ARTYKUŁ ORYGINALNY / ORIGINAL PAPER
Otrzymano/Submitted: 19.05.2025 • Zaakceptowano/Accepted: 10.06.2025

Oral frailty in hospitalized geriatric patients. A retrospective cross-sectional study

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Abstract

Background. Oral frailty is an emerging concept in geriatric medicine that reflects the age-related decline in oral function, and it has gained increasing recognition as a key contributor to the broader "frailty domino" phenomenon. We aimed to assess: 1. the prevalence of oral frailty in Polish geriatric patients hospitalized in internal medicine ward, 2. whether oral frailty may be of predictive value regarding hospital length, costs of hospital stay, and death, and 3. whether oral frailty is associated with results of assessment in popular geriatric scales. ***Material and methods.*** Retrospective cross-sectional study. All patients aged 65 or older, admitted to our ward between October 2024, and December 2024 were enrolled. ***Results.*** 33 patients were included. Oral frailty index (OFI) was not evaluable in 11 patients (33.3%). "High risk" result in OFI scale was obtained by 16 patients (72.7%). OFI-8 score did not correlate with hospital length, costs of hospital stay, and death. OFI-8 score corresponded with results obtained in some other geriatric assessment scales, e.g. Barthel ADL Index, or the Norton Scale. ***Conclusions.*** Oral frailty, assessed by OFI-8 index is relatively common in Polish geriatric patients, hospitalized in internal medicine ward, with less than 20% classified as being of low, or moderate risk for oral frailty. However, in as much as 1/3 of patients, OFI-8 index is not evaluable. *Geriatria 2025;19:81-88. doi: 10.53139/G.20251914*

Keywords: geriatric assessment; inpatient; OFI-8; oral frailty

Introduction

Aging is a complex and irreversible physiological process that leads to a progressive decline in functional capacity [1,2]. Older age is also frequently accompanied by geriatric syndromes – such as frailty. Mental health disorders are also prevalent and often worsened by social isolation, loneliness or elder abuse [3,4]. According to the World Health Organization, in 2019, people aged 60 years and older numbered 1 billion people, with projections estimating 1.4 billion by 2030 and 2.1 billion by 2050, particularly driven by population growth in developing countries [5]. In recent years, Poland has witnessed an acceleration in population aging. At the end of 2021, the number of people aged 60 or more reached 9.7 million, representing 25.7% of the total population. According to projections by the Central Statistical Office, this number is expected to rise to 10.8 million by 2030 and to 13.7 million by 2050, at which point older adults will constitute nearly 40% of Poland's population [6].

Frailty is a clinically significant condition among older adults, characterized by a diminished physiological reserve and heightened vulnerability. Although it is associated with the natural ageing process, frailty represents an accelerated and extreme form of this decline, in which homeostatic mechanisms begin to fail [7-11]. As such, it has been recognized as a cornerstone of geriatric medicine and a key factor contributing to the onset of other geriatric syndromes [12]. Frailty is not a static state, while transitions between degrees of frailty can occur in both directions [13-15], the progression is most often worsening over time [16]. The prevalence of frailty increases significantly with age—from 11% in those aged 50–59 years to over 50% in those aged 90 and above [17].

Oral frailty is an emerging concept in geriatric medicine that reflects the age-related decline in oral function, and it has gained increasing recognition as a key contributor to the broader "frailty domino" phenomenon [18]. Traditionally viewed as a natural part of aging, the deterioration of oral function (manifested by reduced chewing ability, swallowing difficulties, and impaired communication) has now been identified as a clinically significant condition with wide-reaching implications [19,20]. Oral frailty not only impacts

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nutritional intake by limiting the variety and quality of consumed food, but also contributes to downstream effects such as malnutrition, sarcopenia, and physical frailty [18]. Furthermore, oral frailty is often accompanied by cognitive and physical decline, indicating its multidimensional nature. Poor dental hygiene, ill-fitting prostheses, and inadequate dietary habits exacerbate this cycle [19,20]. Evidence from long-term cohort studies and meta-analyses highlights a strong association between oral health indicators (such as number of teeth or dental biofilm) and survival outcomes [21-24]. In this context, oral frailty has gained recognition as an important aspect of geriatric health.

The primary aim of our study was to assess the prevalence of oral frailty in Polish geriatric patients hospitalized in internal medicine ward. The secondary aim was to assess whether oral frailty may be of predictive value regarding hospital length, costs of hospital stay, and death. Additionally, we aimed to assess whether oral frailty is associated with results of assessment in popular geriatric scales.

