud bucal y sistémica.

Métodos: se trata de un estudio observacional transversal con 36 personas mayores en prefragilidad, de la Clínica de Fragilidad (GPFF) y la Clínica de Promoción de la Salud en Personas Mayores (GPFG), que siguieron el mismo protocolo clínico-odontológico: número de dientes, tipo de prótesis dental, lesiones de tejidos blandos, así como número de enfermedades y uso de medicamentos en la última consulta. También se evaluaron mediante el GOHAI (Valoración Geriátrica de la Salud Bucal), un instrumento que correlaciona subjetivamente la salud bucal (percepciones tridimensionales) con la calidad de vida.

Resultados: en el grupo total, el 55,5 % eran edéntulos, mientras que el resto tenía un promedio de 5,33 dientes. El grupo GPFG era significativamente mayor que el grupo GPFF ($p = 0,02$). No se observaron diferencias significativas en el uso de prótesis ni en las lesiones de tejidos blandos entre los grupos. Sin embargo, la puntuación GOHAI fue baja en el grupo GPFF, mientras que los mejores resultados en las dimensiones física y psíquica se obtuvieron en el grupo GPFG ($p=0,005$ y $p=0,001$, respectivamente). El número de enfermedades sistémicas presentó una mediana mayor en el grupo GPFF ($p<0,001$), al igual que el número de medicamentos utilizados ($p=0,037$).

Conclusión: incluso en pacientes clasificados como prefrágiles, el fomento del autocuidado, con especial énfasis en la salud bucal, dentro de un programa de promoción de la salud en adultos mayores, mostró diferencias significativas en los parámetros de salud y calidad de vida.

Palabras clave: Salud Bucodental. Prefragilidad. Envejecimiento. Personas Mayores. Promoción de la Salud.

1 INTRODUCTION

The global elderly population is expected to increase significantly in the coming decades, even considering the impact of the COVID-19 pandemic, which temporarily affected longevity trends. Women continue to have higher life expectancy than men. In Brazil, according to the Brazilian Institute of Geography and Statistics (IBGE) in 2020, the life expectancy for women was 80.1 years, while for men, it was 73.1 years. During the SARS-CoV-2 pandemic, there was a decline in the average life expectancy due to COVID-19 mortality, reducing the Brazilian population's average lifespan from 76.74 years to 74.96 years.¹

In 1997, Rowe & Kahn² proposed possible trajectories of human aging, emphasizing low risk of diseases and functional disabilities, high physical and mental performance, and active engagement with life. These parameters have since been associated with healthy aging. However, in the current scenario, the gradual decline of muscle function is present in a large proportion of elderly individuals.³

1. Frailty is a geriatric condition characterized by increased vulnerability to homeostasis alterations following a stressor event, which increases the risk of adverse outcomes. Frailty and sarcopenia are distinct but interrelated conditions that elevate the risk of falls, disabilities, and mortality.⁴ This condition results from the overall functioning of the body, involving the balance of different organs and systems. Therefore, prevention, diagnosis, and/or treatment of any oral cavity disorder should be considered a means to minimize the systemic effects of medications and treatments that may become necessary as frailty progresses.⁵

2 Oral Health

Oral health has become increasingly significant as it represents a primary barrier that can either increase or decrease risks affecting systemic health. The aging process of the oral cavity can begin in youth due to multifactorial causes, with psychological stress being a key aggravating factor, characterizing the Syndrome of Early Oral Aging (SEPB).⁶

Edentulism has been associated with frailty.^{7,8} Since the oral cavity is the initial stage of the digestive process, it is evident that intraoral structures and stomatognathic functions related to mastication and swallowing, when affected by loss of tone and strength due to aging, alongside the number and quality of remaining teeth, contribute significantly to frailty risks.⁹ Difficulties in proper bolus formation due to poorly adapted prostheses and/or other causes of dysphagia are characteristic of oral frailty¹⁰ concluded that elderly individuals

subjected to specific tongue-strengthening exercises exhibit increased supra-hyoid muscle strength and tongue thickness, resulting in enhanced tongue muscle force.¹¹ Shimizu et al.¹² also associated low tongue pressure with dysphagia and malnutrition in sarcopenic elderly individuals.

