

Oral health-related quality of life in elderly: an umbrella review of systematic reviews from a multidisciplinary rehabilitation point-of-view

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Abstract

Background. Poor oral health is highly prevalent among elderly and may impact quality of life of elderly people. In this scenario, oral health has been often linked to general health and chronic disorders, including distinct features of frailty. The aim of the present umbrella review of systematic reviews was to assess the scientific literature on the correlation between oral health related quality of life (OHRQoL) and elderly to present a multidisciplinary approach to these complex patients.

Methods. We performed a literature search of the databases PubMed/Medline, Scopus, Web of Science, and Physiotherapy Evidence Database electronic databases. Two independent reviewers performed the literature research from the inception to 25th November 2023 and screened the studies for eligibility.

Results. The search resulted in a total of 676 results eligible articles. After removal of duplicates and full-text screening, a total of 3 systematic reviews were considered to meet the inclusion criteria and were included for this review.

Conclusions. Frailty is very common in elderly such as a poor oral health. In this scenario, malnutrition and bad lifestyle habits may affect not only the determinism of many systemic non-communicable diseases but also oral health quality. Taken together, the findings of this umbrella review of systematic reviews showed a strict correlation between the frailty, typical condition of ageing people, and a poor OHRQoL. Therefore, it is mandatory to implement the oral health prevention with specific protocols of oral rehabilitation to improve the OHRQoL in elderly. *Clin Ter 2024; 175 (1):73-82 doi: 10.7417/CT.2024.5036*

Keywords: Older adults, Elderly, Oral health, Oral hygiene, Quality of life, Frailty

Introduction

Aging affects every aspect of life, considering that the improvement in living conditions has lengthened life expectancy; to date, it has not yet been possible to block this process, which inexorably leads to the end of life (1). According to the 2019 United Nations Report on the Aging of the World Population a person is considered old after the age of 65 (2). Moreover, some projections estimate that in 2050 there will be over 1.5 billion people over the age of 65 in the world (2). According to the American Society of Gerontology, in 2035 the number of young people under the age of 18 will be less than that of the over 65s years (3).

Since it is difficult to precisely identify the state of old age, a condition involving multiple factors, sociologists have proposed a subdivision of this group of people into three subgroups: the young-elderly (65-74 years), the middle age (75-84 years) and old age (over 85 years); based on their functional abilities and ability to relate to everyday life, the elderly can be broadly classified as able (robust), fragile (frailty), or dependent (dependent) (4).

The American Gerontological Society predicts that large numbers of Americans will continue to live in good health well beyond the traditional retirement age and that more than half of people who reach age 85 will have no health limitations affecting their activities of daily life (5).

Nonetheless, while largely in good health, the global elderly population tends to increase. At the same time, changes may occur in the social structure surrounding the elderly, such as the estrangement of children, the loss of a partner, the onset of economic difficulties. All these factors

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affect the quality of life of elderly people with an increase of “dependent” ones with all the social, cultural, economic, functional, and health consequences (5).

Oral health changes over the life span appear to observe the same principles of normative physiologic aging as other organ systems and physiologic processes. Oral aging is as relevant as any other health care challenge facing an aging society considering the potentially different levels of dependence in the activities of daily living (see Table 1).

Frailty is one of the most problematic implications of rapid population ageing (6); in this context, nutrition and inflammation have been considered among the leading mechanisms that might impact the course process of frailty (7). In fact, poor oral health is highly prevalent among elderly and has been often linked to general health and chronic disorders, including distinct features of frailty (8). Poor oral health can contribute to frailty, through multiple indirect pathways, as poor oral health and inadequate dentition are inversely related to dietary intake, particularly in chronic disease as stroke or breast cancer (7-12).

The risk of having poor nutritional status increases with age due to physiological age changes, chronic medical conditions, medications, and poor oral conditions that may induce pain, infection, and tooth loss (13). Malnutrition prevalence is increasing worldwide due to the aging of the population, and poor oral health, including dental caries, periodontal disease, dry mouth, and worn dentition may affect the diet intake and may increase the prevalence of age-related pathological conditions (13).