Material and methods

It was a retrospective cross-sectional study. All patients aged 65 or older, admitted to ward B of our Department, between October 2024, and December 2024 were enrolled. As a part of postgraduate training of the first author (AM) in all these patients, anamnesis and physical examination on admission was extended with elements of geriatric assessment, including the Barthel Index for Activities of Daily Living (Barthel ADL Index), the Norton Scale for Predicting Pressure Ulcer Risk, the Abbreviated Mental Test Score (AMTS), the short form of the Geriatric Depression Scale (GDS) and the Oral Frailty Index-8 (OFI-8) developed by Tanaka [25]. For the current study, results of above tests were harvested from case records, together with data on race, sex, and age of the patients, length of hospital stay, and death (if applicable). Additionally, all direct costs of hospital stay were assessed by one author (AŁ) and expressed in Polish zloty (PLN). Data were collected and analyzed at the beginning of 2025.

Statistical analysis was performed using Statistica 13.3 (StatSoft, Tulsa, OK, USA). Normality of data distribution was assessed with the Shapiro-Wilk test. Non-parametric tests were used in further analyses: Fisher's exact test, Mann-Whitney U test, and Spearman correlation test when appropriate. Results were presented as absolute values and percentage for discrete variables, or medians, interquartile ranges (IQR), and ranges for continuous variables. Results with $p<0.05$ were considered statistically significant.

The study was conducted according to the principles of the Declaration of Helsinki. The local Ethics Committee was informed about the study (confirmation no AKBE/30/2025). Due to the retrospective character of the study, as well as anonymization of the data, patients' written informed consent was redundant.

Results

Thirty-three patients were included into our analysis. All patients were Caucasians. Four patients (12%) died during hospitalization. Characteristics of the group presents table I.

OFI was not evaluable in 5 (28%) men and 6 (40%) women ($p=0.35$). Among 22 patients with evaluable OFI, OFI was not differentiated between sexes (median, range, and IQR: 8, 2-11, 5 in men, and 6, 3-10, 4 in women, respectively) ($p=0.82$). The prevalence of "high risk" result in OFI scale was obtained by 16 patients (72.7%). There was no statistically significant difference ($p=0.19$) in age between those with not evaluable OFI (median age 86 years, range 72-95, IQR 18), and those with evaluable OFI (median age 77, range 65-97, IQR 16). However, among those with evaluable OFI, there was a positive correlation between patients' age and OFI-8 score ($R=0.641$, $p<0.05$).

Length of hospital stay was not differentiated ($p=0.44$) between those with OFI not evaluable and those with OFI evaluable (median length in days, range, and IQR: 20, 3-75, 41 in the former, and 12, 3-54, 13 in the latter, respectively). Among those with OFI evaluable, length of hospital stay was not correlated with OFI-8 score.

Similarly, the direct costs of hospitalization were not differentiated ($p=0.53$) between those with OFI not evaluable, and those with OFI evaluable (median direct costs in PLN, range, and IQR: 25269.77, 2931.48-99508.82, 63982.60 in the former, and 15427.97, 3030.68-78893.62, 17464.78 in the latter, respectively). Among those with OFI evaluable, direct costs of hospital stay were not correlated with OFI-8 score.

All 4 deaths occurred in patients with not evaluable OFI (36% of patients with OFI not evaluable died vs. 0% in those with evaluable OFI, $p=0.008$).

Score obtained in the Barthel ADL Index was statistically significantly different ($p=0.000$) between those with OFI not evaluable and those with OFI evaluable

Table 1. Characteristics of the patients

Men/women, n(%)	18 (55%)/15 (45%)
Median age in years (range, IQR)	77 (65-97, 18)
Median length of hospital stay in days (range, IQR)	14 (3-75, 14)
Median direct costs of hospitalization in PLN (range, IQR)	16680.39 (2931.48-99508.82, 22484.23)
Barthel ADL Index – median score (range, IQR)	55 (0-95, 75)
Barthel ADL Index – classification, n(%) • Independent/slightly dependent (86-100 points) • Partially dependent (21-85 points) • Totally dependent (0-20 points)	 8 (24%) 12 (36%) 13 (40%)
Norton Scale – classification, n(%) • No risk (15-20 points) • Increased risk (5-14 points)	 18 (55%) 15 (45%)
AMTS – classification, n(%) • Normal (6-10 points) • Slightly disabled (4-6 points) • Severely disabled (0-3 points)	 18 (55%) 3 (9%) 12 (36%)
GDS – classification, n(%) • Normal (0-5 points) • Moderate depression (6-10 points) • Severe depression (11-15 points) • Not evaluable	 12 (36%) 7 (21%) 1 (3%) 13 (40%)
OFI-8 – median score (range, IQR)	4 (0-11, 8)
OFI-8 – classification, n(%) • Low risk (0-2 points) • Moderate risk (3-4 points) • High risk (5-11 points) • Not evaluable	 1 (3%) 5 (15%) 16 (49%) 11 (33%)

