

Prevalence of malnutrition in Iranian older adults: a systematic review and meta-analysis

Abstract

Objective: Malnutrition is one of the most common health concerns among the elderly population of Iran, yet previous studies in this field in Iran report varied and even contradictory malnutrition rates. Thus, this study aims to provide a pooled prevalence of malnutrition among Iranian older adults in Iran.

Materials and Methods: The Scopus, ScienceDirect, SID, MagIran, Barakat Knowledge Network System, Medline (PubMed), and Google Scholar databases were searched to find related studies published between January 2000 and August 2021. A total of 835 articles were identified through the initial search. Following the PRISMA guidelines, 636 duplicate articles, 173 irrelevant articles, and an additional 4 articles at the secondary review were omitted, which resulted in a total of 22 articles remaining for analyses. The extracted data were analyzed within Comprehensive Meta-Analysis software.

Results: The heterogeneity of the studies was evaluated using the I^2 test ($I^2 = 98.7\%$). Publication bias was examined with the Egger's test, which was not statistically significant ($P = 0.389$). In the study of 9071 Iranians aged 60-90 years, the pooled prevalence of malnutrition was found to be 10.7% (95% CI: 7.7-14.7%). In addition, the prevalence of malnutrition in Iranian older adults decreased with increasing sample size and, which was significantly different ($P < 0.05$).

Conclusion: Considering the high prevalence of malnutrition in Iranian older adults, it is necessary for health policy makers to undertake effective relevant training. In addition, it would be vital to plan periodic screening programs for Iranian older adults.

Keywords: Prevalence, Malnutrition, Older Person, Meta-Analysis, Meta-Regression

Introduction

Global aging population has been increasing in recent years due to reduction of death rates and the rise of life expectancy ([Hossini et al. 2010](#)). The aging population in Iran is also rising. As of 2022, Iran has approximately 10 million elderly citizens, and it is predicted that the country's aging population will rapidly reach more than 26 million and about 23% of the total population by 2050 ([Hosseini Moghaddam et al. 2022](#); [Hossini et al. 2010](#); [Maftoon et al. 2002](#)).

Therefore, improving care for older people is considered as one of the most vital programs in healthcare systems ([Wada et al. 2003](#)). Previous studies show that the nutritional status plays an important role in improving the health status of older adults and is also deemed to be one of the important factors for improving their quality of life ([Christine et al. 2009](#); [Wada et al. 2003](#); [Wahlqvist et al. 2000](#)).

Anorexia and weight loss are common in old age and factors such as reduced physiological function and acute and chronic illnesses affect nutritional status ([Saka et al. 2010](#); [Chang et al. 2008](#)). Moreover, reduced sense of taste and smell as well as dental dysfunction due to non-optimal health status and reduced gastric acid in the older adult can lead to poor intake and reduced body mass and nutrient reserves, leading to malnutrition ([Saka et al. 2010](#); [Chang et al. 2008](#); [Webber et al. 2005](#); [Guigoz et al. 2002](#)).

The aging process causes the lack of many nutrients, which is often related to socioeconomic status of the elderly; in general, hunger, insufficient food intake, poverty, social isolation, living in rural areas, depression and dependency are among the causes. which can expose an elderly to the risk of malnutrition ([Ghadimi et al. 2020](#); [Dent et al. 2019](#); [Vieira de Lima Saintrain et al. 2019](#); [Valentini et al. 2018](#)).

The results of 25 studies on more than 3000 older persons in mainly developed countries show that nearly 9% of the elderly were malnourished ([Guigoz et al. 2006](#)). A study conducted in Asia (continent) reports that between 16 and 78 percent of the elderly that had been examined between 2005 and 2012 were malnourished, and this percentage in a study conducted in England is between 29 and 61 percent. In studies carried out in Iran, the range of 12-16% among hospitalized elderly and 4-35% in older persons living in nursing homes have been reported ([Alzahrani et al. 2017](#); [Mitri et al. 2017](#); [Payvar et al. 2016](#); [Ekong et al. 2015](#); [Saka et al. 2010](#); [Amaral et al. 2010](#); [Drescher et al. 2010](#); [Zhou et al. 2005](#); [Brantervik et al. 2005](#)).