In this scenario, Oral Health-Related Quality of Life (OHRQoL) was developed to identify how oral diseases impact a person's physical, emotional, and social well-being, and to measure oral treatment needs and the consequences of dental treatment (13).

Thus, it has been recently hypothesized a strict correlation among oral health, malnutrition, social isolation, and quality of life, as depicted by Fig. 1.

However, to the best of our knowledge, it is still debated the impact that frailty might have on OHRQoL in older people, also considering the potential role of an adequate oral rehabilitation.

Therefore, the aim of the present umbrella review of systematic reviews was to assess the scientific literature on the correlation between frailty and OHRQoL in elderly in order to present a multidisciplinary rehabilitation approach to these complex patients.

Materials and Methods

Registration and search strategy

The Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines were followed to conduct this umbrella review of systematic reviews. An a priori protocol was established and registered on the prospective register of systematic reviews PROSPERO, with number: CRD42023480255.

We conducted a literature search of the databases PubMed/Medline, Scopus, Web of Science, and Physiotherapy Evidence Database (PEDro) electronic databases using the following strategy: (“oral health”(MeSH Terms) OR (“oral”(All Fields) AND “health”(All Fields)) OR “oral health”(All Fields)) AND (“aging”(MeSH Terms) OR “aging”(All Fields) OR “ageing”(All Fields) OR “older adult”(All Fields) OR “elderly”(All Fields) OR “elder”(All Fields)) AND (“quality of life”(MeSH Terms) OR “quality”(All Fields) AND “life”(All Fields)) OR “quality of life”(All Fields)). The search was limited to humans and English language, peer-reviewed publications.

Table 1. Classification of the elderly in relation to the possibility of maintaining good oral hygiene at home and undergoing dental care.

| Dependence level | Definition |
|-------------------|---|
| Not dependent | Elderly people who regularly carry out all their activities. |
| Pre-dependence | Elderly people suffering from well-controlled chronic diseases that currently do not impact on the maintenance of a good state of home oral hygiene and on the possibility of undergoing dental care. |
| Low dependence | Elderly people with chronic diseases with potential effects on oral health but who currently receive but do not need help to maintain good oral hygiene at home and to access dental services. These patients are not fully dependent, but their basic activities are influenced by age and health status. |
| Medium dependence | Elderly people suffering from chronic systemic diseases that impact on the maintenance of a good state of oral hygiene at home and make it impossible to travel independently to go to the dental clinics; need help with normal oral hygiene procedures and access to dental services. |
| High dependence | Elderly people affected by complex chronic systemic diseases which make it impossible to maintain a good state of oral hygiene at home and to travel to the dental clinics; need help with normal oral hygiene procedures and access to dental services; access to dental services requires the intervention of specific means. |



Fig. 1. Malnutrition and physical disability in older adults: a malnutrition-disability cycle.

Selection criteria

We evaluated for inclusion systematic reviews that included randomized trials, quasi-randomized trials, prospective, or retrospective studies answering the question: "Which characteristics of the ageing can influence OHRQoL?"

We included systematic reviews assessing elderly patients without any restriction in terms of recruitment settings or general health status. The exposure included any indicator of oral health, irrespective of the measurement method (e.g., clinical examination, self-reported). Primary outcome was the OHRQoL.

In vitro studies, animal studies, and every study on human not following our inclusion criteria were excluded.

Study selection

Two independent reviewers performed the literature research from the inception to November 25th 2023 and screened the studies for eligibility, reviewing all titles and abstracts that were identified from the search strategy. In agreement with the predefined eligibility criteria full-text studies for all potentially eligible records were obtained, accordingly with the aforesighted eligibility criteria the reviewers independently revised the bibliography reached. If consensus was not reached by collegial discussion, a third reviewer was asked.