Studies have shown that behavioral health programs (such as tongue positioning when swallowing, lip function, and oral hygiene frequency) and the Repetitive Saliva Swallowing Test (RSST) effectively improve both function and oral hygiene in pre-frail individuals.¹³

During the process of oral aging, certain multimorbidities such as diabetes, obesity, dementia, and smoking, when associated with senescence, contribute to increased inflammatory states, heightening the risk of periodontal disease.¹⁴

Oral diseases have been identified as precursors of frailty, with consequent dietary changes becoming a crucial aspect to monitor in the overall alterations involving all oral functions.¹⁵

3 Frailty in Aging

According to Vendola & Jacob-Filho,¹⁶ there is a clear association between oral health, general health conditions, and the development of Frailty Syndrome in elderly individuals.

A recent systematic review and meta-analysis by Veronesi et al.¹⁷ observed that pre-frailty and frailty are common among the elderly, with frailty affecting 1 in 4 older adults, while 1 in 3 falls into the pre-frail category.

2 OBJECTIVES

To compare two groups of pre-frail elderly individuals from different outpatient settings, analyzing key aspects of oral and systemic health.

3 METHODS

This study included 36 pre-frail elderly individuals, of both sexes, aged 60 years or older. Among them, 27 were from a Health Promotion Outpatient Clinic called the Multidisciplinary Elderly Assistance Group – GAMIA (GPFG), and 9 were from a Frailty Outpatient Clinic (GPFF).

Participants were classified as pre-frail according to the Self-Reported Fried Frailty Criteria,¹⁸ scoring 1 or 2 out of the 5 assessed criteria.

The study was conducted through individualized interviews by a single researcher, following standardized procedures, and preceded by the signing of the Informed Consent Form (ICF).

The Geriatric Oral Health Assessment Index (GOHAI)¹⁹ was applied to evaluate oral hygiene conditions and self-perceptions influencing quality of life. This index comprises 12 questions covering physical, psychological, and pain-related dimensions, with response options of "always," "sometimes," or "never," scoring 1, 2, and 3, respectively. The scores of questions 3, 5, and 7 are reversed (3, 2, and 1). The total score allows subclassification as: Excellent (34–36), Fair (30–33), or Poor (≤ 29).

Clinical examination of the oral cavity assessed oral health conditions through a specific and standardized dental examination. Data were recorded in an Excel spreadsheet, categorized into the following variables:

- Number of teeth (ND)
- Use of upper complete denture (PTS)
- Use of lower complete denture (PTI)
- Use of upper removable partial denture (PPS)
- Use of lower removable partial denture (PPI)
- Use of conventional fixed prosthesis (PFC)
- Use of implant-supported prosthesis (PSI)
- Presence of soft tissue lesions (LTM)

Updated information on systemic diseases and the number of medications used was collected from electronic medical records during the most recent consultation. This study is part of an observational cross-sectional study approved by the Research Ethics Committee of HCFMUSP under approval number 2694474.

4 RESULTS

Despite the difference in the number of elderly individuals in each group, an interesting observation was made regarding the mean ages. The mean age was lower in the pre-frail group from the Frailty Outpatient Clinic ($p=0.02$), suggesting that pre-frailty occurs later among those enrolled in a health promotion program. The description is below (Table 1):

The distribution of teeth in the total sample showed a high percentage of edentulism (55.5%) and an average of 12 teeth among the 16 dentate individuals. The GPFG group had

a higher numerical number of teeth, resulting in an overall mean of 5.33 teeth per individual, according to the table below (Table 2):

The groups did not show significant differences regarding soft tissue lesions (LTM) and prosthesis use. However, a high percentage of complete denture users was observed. (These results can be seen in the table below (Table 3):

GOHAI Oral Hygiene Index of the GPFF showed "Poor" score in 8 out of 9 patients, with statistically significant differences between groups occurring in the physical and psychological dimensions. The GPFG medians were higher, indicating greater masticatory comfort, aesthetic satisfaction, and socialization compared to the GPFF group. And all results found are shown below, the oral hygiene comparison (score) and the median comparison about the three dimensions (Table 4):

Regarding the number of systemic diseases and medications used, the groups showed statistical differences, with GPFF having higher medians for both the number of systemic diseases and medications in use, in according the table below (Table 5):

5 DISCUSSION

Edentulism and poor oral hygiene are currently precursors to oral frailty in the elderly, making Table 1

these areas of high vulnerability when assessing pre-frail individuals. In this study, we observed this scenario in the sample of the GPFF group, with a high percentage of edentulism and poor oral hygiene. A recent systematic mapping review by Jesus et al.²⁰ showed that there are few evidence-based guidelines on oral care for dependent elderly residents in institutions, even though oral hygiene recommendations are reported. Borg-Bartolo et al.'s²¹ systematic review and meta-analysis concluded that untreated dental caries and lost teeth are prevalent at the global level among the elderly population. Current studies show that tongue pressure on the hard palate during swallowing is greater and more effective in edentulous individuals using full upper dentures compared to those without rehabilitation, which aids in swallowing.¹¹ In elderly individuals, labial and tongue strength may prevent and improve sarcopenic dysphagia.²² In this study, both pre-frail groups showed a high percentage of total upper denture use. The GPFF group had high levels of edentulism and poor oral hygiene, with consequences for their self-perception regarding aesthetics and physicality (appearance, pain, interference with chewing).

