**Changes in taste perception in elderly population and its potential impact on oral health:**

**A systematic review with meta-analysis**

**Appendix 1.** Search strategies according to each database, performed on 16th July 2023

|  |  |  |
| --- | --- | --- |
| **Pubmed** | ((("Old Age"[All Fields] OR "Old Aged"[All Fields] OR "Old Elder"[All Fields] OR "Old Elderly"[All Fields] OR "Ageing"[All Fields] OR "Older adults"[All Fields] OR "old adults"[All Fields] OR "Aged"[MeSH Terms]) AND ("Taste Disorders"[All Fields] OR "Dysgeusia"[All Fields] OR "Hedonic Scale"[All Fields] OR "Tasting"[All Fields] OR "Dysgeusias"[All Fields] OR "Distorted Taste"[All Fields] OR "Altered Taste"[All Fields] OR "Parageusia"[All Fields] OR "Parageusias"[All Fields] OR "taste sensation"[All Fields] OR "Taste Perception"[All Fields] OR "Gustatory Perception"[All Fields] OR "Gustatory Response"[All Fields] OR "sweet taste"[All Fields] OR "diet, carbohydrate restricted"[MeSH Terms] OR "Dietary Sugars"[MeSH Terms])) NOT "covid 19"[MeSH Terms]) NOT ("Review"[Publication Type] OR "systematicreview"[Publication Type]) | 2218 |
| **Scopus** | ( ABS ( "Old Age" OR "Old Aged" OR "Old Elder" OR "Old Elderly" OR "Ageing" OR "Older adults" OR "old adults" OR "Aged" ) AND ABS ( "Taste Disorders" OR dysgeusia OR "Hedonic Scale" OR tasting OR "Dysgeusias" OR "Distorted Taste" OR "Altered Taste" OR parageusia OR parageusias OR "Taste sensation" OR "Taste Perception" OR "Gustatory Perception" OR "Gustatory Response" OR "diet, carbohydrate restricted" OR "sweet taste" OR "Dietary Sugars") ) | 810 |
| **ProQuest** | noft(((("Old Age" OR "Old Aged" OR "Old Elder" OR "Old Elderly" OR "Ageing" OR "Older adults" OR "old adults" OR "Aged") AND ("Taste Disorders" OR "Dysgeusia" OR "Hedonic Scale" OR "Tasting" OR "Dysgeusias" OR "Distorted Taste" OR "Altered Taste" OR "Parageusia" OR "Parageusias" OR "taste sensation" OR "Taste Perception" OR "Gustatory Perception" OR "Gustatory Response" OR "sweet taste" OR "diet, carbohydrate restricted" OR "Dietary Sugars")) NOT ("covid 19") NOT ("Review" OR "systematic review"))) | 163 |
| **Web of Science** | "Old Age" OR "Old Aged" OR "Old Elder" OR "Old Elderly" OR "Ageing" OR "Older adults" OR "old adults" OR "Aged" (Abstract) and "Taste Disorders" OR "Dysgeusia" OR "Hedonic Scale" OR "Tasting" OR "dysgeusia" OR "Distorted Taste" OR "Altered Taste" OR "parageusie" OR "parageusie" OR "taste sensation" OR "Taste Perception" OR "Gustatory Perception" OR "Gustatory Response" OR "sweet taste" OR "diet,carbohydrate restricted" OR "Dietary Sugars" (Title) | 1367 |
| **Embase** | ('old age':ti,ab,kw OR 'old aged':ti,ab,kw OR 'old elder':ti,ab,kw OR 'old elderly':ti,ab,kw OR 'ageing':ti,ab,kw OR 'older adults':ti,ab,kw OR 'old adults':ti,ab,kw OR 'aged':ti,ab,kw) AND ('taste disorders':ti,ab,kw OR 'dysgeusia':ti,ab,kw OR 'hedonic scale':ti,ab,kw OR 'tasting':ti,ab,kw OR 'dysgeusias':ti,ab,kw OR 'distorted taste':ti,ab,kw OR 'altered taste':ti,ab,kw OR 'parageusia':ti,ab,kw OR 'parageusias':ti,ab,kw OR 'taste sensation':ti,ab,kw OR 'taste perception':ti,ab,kw OR 'gustatory perception':ti,ab,kw OR'gustatory response':ti,ab,kw OR 'sweet taste':ti,ab,kw) NOT 'covid 19':ti,ab,kw NOT ('review':ti,ab,kw OR 'systematic review':ti,ab,kw) | 630 |
| **LIVIVO** | ((("Old Age" OR "Old Aged" OR "Old Elder" OR "Old Elderly" OR "Ageing" OR "Older adults" OR "old adults" OR "Aged”) AND ("Taste Disorders" OR "Dysgeusia" OR "Hedonic Scale" OR "Tasting" OR "Dysgeusias" OR "Distorted Taste" OR "Altered Taste" OR "Parageusia" OR "Parageusias" OR "taste sensation" OR "Taste Perception" OR "Gustatory Perception" OR "Gustatory Response" OR "sweet taste" OR "diet,carbohydrate restricted" OR "Dietary Sugars")) NOT ("covid 19") NOT ("Review" OR "systematic review")) | 372 |