Data extraction

Data extraction for each eligible manuscript was achieved independently by two reviewers using a predetermined spreadsheet. Exclusion criteria were: i) languages other than

English; ii) studies without full text available; iii) conference abstracts, masters, or doctorate theses. Following data will be extracted: 1) First author; 2) Publication year; 3) Journal; 4) Number of the searched databases; 5) Study design of the studies included in each systematic review; 6) Number of the studies included in each systematic review; 7) Population; 8) Outcome; 9) Main findings. Both the data extraction and the data synthesis were performed by two independent reviewers. If consensus was not reached by collegial discussion, a third reviewer was asked. The reference lists of relevant systematic reviews identified during the title and abstract screen were also hand searched to identify any potentially eligible articles that may have been missed in the electronic database search.

Study quality assessment

We assessed the study quality of the systematic reviews included in the umbrella review using the "A MeASurement Tool to Assess systematic Reviews 2" (AMSTAR2) checklist. It is a tool for critical appraisal of systematic reviews, consisting of 16 items, with each of them judged with "Yes", "Partial Yes", "No". Seven items are considered critical. The domains considered as critical are the 2 (registration of the protocol before starting the review), 4 (adequate search of the literature through the databases), 7 (description of the excluded studies and the justification for exclusion), 9 (satisfactory assessment of risk of bias in the included studies), 11 (correct use of statistical methods in performing a meta-analysis), 13 (evaluation of the impact of different risk of bias when analyzing the results), 15 (evaluation of publication bias). Moreover, the overall quality of the included studies was judged by adhering to the tool guidance