Malnutrition is a risk factor for many clinical disorders and is usually remain undetected considering its high prevalence. It also contributes to the decline in quality of life, disability, and eventually death of the older adult ([Saka et al. 2010](#); [Mirarefin et al. 2009](#); [Chang et al. 2008](#)).

The results of studies in different regions of Iran report different rates for malnutrition, including 12% in Khorasan Razavi, ([Aliabadi et al. 2007](#)), 6.2% in Tabriz ([Payahoo et al. 2013](#)), 22.5% in Shahroud ([Dehdari et al. 2019](#)), and 23.5% in Tehran ([Mirarefin et al. 2009](#)). These reported results indicate the heterogeneity and inconsistency among the reported results in previous studies. The prevalence figures of malnutrition among the elderly in different regions of Iran also vary. Therefore, this study aims to obtained an overall pooled prevalence of malnutrition among Iranian older adults through a systematic review and meta-analysis.

Methods

This is a systematic review and meta-analysis that aims to review, and extract reported evidence within the existing studies focused on the prevalence of malnutrition in the Iranian older adults. As part of the meta-analysis, the study also provides an overall pooled prevalence to homogenize the varied existing results. To identify existing studies, both Iranian and international indices and databases were searched. Accordingly, ScienceDirect, Scopus, SID, MagIran, Medline (PubMed), Barakat Knowledge Network System, and Google Scholar repositories were searched in the period between January 2000 to August 2021 (This particular time range of the search was determined, in order to obtain quality articles and more up-to-date information).

Inclusion and exclusion criteria

Reported evidence were extracted from the Persian and English cross-sectional studies focused on the prevalence and of malnutrition in Iranian older adults, that met the inclusion criteria. Review, case-control, cohort, and interventional studies were excluded from the identified and collated list of articles.

Criteria for selection and evaluation of articles

All articles were first collected using the selected keywords of Prevalence, Malnutrition, Nutritional Deficiency, Undernutrition, Malnourishment, Elderly, Older adult, Aging. Subsequently, identified articles were redacted (i.e., name of the journal and the author(s) were removed), and then the full texts of the articles were made available to the reviewers.

Each article was evaluated independently by two reviewers. In cases of disagreement between the two reviewers, the article was examined by a third reviewer to reach a consensus. Remaining studies were then reviewed in accordance with the four-phases¹ of Preferred Reporting Items for Systematic Reviews and Meta-Analyses - PRISMA (2009).

Quality Assessment

To evaluate the quality of articles (i.e., methodological validity and results), a checklist appropriate to the type of study was adopted. Strengthening the reporting of observational studies in epidemiology (STROBE) checklists are commonly used to critique and evaluate qualitative observational research such as the present study (Von Elm et al. 2014). Accordingly, the maximum score obtained from the qualitative evaluation within STROBE is 32. Considering the score of 17 as the cut-off point, articles with scores of 17 or above were considered as medium or high quality articles respectively and were retained for further analysis.

Statistical analysis

Data were analyzed within the Comprehensive Meta-analysis software (Biostat, Englewood, NJ, USA V.3). Within each of the remaining articles, the prevalence of malnutrition among Iranian

¹ Identification, Screening, Eligibility, and Included

older adults were reported. The heterogeneity of the studies was assessed using the I^2 test. The probability of publication bias was assessed with the Egger's test ($P=0.05$), and corresponding Funnel plots were drawn.