A recent systematic review and meta-analysis by Hussein et al.²³ concluded that as the elderly become more dependent, their oral hygiene care for teeth and dentures decreases, resulting in ineffective mastication. Genç & Uslu²⁴ published a cross-sectional study with 321 elderly individuals using various instruments, including the GOHAI, finding that more than half of the sample had poor oral hygiene and varying levels of frailty. Studies have found a direct association between poor oral health and frailty in the elderly.²⁵ A study with 102 pre-frail elderly individuals in Japan¹³ applied an educational methodology to improve behaviors related to oral functions and achieved significant improvement in oral hygiene, mucosa, and teeth or prostheses in these elderly individuals. Our study showed that the pre-frail individuals from the Health Promotion Clinic had better oral hygiene scores, reflected in the physical and psychological domains, reinforcing the importance of educational content in health promotion.

- 4 According to Vieira et al.²⁶ the lack of natural teeth or prostheses can lead to difficulties in chewing, cause pain and dissatisfaction, and result in negative psychological impacts, all factors associated with frailty in the elderly. We observed that the pre-frail individuals from the Fragility Clinic, with a higher percentage of edentulous individuals, performed worse than the other group in terms of the GOHAI medians for psychological and physical aspects, which relate to satisfaction with self-image and mastication, while the GPFG had 51.8% dentate individuals with an average of 13 teeth.

A recent systematic review-meta-analysis using multidimensional tools (greater vulnerability to functional decline) concluded that more pre-frail elderly individuals are in hospital care than in home care settings.¹⁷ Thus, we found the GPFF with a much higher number of systemic diseases and medications in use, confirming this vulnerability.

Nagatani et al.²⁷ conducted a cohort study in Korea (2023) with 1410 elderly individuals studying the status of oral frailty (non-frail, pre-frail, and frail), and the oral frailty group showed a significantly higher risk rate for recently developed mild cognitive impairment (reduced number of remaining teeth, low tongue pressure, and difficulty eating hard foods correlated significantly). The cohort study by Arenas-Márquez et al.²⁸ with elderly individuals in family homes found an accumulated incidence of 30 cases per 100 edentulous participants with masticatory difficulties over eight years, who had a higher risk of developing frailty. Our study showed a total sample of pre-frail individuals with 44.4% dentate, of which the GPFF group had only 2 dentate individuals, along with very low oral hygiene scores and

dissatisfaction with their own appearance and oral function, signaling increased risk factors for developing physical frailty.

Chu et al.²⁹ published a study in 2023 with 202,537 participants using the UK Biobank to investigate 31 biomarkers related to pre-frailty and frailty, concluding that many of these biomarkers were connected to pre-frailty and frailty. A cohort of hospitalized pre-frail elderly individuals concluded that some systemic diseases and medications significantly increased the risk of mortality.³⁰ The GPFF group indeed showed both a high number of systemic diseases and medications in use, with a significant statistical difference related to the health promotion group.

6 FINAL CONSIDERATIONS

In health promotion educational programs, pre-frail individuals achieve more years in this condition, preventing further local and systemic aggravations. Oral health care showed interesting differences in health parameters and quality of life. In this context, we emphasize the need for more studies with the pre-frail elderly population and their association with oral frailty.

Tables attached in separated doc:

1 Pre-frail individuals in the frailty and GAMIA groups by sex and age

2 Distribution of GPFF and GPFG by number of teeth

3 Comparison between pre-frail individuals (GPFF and GPFG) regarding the presence of prostheses and oral lesions

4 Comparison of pre-frail groups in relation to the GOHAI index

5 Comparison of pre-frail individuals by clinic of origin (GPFF and GPFG) regarding the number of systemic diseases and medications used

REFERENCES

- 1 Arenas-Márquez, M. J., Tôrres, L. H. N., Borim, F. S. A., Yassuda, M. S., Neri, A. L., & Sousa, M. L. R. (2022). Perda de função mastigatória e risco de fragilidade em idosos vivendo em domicílios familiares no Estado de São Paulo. *Revista Brasileira de Geriatria e Gerontologia*, 25(5), Article e210234. <https://doi.org/10.1590/1981-22562022025.210234.pt>
- 2 Atchison, K. A., & Dolan, T. A. (1990). Development of the geriatric oral health assessment index. *Journal of Dental Education*, 54(11), 680–687.