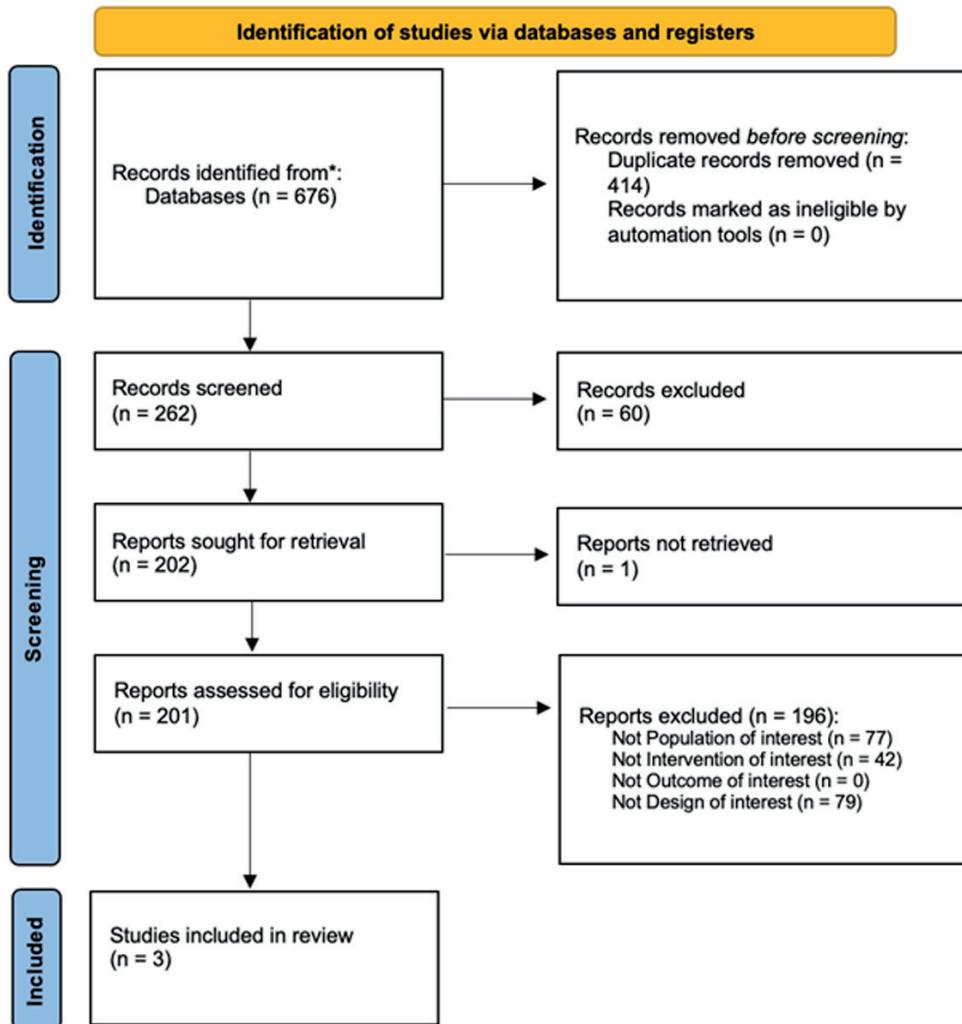


Fig. 2. PRISMA flow diagram.

with the following criteria: high (none or one non-critical weakness), moderate (more than one non-critical weakness), low (one critical weakness), critically low (more than one critical weakness). In this context, two researchers independently assessed the study quality of the systematic reviews and discrepancies between the two researchers were solved by discussion.

Results

Study characteristics

The search resulted in a total of 676 results eligible articles. After removal of duplicates, 262 articles were screened. Full-text screening resulted in 201 articles, which were assessed for eligibility. In total, 3 systematic reviews (14,15,16) were considered to meet the inclusion criteria and included for this umbrella review. The Figure 2 illustrates the flow diagram with the entire selection process of systematic reviews for inclusion in the review.

Publication date of the included studies ranged between 2019 and 2022, and interesting to note, all the systematic reviews or meta-analyses were published in the last five years.

One systematic review included cross-sectional and case-control (14), one study (15) included cross-sectional and longitudinal studies, and one systematic review (16) included only cross-sectional studies.

All articles performed a systematic search on at least 3 databases. The number of the studies included in the systematic reviews ranged between 19 and 40.

The main characteristics of the selected systematic review were reported by Table 2.

Main findings of the included systematic reviews

Analyzing the impact of periodontal diseases on OHRQoL, the study by Wong et al. (14) reported the highest CPI score of the elder subjects as follow: shallow pockets: 8.3% - 31.7%; deep pockets: 4.3% - 13.3%; calculus: 18.6% - 38.3%; bleeding on probing: 0.0% - 11.7%; healthy results:

Table 2. Main characteristics and findings of the systematic reviews included

| Au-thors | Year | Journal | Searched databases | Study designs included | Nº of studies included | Population | Outcome | Main findings |
|----------------------|------|---|--------------------|----------------------------------|------------------------|---|--|--|
| Wong et al. | 2019 | International journal of environmental research and public health | 3 | Cross-sectional and case-control | 25 | Institutionalized elderly population (n= 10958) | Oral health and/or oral health quality of life | This systematic review provided evidence on the multiple oral problems with various levels of severity. Findings increased the awareness of healthcare policymakers and health promotion teams regarding oral health severity were observed. |
| Azami-Aghdash et al. | 2020 | Iranian Journal of Public Health | 7 | Cross-sectional and longitudinal | 40 | Older People (n=22416) | Oral Health-related Quality of Life, assessed by General Oral Health Assessment Index (GOHAI), Oral Health Impact Profile-14 (OHIP-14), Oral Health Impact Profile-49 (OHIP-49). | This systematic review showed that the elderly group of the population had no proper oral health-related quality of life. |
| Baniasadi et al. | 2021 | International Journal of Dental Hygiene | 4 | Cross-sectional | 19 | Older People (n=9908) | Oral Health-related Quality of Life | This systematic review showed a positive association between low educational level, marital status, depression, smoking status, denture wearing, poor general health, tooth-induced pain, periodontal diseases and poor OHRQoL. |

0.0% - 5.0%. Thus, the authors suggested a high prevalence of periodontal problems in elderly reporting that the highest loss of attachment scores ranged from 0.0% to 11.7% for more than 12 mm and from 2.8% to 13.3% for 9 to 11 mm, indicating that half of elderly residents revealed a significant (at least 9 mm) periodontal attachment loss.