Results

Searching technique

The OR operator was used to check for common names for disorders, e.g., (Older adult OR Aging), (malnutrition OR Nutritional Deficiency OR Under nutrition), (nutritional status OR Nutrition Disorders). Also, the AND operator was used among the keywords (Older adult and Malnutrition) and by including a relevant keyword from the Medical Subject Headings (MeSH) thesaurus. The combination of keywords and operators are provided below:

(((((Older adult [Title/Abstract]) OR Aging [Title/Abstract]) AND malnutrition [Title/Abstract]) OR Nutritional Deficiency [Title/Abstract]) OR Under nutrition [Title/Abstract]) AND nutritional status [Title/Abstract]) OR Nutrition Disorders [Title/Abstract])))).

PRISMA 2009 was adopted as the key review protocol and reporting guideline ([Figure 1](#)), Following the search process, the following results were obtained: MagIran, SID, Barakat Knowledge Network System ($n=72$ articles), Medline (PubMed) ($n=142$ articles), ScienceDirect ($n=405$ articles), Scopus ($n=34$ articles), Google Scholar search engine ($n=182$ articles) resulting in a total of 835 articles. Out of these, 636 articles were omitted due to duplication, and 199 studies were retained.

Subsequent to this, 173 irrelevant studies were excluded as part of eligibility evaluation stage. An additional 4 articles were also excluded, due to being low quality of articles. Finally, 22 articles were retained for meta-analysis. The total number of samples included in the study was 9071 individuals aged 60-90 years. Data extracted from the final 22 studies are reported in [Table 1](#) ([Table 1](#)).

The highest prevalence of malnutrition (46.01%) was seen among older adults in Urmia (95% CI: 7.5-39.58%) in 2011 ([Saeidlou et al. 2011](#)), and the lowest prevalence of malnutrition (3%) was reported in older adults in Isfahan (95% CI: 1.6-6.3%) in 2007 ([Eshaghi et al. 2007](#)).

(Table 1 Here)

(Figure 1 Here)

Publication bias was examined using Egger's test ([Figure 2](#)), which was not statistically significant ($P=0.389$). which means that there is no publication bias in the study.

(Figure 2 Here)

The heterogeneity of the studies was evaluated using the I^2 test ($I^2=98.7\%$) which indicated a high heterogeneity among the included studies; thus, random effects model was used to pool the reported results.

Figure. 3 shows the prevalence of malnutrition among the Iranian older adults using random effects method, in which the black square denotes the prevalence (rate) and the length of the segment on which, the square is located, represents 95% CI in each study. The diamond sign denotes the overall pooled prevalence. The overall pooled prevalence of malnutrition in Iranian older adults was found to be 10.7% (95% CI: 7.7-14.1%) (Figure. 3).

(Figure 3 Here)

The effects of the sample size and the year of the study on the pooled prevalence were also investigated through meta-regression. According to Figure 4, with increasing sample size, the prevalence of malnutrition in Iranian older adult decreases, which is statistically significant ($P<0.05$). Figure 5. also demonstrates that the prevalence of malnutrition in Iranian older adults increases with the increase in the year of study, which is not statistically significant ($P=0.359$).

(Figure 4 Here)

(Figure 5 Here)

Discussion

Following a meta-analysis on studies with a total sample size of 9071 people aged 60-90 years, the overall pooled prevalence of malnutrition in Iranian older adult was found to be 10.7%. According to a meta-analysis study conducted in Iran over the period of 2007–2015, the overall prevalence of malnutrition in Iranian older adult was reported as 12.2% (Abolghasem Gorji et al. 2017). The prevalence of malnutrition in the older adults was reported as 14% (Vedantam et al. 2009) in a study in India, 13% in Turkey (Saka et al. 2010), 1.3% in Brazil (Vieira et al. 2011), and above 25.4% in Spain (Cuervo et al. 2008), which shows the high prevalence of malnutrition among the elderly population globally, and the results of other studies are consistent with the results of our meta-analysis.