|  |  |  |
| --- | --- | --- |
| **Google Scholar** | ((“Old Age” OR “Older adults”) AND (“Taste Disorders” OR “Altered Taste” OR "diet, carbohydrate restricted")) -"Covid-19" | First 100 out of 2,670. |

**Appendix 2.** Excluded articles in phase 2 and reasons for exclusion (n= 46)

|  |  |
| --- | --- |
| **Author, year** | **Reason for exclusion** |
| *After full-text reading* |  |
| (1) (Alia et al. 2021) | 3 |
| (2) (Allen et al. 2011) | 2 |
| (3) (Appleton et al. 2016) | 1 |
| (4) (Bartoshuk et al. 1986) | 1 |
| (5) (Boesveldt et al. 2011) | 3 |
| (6) (Cao et al. 2015) | 2 |
| (7) (Cohen et al. 1959) | 1 |
| (8) (Coltell et al. 2019) | 3 |
| (9) (Dias et al. 2015) | 3 |
| (10) (Dikmen et al. 2017) | 2 |
| (11) (Drewnowski et al. 2001) | 2 |
| (12) ( Fikentscher et al. 1977) | 3 |
| (13) (Gervis et al. 2020) | 2 |
| (14) (Gervis et al. 2021) | 3 |
| (15) (Guido et al. 2016 ) | 3 |
| (16) (Habberstad et al. 2017) | 3 |
| (17) (Hasan et al. 2022) | 3 |
| (18) ( Hyde R. J., Feller R. P. 1981) | 2 |
| (19) ( Jacquot et al. 2020) | 1 |
| (20) (Jayasinghe et al. 2017) | 3 |
| (21) (Jayasinghe et al. 2017) | 2 |
| (22) (Kanjirath et al. 2018) | 2 |
| (23) (Klimacka-Nawrot et al. 2005) | 2 |

|  |  |  |
| --- | --- | --- |
| (24) | (Lampuré et al. 2015) | 3 |
| (25) | (Magdalena et al. 2017) | 2 |
| (26) | (Martelli et al. 2020) | 3 |
| (27) | (Mattos et al. 2022) | 3 |
| (28) | (Methven et al. 2012) | 2 |
| (29) | (Miotti et al. 1989) | 2 |
| (30) | (Mondon et al. 2014) | 2 |
| (31) | (Fatemeh et al. 2021) | 3 |
| (32) | (Nagy et al. 2014) | 3 |
| (33) | (Ogawa et al. 2016) | 3 |
| (34) | (Ogawa et al. 2017) | 3 |
| (35) | (Ozturk et al. 2022) | 3 |
| (36) | (Pfrimer et al. 2023) | 2 |
| (37) | (Plattig et al. 1980) | 2 |
| (38) | (Richter et al. 2017) | 2 |
| (39) | (Rivers et al. 2017) | 2 |
| (40) | (Robino et al. 2015) | 3 |
| (41) | (Sergi et al. 2017) | 2 |
| (42) | (Silva et al. 2021) | 3 |
| (43) | (Stevens et al. 1993) | 4 |
| (44) | (Trachootham et al. 2018) | 3 |
| (45) | (Uota et al. 2016) | 3 |
| (46) | (Yoshinaka et al. 2016) | 1 |

1- Studies including children and adolescents, edentulous individuals, participants with cancer or those who have undergone chemotherapy and radiation therapy, individuals with dementia or other neurological conditions, and participants who are continuously using medications.