The study by Baniasadi et al. (16) assessed the impact of periodontal diseases on OHRQoL and reported that subjects who had periodontal diseases were 1.38 times more likely to be assessed as having a high OHRQoL (OR = 1.38, 95% CI (1.15, 1.62)).

Analyzing the impact of DMFT on OHRQoL, the study by Wong et al. (14) reported that the mean DMFT score ranged from 11.3 to 28.8 (decayed teeth: 1.2-3.5; decayed roots: 0.6- 2.2; missing teeth: 15.0- 24.9; filled teeth: 0.2-8.0). The authors concluded that the higher prevalence of decayed/filled lesions was assessed at the buccal, distal, or mesial surfaces than the lingual surface in the elder people. In terms of impact of DMFT on OHRQoL among elderly, the results of this systematic review showed that subjects with increased decayed teeth, missing teeth or DMFT, without maxillary/mandibular dentures, were associated with a better OHRQoL (evaluated using the OHIP-14 and the GOHAI-20). The study by Baniasadi et al. (16) assessed the impact of DMFT scores on OHRQoL and reported the negative association between DMFT scores and poor OHRQoL. The authors showed that subjects without caries were 0.91 times more likely to rich high OHRQoL (OR=0.91, 95% CI (0.87, 0.96)).

Analyzing the impact of prosthesis and OHRQoL, the study by Wong et al. (14) reported that 82.5% (47.8% - 100%, mean 86.5%) of the edentulous participants had complete dentures, that 14.5%, (0.0% - 23.6%, mean 9.5%) had no replacement, and that 12.1%, (1.9% - 25.4%, mean 16.6%) had their own natural dentition.

Baniasadi et al. (16) assessed the impact of wearing dentures on OHRQoL and reported that subjects wearing dentures were 1.41 times more likely to report poor OHRQoL (OR = 1.41, 95% CI (1.03, 1.8)).

Quality assessment

The methodological quality of the included articles was assessed by the AMSTAR2 tool and was reported in Table 3. Out of 3 systematic reviews included in this umbrella review, we reported one high-quality study, one systematic review with a critically-low quality, and one had a low-quality.

The most common reason why they were judged to be low-quality studies was the absence of a list of the reasons for the exclusion of articles.

Discussion

Role of oral health assessment

WHO defines oral health as the state of the mouth, teeth and orofacial structures that enable an individual to perform

Table 3. AMSTAR2 Quality Assessment

| Article | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 | Q16 | Overall Assessment |
|----------------------------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|------|--------------------|
| Wong et al., 2019 | Y | Y | Y | Y | Y | Y | Y | Y | Y | NM | NM | Y | Y | NM | Y | High | |
| Azami-Aghdash et al., 2020 | PY | PY | Y | Y | N | N | N | Y | Y | N | Y | N | N | PY | PY | Y | Critically-Low |
| Baniasadi et al., 2022 | Y | Y | Y | PY | Y | Y | N | Y | Y | Y | Y | Y | Y | PY | Y | Low | |

Abbreviations: Y=yes, N=no, PY = partial yes, NA= not applicable, NM = no meta-analysis performed. Q1: Did the research questions and inclusion criteria for the review include the components of PICO? Q2: Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol? Q3: Did the review authors explain their selection of the study designs for inclusion in the review? Q4: Did the review authors use a comprehensive literature search strategy? Q5: Did the review authors perform study selection in duplicate? Q6: Did the review authors perform data extraction in duplicate? Q7: Did the review authors provide a list of excluded studies and justify the exclusions? Q8: Did the review authors describe the included studies in adequate detail? Q9: Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review? Q10: Did the review authors report on the sources of funding for the studies included in the review? Q11: If meta-analysis was performed, did the review authors use appropriate methods for statistical combination of results? Q12: If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis? Q13: Did the review authors account for RoB in primary studies when interpreting/discussing the results of the review? Q14: Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review? Q15: If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review? Q16: Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?

essential functions, such as eating, breathing, and speaking (17). The definition therefore does not oppose health to illness but identifies the former as a state of well-being which also includes the psychosocial sphere, self-confidence, well-being, the ability to socialize and work without pain but also a sense of discomfort and embarrassment (18). Oral health is therefore an integral part of individual health and varies throughout life from early life to old age (18-20).