Abbreviations: IQR, interquartile range; PLN, Polish zloty; ADL, activities of7 daily living; AMTS, abbreviated mental test score; GDS, geriatric depression scale; OFI-8, oral frailty index-8

(median score, range, IQR: 0, 0-10, 10 in the former, and 80, 15-95, 35 in the latter, respectively). Moreover, in those with evaluable OFI, score in the Barthel ADL Index correlated inversely with OFI-8 score (R=-0.674, p<.05).

From among 11 patients with OFI not evaluable, 10 (91%) had increased risk for pressure ulcer, assessed by the Norton Scale, compared to 5 (23%) patients in whom OFI was evaluable (p=0.000). In the subgroup of 22 patients with evaluable OFI, those with increased risk for pressure ulcer, assessed by the Norton Scale, had statistically significantly higher OFI-8 score (p=0.015), compared to those without increased risk (median, range, IQR: 9, 8-11, 2, and 6, 2-9, 4, respectively).

All 11 patients (100%) with OFI not evaluable were classified as severely disabled by AMTS, compared to 1 (5%) patient in the subgroup, in which OFI was evaluable (p=0.000). From among 22 patients with OFI evaluable, there was no statistically significant difference (p=0.097) in OFI-8 score between those classified with AMTS as normal, compared to those classified as slightly or severely disabled; however, it should be noted that the latter subgroup included only 4 patients.

Similarly, in all 11 patients (100%) with OFI not evaluable, depression was not evaluable with GDS, compared to 2 (9%) patients in the subgroup, in which OFI was evaluable (p=0.000). However, from among 22 patients in which OFI was evaluable, statistically significant difference was not observed (p=0.086) in OFI-8 score between those classified with GDS as normal, compared to those classified as moderate depression, severe depression, or not evaluable with GDS; these three subgroups were connected for the analysis due to the low number of patients.

Discussion

One of the objectives of this study was to determine the prevalence of oral frailty among hospitalized geriatric patients in Poland. Our findings revealed that 72.7% of hospitalized individuals aged 65 or older were affected by oral frailty. This rate is considerably higher than the 28% prevalence reported by Zhou et al. [26] in their meta-analysis of 17 original studies involving older adults [26]. The literature suggests that oral frailty tends to be more common in specific patient populations

compared to the general older population. According to Tanaka [20], this may be attributed to the increased vulnerability to various diseases observed in older adults. For instance, Miyasato et al. [18] found a prevalence of 38.8% among patients undergoing hemodialysis and identified associations with aging, lower serum creatinine levels and comorbid osteoporosis [18]. Oral frailty is characterized by a range of age-related changes, such as tooth loss, reduced oral function and deteriorating hygiene. In older adults, it often presents as a diminished focus on oral care, which can lead to compromised eating behaviors and a gradual decline in both physical and mental well-being [20,26,27]. Motokawa et al. [28] reported that individuals with compromised chewing ability had significantly lower intake of energy, fat, and various food groups compared to those with intact chewing function. Furthermore, two studies have explored the link between oral frailty and dietary diversity, highlighting reduced chewing ability as a contributing factor to poorer diet quality [29,30]. More broadly, existing research indicates that oral frailty is more likely to develop in individuals with chronic diseases, cognitive impairment, or depressive symptoms [31-33].