- 3 Bianco, A., Mazzea, S., Fortunato, L., Giudice, A., Papadopoli, R., Nobile, C. G. A., et al. (2021). 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. *International Journal of Environmental Research and Public Health*, 18(4), Article 2175. <https://doi.org/10.3390/ijerph18042175>
- 4 Borg-Bartolo, R., Roccuzzo, A., Molinero-Mourelle, P., Schimmel, M., Gambetta-Tessini, K., Chaurasia, A., et al. (2022). Global prevalence of edentulism and dental caries in middle-aged and elderly persons: A systematic review and meta-analysis. *Journal of Dentistry*, 127, Article 104335. <https://doi.org/10.1016/j.jdent.2022.104335>
- 5 Boschetto, R. M., Barbosa, L. C., Souza, T. M., & Bastos, R. S. (2023). Edentulismo e fragilidade em pessoas idosas domiciliadas: Um estudo transversal. *Revista Brasileira de Geriatria e Gerontologia*, 26, Article e230165. <https://doi.org/10.1590/1981-22562023026.230165.pt>
- 6 Cano-Escalera, G., Graña, M., Irazusta, J., Labayen, I., Gonzalez-Pinto, A., & Besga, A. (2023). Mortality risks after two years in frail and pre-frail older adults admitted to hospital. *Journal of Clinical Medicine*, 12(9), Article 3103. <https://doi.org/10.3390/jcm12093103>
- 7 Chan, D. C. D., Tsou, H. H., Chang, C. B., Yang, R. S., Tsauo, J. Y., Chen, C. Y., et al. (2017). Integrated care for geriatric frailty and sarcopenia: A randomized control trial. *Journal of Cachexia, Sarcopenia and Muscle*, 8(1), 78–88. <https://doi.org/10.1002/jcsm.12132>
- 8 Chu, W., Lynskey, N., Iain-Ross, J., Pell, J. P., Sattar, N., Ho, F. K., et al. (2023). Identifying the biomarker profile of pre-frail and frail people: A cross-sectional analysis from UK Biobank. *International Journal of Environmental Research and Public Health*, 20(3), Article 2421.
- 9 Colombo, R., Bertolini, S. M. M. G., Silva, J. C., & Macedo, A. B. (2019). A importância do treinamento físico funcional frente à sarcopenia decorrente do envelhecimento. *Arquivos Mudi*, 23(3), 22–24. <https://doi.org/10.4025/arqmudi.v23i3.51494>
- 10 Fried, L. P., Tangen, C. M., Walston, J., Newman, A. B., Hirsch, C., Gottdiener, J., et al. (2001). Frailty in older adults: Evidence for a phenotype. *The Journals of Gerontology: Series A, Biological Sciences and Medical Sciences*, 56(3), M146–M156. <https://doi.org/10.1093/gerona/56.3.m146>
- 11 Genç, F. Z., & Uslu, A. (2024). The relationship and affecting factors between oral health and frailty in the older people: A cross-sectional study. *Public Health Nursing*, 41(3), 438–445. <https://doi.org/10.1111/phn.13300>
- 12 Hogue, C. M., & Castrejón-Pérez, R. C. (2024). Oral health and frailty. In J. G. Ruiz & O. Theou (Eds.), *Frailty: A multidisciplinary approach to assessment, management, and prevention* (pp. 359–368). Springer.