There is not an age or a typical elderly person: maintaining a good state of home oral hygiene and therefore oral-dental health as well as the ability to access dental services is not related to chronological age but to the ability, influenced by systemic conditions, to carry out the normal activities of daily life (21).

The assessment of the oral health status of the Italian population is officially crystallized by the 2005 ISTAT survey on Dental Care and Dental Health (22): according to this report, the 87.5% of the total clinical evaluations and dental interventions took place at freelance dentists; only 12.5% of the Italian population (mostly elderly) turned to public or private structures with special agreements; the frequency of dental visits gradually decreases starting from the age of 55 and among the over-80s the percentage of those who have had a check-up in the last year drops below the threshold of 17% (23).

Malnutrition and physical disability in older adults: a malnutrition-disability cycle

Recently, malnutrition incidence has been rising worldwide due to population aging and the increasing prevalence of age-related pathological conditions (24). To date, in a recent meta-analysis involving over 110,000 older people, Cedera et al. (25) pointed out that the malnutrition rate might range between 6% (95% CI, 4.6-7.5) and 29.4% (95% CI, %, 21.7-36.9) based on the healthcare scenario. More pre-

cisely, rehabilitation and subacute care settings are facing a higher prevalence of malnutrition; Wojzischke et al. (26) confirmed similar findings, considering that roughly half of the patients in geriatric rehabilitation were at risk of malnutrition. Although potential pathophysiological mechanisms underlying the close association between malnutrition and aging have been indicated, the current evidence in the literature is still scarce (27). Impaired physical function, social and environmental conditions, acute and chronic diseases, and pharmacological treatments have been identified as in-dependent risk factors potentially responsible for the generation of malnutrition in the elderly (28).

In this scenario, there is growing evidence on the strict correlation between nutrition and disability (28).

Movement disability has a high prevalence in elderly population, either healthy or with chronic disease (29). The decline of nutritional status is an expected condition in elderly, above all if we assume the elderly subjects as hospitalized. On the one hand, nutritional status is one of the many elements that impact the onset and course of a functional disability; on the other hand, disability itself might contribute to the onset and worsening of malnutrition (30). Recently, Nishioka and Wakabayashi (29) have introduced the concept of the malnutrition-disability cycle; indeed, there may be evidence for the interaction between low body mass index and swallowing disorders and for the effects of some components of malnutrition and disability (29) Nonetheless, malnutrition and physical disability are urgent problems in aging, and super-aging societies, and the two phenomena are closely linked in the elderly (31). Both conditions have common underlying causes, including physiological changes from aging and the burdens imposed by illness or injury (32). Nutrition may not be the only factor involved in impaired movement in the elderly, but cognition of its prominence in the frail elderly population is growing among physicians and the scientific community (33). At the same time, the

results of malnutrition could influence the musculoskeletal system with critical implications on functional performance and HRQoL of frail geriatric people. Consequently, the role of nutritional interventions in the elderly has been extensively studied with increasing evidence endorsing the positive function of oral supplementation in optimizing the rehabilitation route of frail people (34). However, it should be noted that tailor-made therapy should be proposed for patients suffering from these disorders.

The systematic review by O'Keeffe et al. (13) examined the potentially modifiable determinants of malnutrition in older adults, providing moderate quality evidence that dental status, swallowing, and periodontal disease might be determinant of malnutrition. Indeed, dysphagia, malnutrition, sarcopenia, vitamin D deficiency, and oral frailty are conditions that might often coexist in the elderly, thus making necessary an adequate nutritional intervention (e.g., vitamin D supplementation, calcium, amino acids, probiotics) and oral rehabilitation in these frail subjects (35-39).