OFI-8 was developed as a screening tool rather than a diagnostic instrument [18,34,35]. A study in community-dwelling older adults identified oral frailty as a predictor of physical frailty [20,25,36]. In our hospitalized geriatric cohort, although oral frailty was highly prevalent, no significant association was found between OFI-8 scores and hospital length of stay or direct costs. Notably, all in-hospital deaths occurred among patients for whom OFI-8 could not be assessed – a group characterized by severe functional and cognitive impairment, lower Barthel Index scores, higher risk of pressure ulcers, and pronounced cognitive decline. This suggests that while OFI-8 may not independently predict hospital duration or costs, the inability to evaluate oral frailty may identify a subgroup at particularly high risk for adverse outcomes, including mortality. Similarly, Miyasato et al. [18] found oral frailty to be a strong predictor of worsening malnutrition and sarcopenia in patients undergoing hemodialysis [18]. There is evidence in the literature suggesting that oral frailty has predictive value for adverse health outcomes. Prospective studies have linked impaired masticatory function to the development and progression of frailty, cognitive deterioration, and increased risk of all-cause mortality [37-40]. While cross-sectional studies have also explored associations with physical performance, sarcopenia, fall history, and nutritional status, their findings have been less consistent. Overall data suggest that maintaining chewing function through proper oral care could promote healthy aging and reduce functional decline [37]. Regular assessment of oral function, even through simple tools like OFI-8, could inform preventive strategies aimed at preserving masticatory ability.

Oral frailty appears to be closely associated with outcomes measured by commonly used geriatric assessment tools. In our study, patients with non-evaluable OFI-8 scores consistently demonstrated poorer performance across these assessments. The Barthel Index is a reliable and valid tool for assessing independence in basic daily activities and has also been used to predict mortality in geriatric patients [41-43]. In our cohort, patients with non-evaluable OFI-8 had significantly lower Barthel Index scores, indicating profound functional impairment. Among those with evaluable OFI-8, a strong inverse correlation was observed between OFI-8 scores and Barthel Index results. This aligns with previous studies demonstrating the predictive value of the Barthel Index in settings such as in-hospital mortality due to COVID-19 [43], postoperative complications in older adults undergoing gastrointestinal surgery [44], and one-year mortality following hip fracture surgery in geriatric patients [45]. Similarly, pressure ulcer risk, assessed using the Norton Scale, was significantly higher among patients with non-evaluable OFI-8 scores, and among those with evaluable OFI-8, higher scores were associated with greater ulcer risk. The Norton Scale is a widely used nursing tool developed in the 1960s to assess the risk of pressure ulcer development, particularly in elderly patients [46-48]. Although originally designed to predict pressure ulcers, low Norton Scale scores have also been associated with adverse outcomes such as complications during rehabilitation, in-hospital mortality, and long-term mortality in elderly patients [49,50], including those admitted to internal medicine and orthopedic wards or undergoing interventions such as TAVI and hip arthroplasty [51-54]. Cognitive status, measured by the AMTS, also differed notably – 100% of those with non-evaluable OFI were severely cognitively impaired, compared to only 5% in the evaluable group. This finding highlights the strong link between oral frailty and cognitive decline. The AMTS, a quick and validated screening tool for cognitive impairment in older adults, has been shown to predict adverse hospital outcomes [55]. In elderly patients with myocardial infarction, lower AMTS scores were significantly asso-

ciated with longer hospital stays and increased risk of complications [56]. Similarly, among patients admitted with hip fractures, cognitive impairment as indicated by low AMTS scores was associated with a higher risk of malnutrition [57]. Lastly, depression screening with the GDS was not feasible in any patient with non-evaluable OFI, due to cognitive limitations. However, our study showed no significant difference in OFI-8 scores between patients with and without depression assessed by GDS. Unlike our findings, Lin et al. [31] observed a relationship between oral frailty and late-life depression, suggesting that the role of depression in oral frailty may differ between patient groups.

Limitations of the study need to be acknowledged. First, it was a retrospective analysis. Second, as it was a single center study, and our group could not reflect populations hospitalized in other centers. Third, the study group was relatively small. However, we think that the value of our study is that, according to our knowledge, it was the first study with assessment of oral frailty in Polish patients.

Conclusions

Oral frailty, assessed by OFI-8 index is relatively common in Polish geriatric patients, hospitalized in internal medicine ward, with less than 20% classified as being of low, or moderate risk for oral frailty. However, in as much as 1/3 of patients, OFI-8 index is not evaluable. OFI-8 score does not correlate with hospital length, costs of hospital stay, and death. As expected, OFI-8 score corresponds with results obtained in some other geriatric assessment scales, e.g. Barthel ADL Index, or the Norton Scale.

List of abbreviations

ADL	Activities of Daily Living
AMTS	Abbreviated Mental Test Score
GDS	Geriatric Depression Scale
IQR	interquartile range
OFI	Oral Frailty Index
PLN	Polish zloty
TAVI	Transcathether Aortic Valve Implantation

Conflict of interest
None

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