2 = Articles with full text not available, Reviews, Review systematic, Book chapters, opinions, letters, conference abstracts, study protocols, case reports, case series, duplicate data.

3 = Studies without a control group (adults) or test group (elderly).

4 = Studies that evaluated did not evaluate the sweet taste.

5 = Studies that have not assessed taste perception using a quantitative/qualitative scale.

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**Appendix 3.** Risk of bias assessment of individual studies using the JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies (Moola et al. 2020).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Author | 1. Were the criteria for inclusion in the sample clearly defined? | 2. Were the study subjects and the setting described in detail? | 3. Was the exposure measured in a valid and reliable way? | 4. Were objective, standard criteria used for measurement of the condition? | 5. Were confounding factors identified? | 6. Were strategies to deal with confounding factors stated? | 7. Were the outcomes measured in a valid and reliable way? | 8. Was appropriate statistical analysis used? | **Overall appraisal:**LOW, MODERATE, OR HIGH RISK |
| **Barragán, 2018** | U | U | Y | Y | N | N | Y | Y | **HIGH RISK** |
| **Bales, 1986** | U | U | Y | Y | N | N | U | Y | **HIGH RISK** |
| **Cowart, 1989** | U | U | Y | U | N | N | U | Y | **HIGH RISK** |
| **Fukunaga, 2005** | U | U | Y | Y | N | N | U | Y | **HIGH RISK** |
| **Gilmore, 1989** | U | U | U | Y | N | N | Y | Y | **HIGH RISK** |
| **Huang, 2022** | Y | Y | Y | Y | Y | Y | Y | Y | **LOW RISK** |
| **Jeon, 2021** | U | Y | Y | U | U | N | Y | Y | **HIGH RISK** |
| **Keneda, 2000** | N | U | U | U | N | N | N | N | **HIGH RISK** |
| **Kennedy, 2010** | N | U | Y | N | N | N | U | Y | **HIGH RISK** |
| **Mojet, 2001** | Y | U | Y | Y | Y | Y | Y | Y | **LOW RISK** |
| **Mojet, 2003** | Y | U | Y | Y | Y | Y | Y | Y | **LOW RISK** |
| **Mojet, 2005** | Y | U | Y | Y | Y | Y | Y | Y | **LOW RISK** |
| **Receputo, 1996** | N | N | U | N | N | N | U | N | **HIGH RISK** |
| **Spitz, 1988** | N | U | Y | Y | N | N | Y | Y | **HIGH RISK** |
| **Stevens, 1995** | N | U | Y | U | N | N | Y | Y | **HIGH RISK** |
| **Wang, 2020** | Y | N | Y | Y | N | N | Y | Y | **HIGH RISK** |
| **Weiffenbach, 1986** | N | U | Y | U | N | N | U | Y | **HIGH RISK** |
| **Wiriyawattana, 2018** | U | U | Y | Y | Y | N | Y | Y | **HIGH RISK** |

Y: Yes; N: No; U: Unclear; NA: Not applicable.

1. 1. Were the criteria for inclusion in the sample clearly defined? **CRITICAL DOMAIN**
2. 2. Were the study subjects and the setting described in detail? **VERY CRITICAL DOMAIN**
3. 3. Was the exposure measured in a valid and reliable way? **CRITICAL DOMAIN**
4. 4. Were objective, standard criteria used for measurement of the condition? **VERY CRITICAL DOMAIN**
5. 5. Were confounding factors identified? **NON-CRITICAL DOMAIN**
6. 6. Were strategies to deal with confounding factors stated? **NON-CRITICAL DOMAIN**
7. 7. Were the outcomes measured in a valid and reliable way? **NON-CRITICAL DOMAIN**
8. 8. Was appropriate statistical analysis used? **NON-CRITICAL DOMAIN**