Oral health changes in the ageing population

The normal aging process of the oral cavity undergoes many physiologic changes; many of these changes are secondary to chronic systemic disease and their associated treatment (inflammatory response, medication, chemotherapy, and radiotherapy) (40).

Aging changes in tooth anatomy and histology depend on chemical and mechanical wear from mastication as well as factors, such as culture, diet, occupation, tooth composition, and resiliency and strength of teeth and the surrounding periodontal apparatus (40,41).

As for enamel, changes occur in both physical appearance and molecular composition in health aging adults, related mainly to the exchange of minerals in the oral environment with the enamel surface and mechanical wear over time. The demineralization-remineralization process that occurs throughout life has an impact on the enamel hardness and subsequent tooth wear. Another age-related change to enamel is the loss of fluoride from the enamel surface and an increase in the fluoride concentration in the cervical third of the tooth. Clinically, such changes to the enamel determine decreased enamel thickness for tooth preparation, decreased hydration, more effective acid etching, smoother and more translucent facial contours, flattened incisal and interproximal wear, cracks along enamel surfaces, and brittleness (41-43).

As for dentin, age-related changes are due to chemical and mechanical impacts related to the formation of secondary dentin as well as sclerosis of the dentinal tubules, with a reduction in tubular fluid movement and subsequent decreased dentinal hypersensitivity. Additional age-related changes lead to higher calcium concentration in dentin as well as higher hardness and elastic modulus. Clinically, such changes to dentin determine change in tooth color, decreased hypersensitivity, and decreased bond strength (41).

As for the pulp, age-related changes determine a decrease of the reparative capabilities due to reduction in pulpal blood flow and blood vessels and an increase of tissue calcification. Older patients have fewer nerve branches, greater mineralization of the dental pulp nerves, and increased connective

tissue within the pulp. Clinically, these changes lead to delay responses to thermal stimuli and decreased sensitivity and pain perception. Thermal pulp testing may be ineffective or result in increased false-negative responses (40,41).

Finally, as for cementum, an increased exposure of cementum from gingival recession may result in hypercementosis. Clinically, these age-related changes determine a decreased sensitivity to thermal stimuli and reporting of pain.

Age-related changes of oral mucosa show a decrease in the elastic fibers and thickening and disorganization of the collagen bundles in the connective tissue. The mucosa becomes less resilient, but few clinically significant changes have been observed as for appearance or oral sensation.

In the elderly population, there seems to be an increase in concentration of IgA and a decrease in total protein concentration in saliva, with a consequent thicker and more ropey saliva (40-43).

Oral rehabilitation planning in the elderly

Several considerations should accompany dental care for the elderly. In this scenario, the SOAP (Subjective findings, Objective findings, Assessment, and Plan) is a comprehensive approach to treatment planning for the elderly. In geriatric patients, the subjective findings include additional information concerning functional status as described by the ability to carry out activities of daily living (44,45).

Another approach to treatment planning for older adults is the OSCAR (Oral factors, Systemic factors, Capability, Autonomy, and Reality): oral factors consider the current dentition and restorations, periodontium, oral hygiene and root caries, salivary secretions, tooth loss, mucosal tissues, removable prosthesis, and occlusion; systemic factors include normal changes related to aging and comorbidity, effect of medications, and communication between the dentist and physician(s) in managing the geriatric dental patient with a medically compromised health status; capability consider the ability to carry out activities of daily living, walk with or without assistance, and control incontinence; autonomy relates to the patient's ability to independently make health care decisions within the context of cognitive impairment; and reality refers to financial issues and life expectancy (44,45).

Furthermore, the patient must also possess decision-making capacity as defined by ability to comprehend, appreciate, and reason the contingencies of treatment or no treatment; the ability to weigh the risks and benefits of treatment, no treatment, and alternatives; and the ability to communicate his or her choices.

Planning treatment and managing care for an elderly patient can be challenging. As patients age and their physical and mental health deteriorates, dental practitioners are challenged to alter treatment plans to accommodate these changes, as an elderly patient may not be able to tolerate extensive restorative procedures, and often it may be necessary to shorten and redefine achievable goals for each appointment (44-46).