- 13 Hussein, S., Kantawalla, R. F., Dickie, S., Suarez-Durall, P., Enciso, R., & Mulligan, R. (2022). Association of oral health and mini nutritional assessment in older adults: A systematic review with meta-analyses. *Journal of Prosthodontic Research*, 66(2), 208–220. https://doi.org/10.2186/jpr_d_20_00207
- 14 Instituto Brasileiro de Geografia e Estatística. (2022). Expectativa de vida. <https://www.ibge.gov.br/busca.html?searchword=expectativa%20de%20vida&searchphrase=all>
- 15 Jesus, R. M., Campos, F. L., Rodrigues, L. G., Perazzo, M. F., Soares, A. R. D. S., Ribeiro, M. T. F., et al. (2020). Guideline for oral care of dependent elders: Mapping review and cross-cultural adaptation to Portuguese-Brazil. *Brazilian Oral Research*, 34, Article e097. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0097>
- 16 Kondoh, J., Ono, T., Tamine, K., Fujiwara, S., Minagi, Y., Hori, K., et al. (2015). Effect of complete denture wearing on tongue motor biomechanics during swallowing in edentulous older adults. *Geriatrics & Gerontology International*, 15(5), 565–571. <https://doi.org/10.1111/ggi.12315>
- 17 Kotronia, E., Wannamethee, S. G., Papacosta, A. O., Whincup, P. H., Lennon, L. T., Visser, M., et al. (2021). Poor oral health and inflammatory, hemostatic, and cardiac biomarkers in older age: Results from two studies in the UK and USA. *The Journals of Gerontology: Series A, Biological Sciences and Medical Sciences*, 76(2), 346–351. <https://doi.org/10.1093/gerona/glaa096>
- 18 Linabarger, M., Griffin, S. O., & Hamilton, E. K. (2021). Utility of state-based basic screening survey reports for national oral health surveillance in older adults. *Preventing Chronic Disease*, 18, Article E31. <https://doi.org/10.5888/pcd18.200471>
- 19 Mafra, L. P. V., Penna, A. M., Garrido, G. O., Coutinho, M. P., Catapreta Junior, A. A., & Barros, S. B. (2023). Síndrome do envelhecimento precoce bucal: Uma revisão de literatura. In *Anais do 2º Congresso Tudo é Ciência: (Ser) humano na sociedade 5.0. Brasil, Volta Redonda*.
- 20 Mauceri, R., Arduini, S., Coppini, M., Bazzano, M., Trujillo, I., & Campisi, G. (2024). Drug assumption and awareness about adverse drug reactions. The right to know. The case of the bone-modyfing agents: A systematic review. *Frontiers in Oral Health*, 5, Article 1441601. <https://doi.org/10.3389/froh.2024.1441601>
- 21 Nagatani, M., Tanaka, T., Son, B. K., Kawamura, J., Tagomori, J., Hirano, H., et al. (2023). Oral frailty as a risk factor for mild cognitive impairment in community-dwelling older adults: Kashiwa study. *Experimental Gerontology*, 172, Article 112075. <https://doi.org/10.1016/j.exger.2022.112075>
- 22 Park, J. S., Lee, S. H., Jung, S. H., Choi, J. B., & Jung, Y. J. (2019). Tongue strengthening exercise is effective in improving the oropharyngeal muscles associated with swallowing in community-dwelling older adults in South Korea: A randomized trial. *Medicine*, 98(40), Article e17304. <https://doi.org/10.1097/md.00000000000017304>

- 23 Rapp, L., Sourdet, S., Vellas, B., & Lacoste-Ferré, M. H. (2017). Oral health and the frail elderly. *The Journal of Frailty & Aging*, 6(3), 154–160. <https://doi.org/10.14283/jfa.2017.9>
- 24 Rowe, J. W., & Kahn, R. L. (1997). Successful aging. *The Gerontologist*, 37(4), 433–440. <https://doi.org/10.1093/geront/37.4.433>
- 25 Sakaguchi, H. (2014). An oral function improvement program utilizing health behavior theories ameliorates oral functions and oral hygienic conditions of pre-frail elderly persons. *Kokubyo Gakkai Zasshi*, 81(2), 77–86.
- 26 Sakai, K., Nakayama, E., Yoneoka, D., Sakata, N., Iijima, K., Tanaka, T., et al. (2022). Association of oral function and dysphagia with frailty and sarcopenia in community-dwelling older adults: A systematic review and meta-analysis. *Cells*, 11(14), Article 2199. <https://doi.org/10.3390/cells11142199>
- 27 Shimizu, A., Maeda, K., Wakabayashi, H., Nishioka, S., Ohno, T., Nomoto, A., et al. (2021). Sarcopenic dysphagia with low tongue pressure is associated with worsening of swallowing, nutritional status, and activities of daily living. *The Journal of Nutrition, Health & Aging*, 25(7), 883–888. <https://doi.org/10.1007/s12603-021-1641-3>
- 28 Vendola, M. C. C., & Jacob-Filho, W. (2023). Impact of oral health on frailty syndrome in frail older adults. *Einstein (São Paulo)*, 21, Article eAO0103. https://doi.org/10.31744/einstein_journal/2023ao0103
- 29 Veronese, N., Custodero, C., Cella, A., Demurtas, J., Zora, S., Maggi, S., et al. (2021). Prevalence of multidimensional frailty and pre-frailty in older people in different settings: A systematic review and meta-analysis. *Ageing Research Reviews*, 72, Article 101498. <https://doi.org/10.1016/j.arr.2021.101498>
- 30 Vieira, B. L. C., Morais, L. P., Vargas-Ferreira, F., Guimarães, M. R. C., Mattos, F. F., & Vargas, A. M. D. (2021). Use and need of removable dental prostheses in an institutionalized Brazilian elderly population: A cross-sectional study. *Brazilian Oral Research*, 35, Article e134. <https://doi.org/10.1590/1807-3107bor-2021.vol35.0134>