As reported in this paper, the prevalence of malnutrition in Iranian older adults is high, and therefore effective interventions should be designed, as lack of on-time diagnosis can be a risk factor for clinical disorders in the older adult, decrease in quality of life, and eventually death (Constans et al. 2003).

Determining malnutrition status in the older adults is a suitable health assessment, however, malnutrition is not easy to identify among the older adults community, as malnutrition is a multifactorial problem and is not fully known concept (Schneider et al. 2000). Nevertheless, it is more difficult to assess nutritional status of the older adults due to their potential disability and

physical problems; and therefore, preventive interventions as well as timely diagnosis are the most important factors in reducing the progression and improvement of this health concern among the elderly population (Edington et al. 2004).

Nutritional status assessment is the first step in designing a successful nutritional care plan and this assessment requires design and use of appropriate nutritional monitoring tools (Edington et al. 2004; Saava et al. 2002; Schneider et al. 2000). The use of appropriate and noninvasive tools can be effective in early identification, prevention of malnutrition-related short- and long-term complications (Saava et al. 2002). Therefore, it is necessary to increase awareness among the older adults around nutritional balance, to incorporate age-appropriate activities and exercises into their daily schedule. Such awareness programs can also be extended to provide information on lifestyle changes, and to minimize sitting activities with a view to reducing the malnutrition susceptibility, and achieving age-appropriate weight in this population group. It is suggested that future studies are focused on intervention measures to reduce the prevalence of malnutrition among the Iranian elderly population.

Strengths and Limitations

One of the most important strengths of this study is the selective time range for conducting the searches, as the sensitivity and quality of the articles increased within the specified range. Additionally, specialized keywords as well as a wide range of repositories and databases were considered for study identification. Moreover, impact of selected factors on the prevalence were investigated through meta-regression analyses. Further to these, it is worth noting that this study is the first comprehensive review of malnutrition rates among the Iranian older adults offering a pooled prevalence.

The most important limitations of the current study is that the team lacked access to the full text of some of the excluded papers (due to the same shortcoming). Additionally, some of the reviewed studies were deemed to be of relatively lower quality studies.

Conclusion

The results of this study showed that the prevalence of malnutrition in Iranian older adults is 10.7%. Considering the high prevalence of malnutrition among Iranian older adults, it is necessary for health policymakers to design effective measures and interventions for periodic screening of the older adults, as well as to provide education and raise awareness around malnutrition among the population.

Abbreviations

SID: Scientific Information Database

STROBE: Strengthening the Reporting of Observational Studies in Epidemiology for cross-sectional Study

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analysis.

Declaration

Acknowledgements

The authors would like to thank the faculty members of the Gerash University of Medical Sciences.

Funding

By Student Research Committee of Kermanshah University of Medical Sciences, Deputy for Research and Technology, Kermanshah University of Medical Sciences (IR) (990089). This deputy has no role in the study process.

Availability of data and materials

Datasets are available through the corresponding author upon reasonable request.

Authors'contributions

MM contributed to the design, MM statistical analysis, participated in most of the study steps. MM and AAK prepared the manuscript. MM and NS and AH and AA assisted in the study design and interpretation of the findings. All authors have read and approved the contents of the manuscript.

Ethics approval and consent to participate

Ethics approval was received from the ethics committee of deputy of research and technology, Kermanshah University of Medical Sciences (IR.KUMS.REC.1399.081).

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no conflict of interest.

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Table Legend:

Table1: Specifications of studies entered the study

Figures Legend:

Figure 1: the flowchart on the stages of including the studies in the systematic review and meta-analysis (PRISMA 2009)

Figure 2: Funnel plot of results on the prevalence of malnutrition in Iranian older adult

Figure 3: Prevalence of malnutrition in Iranian older adult based on a random effects model

Figure 4: A meta-regression chart of the prevalence of malnutrition in Iranian older adult by sample size

Figure 5: A meta-regression chart of the prevalence of malnutrition in Iranian older adult by the year of study