Rational treatment planning evaluates the modifying factors to offer a realistic treatment plan that has the best potential outcome for the patient. The decision would depend

on the patient's access to care, the systemic health of the patient, the extent of the carious lesion/periodontal disease, and patient's ability to tolerate treatment and to maintain oral hygiene as well as ability to pay for care.

Therefore, prevention is crucial by establishing good preventive technique while the older patient is still relatively healthy. Then, diet education, hygiene education, and patient-specific measures to increase tooth resistance is of primary importance, as well as a rational dental care individualized to a patient's needs. Treatment protocol should be individualized for the patient that take into consideration the person's ability to handle stress, and reasonable treatments that are less extensive (44-46).

Multidisciplinary approach in older people

Several clinical features are typically observed in the elderly, both for the ageing consequences and for systemic diseases and their related medications, such as xerostomia, dental carious lesions, candidiasis, burning tongue, tooth surface loss, fissuring of the tongue, difficulty with swallowing and speech, mucositis, and loss of taste perception (44-46).

To face these symptoms, several therapeutic strategies have been proposed. Gustatory and mechanical actions in the oral cavity, via neural reflexes, stimulate saliva by chewing sugar-free gum over a prolonged period. The use of xylitol-incorporated lozenges, spray, and gum stimulate and increase saliva, by osmotically drawing water from the tissues, improving pH, and buffering capacity of the saliva in the oral cavity. The use of remineralizing solutions may help provide the physiologic supersaturated level of calcium phosphate that is necessary for re-mineralization and mucosal healing. Prescription-strength fluoride in the form of toothpastes, gels, and professionally applied varnishes may be used in the elderly to prevent caries in a population with salivary hypofunction. Instead, the evidence for caries protection from salivary substitutes is not sufficient for artificial saliva substitutes, as the soothing effect of these substitutes is only temporary (45,46).

To summarize, regular dental care may represent an important strategy in older frail adults. Indeed, the oral cavity should be examined for any development of new dental carious lesion, soft tissue change due to infection or inflammation, and periodontitis (36,45-46).

Oral rehabilitation might play a key role in these subjects, in order to improve their OHRQoL that has a considerable impact on their activities of daily living. In this scenario, it has been recently showed that tele-rehabilitation could be considered as not inferior to rehabilitation in terms of improving functional outcomes (47-50). Moreover, telehealth might be important both in medicine and dentistry as a useful tool for overcoming barriers in community-based settings, thus reducing resources and time spent by healthcare practitioners (47-50).

Conclusions

Taken together, the findings of this umbrella review of systematic reviews showed a strict correlation between

the frailty, typical condition of ageing people, and a poor OHRQoL.

Frailty is very common in elderly such as a poor oral health, also considering the rapid changes in lifestyle, which have led to the spread of diets rich in sugars and high consumption of alcohol and tobacco in many countries. In this scenario, malnutrition and bad lifestyle habits may affect not only the determinism of many systemic non-communicable diseases but also oral health quality.

In this scenario, a poor oral hygiene is the main cause of the most frequent and globally widespread oro-dental pathologies in elderly, that commonly have a very high prevalence especially in the most disadvantaged economic and social classes with serious repercussions also on the global health.

Therefore, we retain that it is mandatory to implement the prevention in terms of oral health and to clearly define specific protocols of oral rehabilitation in order to improve the OHRQoL in elderly.

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Author Contributions

Conceptualization, M.F., M.M., and A.d.S.; methodology, M.F., F.A., N.M., and A.d.S.; validation, M.M., F.A., P.B., and A.d.S.; investigation, M.F., N.M., and P.B.; data curation, M.F., N.M., and P.B.; writing—original draft preparation, M.F., F.A., and N.M.; writing—review and editing, M.M., A.A., and A.d.S.; visualization, G.S., P.B., D.S. and G.L.M.; supervision, M.M. and A.d.S. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement

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Data Availability Statement

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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