ATTACHMENT

Table 1

Pre-frail individuals in the frailty and GAMIA groups by sex and age

	TOTAL (n=36)	GPFF (n=9)	GPFG (n=27)	P
GENDER n(%)	n(%)	n(%)		
M (Male)	07 (19.5)	0 (0)	7 (26)	
F (Female)	29 (80.5)	9 (100)	20 (74)	0.15 ¹
Age, mean (\pm SD)	-----	79.88 (6.43)	84.5 (5.53)	0.02 ²

GPFF = Pre-Frail Frailty Group, GPFG = Pre-Frail GAMIA Group, M = Male, F = Female
Statistical tests used: Fisher's exact test¹, Student's t-test²

Table 2

Distribution of GPFF and GPFG by number of teeth

	GPFF (n=9)	GPFG (n=27)	Total (n=36)
Edentulous n (%)	7 (77.7%)	13 (48.2%)	20 (55.5%)
Dentate n (%)	2 (22%)	14 (51.8%)	16 (44.4%)
Teeth n	11	181	192
Dentated Mean	5.5	13	12
Upper Teeth n (%)	3 (33.3%)	61 (22.5%)	
Lower Teeth n (%)	8 (77%)	120 (44.4%)	
Teeth Mean n (M)	1.22	6.70	5.33

GPFF: 1.22 | GPFG: 6.70 | Total: 5.33N(%) = percentage, n = number, M = mean
GPFF = Pre-Frail Frailty Group, GPFG = Pre-Frail GAMIA Group

Table 3

Comparison between pre-frail individuals (GPFF and GPFG) regarding the presence of prostheses and oral lesions

VARIABLE	GPFF (n=9)	GPFG (n=27)	*P
PTS, n (%)	7 (77.7)	20 (74)	0.99
PTI, n (%)	6 (66.6)	12 (44.4)	0.44
PPRS, n (%)	0 (0)	3 (11.1)	0.55

VARIABLE	GPFF (n=9)	GPFG (n=27)	*P
PPRI, n (%)	0 (0)	7 (25.9)	0.15
PFC, n (%)	0 (0)	2 (7.4)	0.99
PSI, n (%)	1 (11.1)	4 (14.8)	0.99
LTM, n (%)	1 (11.1)	3 (11.1)	0.99

PTS - Upper Complete Denture; PTI - Lower Complete Denture; PPRS - Upper Removable Partial Denture; PPRI - Lower Removable Partial Denture; PFC - Conventional Fixed Prosthesis; PSI - Implant-Supported Prosthesis; LTM - Soft Tissue Lesions. Statistical tests used: Mann-Whitney¹, Chi-Square², Student's t-test³

Table 4

Comparison of pre-frail groups in relation to the GOHAI index

SCORE	GPFF (n=9)	GPFG (n=27)	*P
Excellent	0	7 (25.92%)	0.17 ¹
Regular	1 (11.11%)	7 (25.92%)	
Poor	8 (88.88%)	13 (48%)	
Dimensions	GPFF (Median)	GPFG (Median)	* P
Physical	7	10	0.005 ²
Psychological	7	11	0.001 ²
Pain	10	10	0.91 ²
Total	26	31	0.012 ²

Score: Excellent (34-36), Regular (30-33), Poor (≤ 29).

Statistical tests used: Chi-Square¹, Mann-Whitney²*P=SD

Table 5

Comparison of pre-frail individuals by clinic of origin (GPFF and GPFG) regarding the number of systemic diseases and medications used

		GPFF	GPFG	*P
Systemic Diseases	M (\pm SD)	7 (2.29)	3.62 (1.14)	<0.001
Medications	M (\pm SD)	6.11 (2.97)	4.29 (1.85)	0.037

M=mean *P/ SD=standart deviation Statistical test used: Student's t-test