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Review Article

Prevalence and Risk Factors of Dehydration Among Nursing Home Residents: A Systematic Review

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A B S T R A C T

Objectives: To provide an overview of the prevalence rates and risk factors of dehydration among nursing home residents.
Design: Systematic literature review.
Setting: Nursing homes.
Participants: Nursing home residents or institutionalized long-term care residents.
Measurements: A systematic literature review was executed on March 15, 2018, using the databases PubMed, CINAHL, and EMBASE to retrieve all articles focused on the prevalence rates and risk factors for acute and chronic dehydration. Studies were included if the target population involved nursing home residents or institutionalized long-term care residents.
Results: Nineteen studies were included in this systematic review. Prevalence rates of dehydration varied between 0.8% and 38.5% and were measured using different methods. Furthermore, 49 potential risk factors for dehydration were identified. Of the 12 potential risk factors that were investigated in more than 1 study, cognitive impairment and fever were significantly associated with dehydration among nursing home residents.
Conclusions/implications: Dehydration is a relevant and frequently occurring problem among nursing home residents. This systematic review shows that a wide variety of methods are used to assess dehydration and that it is often unclear which type of dehydration (chronic or acute) is measured. This makes it difficult to compare prevalence rates among studies. Moreover, only 2 of 49 potential risk factors (fever and cognitive impairment) were more than once significantly associated with dehydration in the respective studies. Most of the other risk factors were assessed by only 1 study or showed inconsistent results. Therefore, more research into dehydration among nursing home residents is needed.

The world's population is aging, which will result in an increase in the number of people having multimorbidity. This is especially apparent among nursing home residents.[1,2] Multimorbidity, defined as the occurrence of multiple chronic conditions within one person,[3] is associated with considerable functional dependence and complicating care problems.[4,5] One of these care problems is dehydration,[6] which often occurs in nursing home residents.[7–9] Due to the aforementioned aging of the population, the number of nursing home residents suffering from dehydration is expected to increase substantially in the future.[10,11]

Dehydration is a condition that results from excessive loss of body water with or without sodium.[12,13] Normally, homeostasis ensures a stable and constant hydration of the body, which is maintained via several processes affecting the regulation of the body water and electrolyte balance.[6] Sodium is essential for the water environment within the cells of the body, and under normal circumstances, there is an equilibration between sodium intake and sodium excretion.[14] This keeps the water level in the cells stable.[15] When dehydration occurs, this equilibrium is disrupted.[15]

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Disruption of homeostasis in the body can be caused by a number of factors. A first factor is the aging of the human body, which results in various physiological changes, such as a reduction of total body water and decreased thirst stimulus and therefore insufficient water intake and poor renal function.[16,17] A second factor is the presence of medical factors, such as acute diseases (eg, infections), comorbidities, and medication use. Finally, homeostasis can be disturbed by social and environmental factors, such as heat waves, care dependency, and hospitalization.[6,18,19]

Nursing home residents have a particular risk of dehydration[20] because they often carry 1 or more of these contributing factors.[21–24] Moreover, dehydration can be acute or chronic. In contrast to acute dehydration, which results from an excessive water and sodium loss due to an acute illness (eg, infection), chronic dehydration represents an ongoing fluid imbalance, generally caused by insufficient fluid intake.[18,25] Research shows that longer-lasting low fluid intake is rather prevalent among nursing home residents.[23]

Although slight dehydration might be desirable in some cases, such as iatrogenic dehydration to reduce fluid overload and the workload of the heart among patients with heart failure and in treatment with diuretics,[26] dehydration is usually associated with various negative consequences, including delirium, falls, constipation, urinary tract infections, and renal impairment.[27] It affects the individual's quality of life and significantly increases the risk of mortality.[28] Research has shown that mortality rates due to dehydration are higher among people living in institutions than those living at home.[29] Nursing home residents are also often hospitalized with a co-occurring diagnosis of dehydration, making dehydration an economic burden as well.[20] As recovering from dehydration takes longer among older adults, the costs of dehydration increase with advancing age.[30] Limited data available show that the annual health care costs related to hospitalizations due to dehydration reached $4.97 billion in 2008 in the United States.[31] For Europe, there are no data available.

Although dehydration is a serious problem in nursing homes, research about the prevalence of dehydration and/or the related risk factors is scarce. There are some systematic literature reviews available regarding the prevalence of and risk factors for dehydration, but these studies do not primarily focus on nursing home residents.[7,32] A better understanding of the prevalence of dehydration and its risk factors among nursing home residents helps to create awareness of the size of the problem. Furthermore, establishing the relevant risk factors for dehydration among nursing home residents may help in developing interventions focused on the prevention of dehydration. This might contribute to the quality of care and possibly prevent dehydration among nursing home residents in the future.

In this review, the following research questions are addressed:

- What is the prevalence of dehydration among nursing home residents?
- What are the risk factors for dehydration among nursing home residents?

Methods

The protocol of this systematic review was registered in the Prospero database on October 10, 2016 (registration number: CRD42016049090). Furthermore, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement was followed as a reporting guide.

Search Strategy

Using the electronic databases PubMed, CINAHL, and EMBASE, 2 systematic searches of the literature were conducted on March 15, 2018. One search focused on the prevalence of dehydration and 1 search focused on risk factors of dehydration. No publication date restrictions were imposed.

Prevalence of Dehydration

In the first search, search terms related to "prevalence" were combined with the Boolean operator "AND" with search terms related to the concept of "dehydration" and search terms related to the concept of "nursing home." The search strategy can be found in Box 1.

Risk Factors for Dehydration

In the second search, search terms related to "risk factors" were combined with the Boolean operator "AND" with search terms related to the concept of "dehydration" and search terms related to the concept of "nursing home." This search strategy can be found in Box 2. In Appendix 1, the full search strategy per database can be found. Additional studies were searched by reviewing the reference lists of the included studies.

Study Sample

To be included in the review, studies had to meet the following criteria.

Inclusion:

- Nursing home residents or residents staying in institutions for long-term care
- Data on dehydration combined with prevalence rates and/or risk factors for dehydration
- Prevalence rates measured among patients residing in the nursing home (ie, not calculated among nursing home residents into the hospital)
- Published in Dutch, English, or German

Exclusion:

- Reviews, opinion articles, congress abstracts, and case studies

In the first round, the first and second authors independently assessed all titles and abstracts based on the inclusion and exclusion criteria. Titles and abstracts that met the inclusion criteria according to both authors were included for full-text review. This was also the case for articles without an abstract or articles for which the 2 authors did not reach consensus. In the second round, all abstracts that were not excluded were retrieved as full texts. The first and second authors independently screened 30% of all full-text articles based on the inclusion and exclusion criteria. If the interrater agreement on eligibility of the full-text articles between the 2 authors was more than 90%, it

Box 1. Search strategy for prevalence of dehydration

(Prevalence [Mesh]) OR Incidence [Mesh]) OR Epidemiology [Mesh]) OR Diagnosis [Mesh]) OR prevalence OR incidence OR epidemiology OR occurrence OR statistics OR diagnose* OR diagnosi* AND Dehydration [Mesh]) OR Hypernatremia [Mesh] OR Hyponatremia [Mesh] OR Beverages [Mesh] OR dehydration OR fluids OR water stress OR hyponatremia OR hypernatremia OR fluid intake OR hydration status AND Long-Term Care [Mesh] OR Nursing Homes [Mesh] OR Homes for the Aged [Mesh] OR nursing homes OR nursing home OR care homes OR care home OR nursing home residents OR long term care facilities OR institutionalized elderly OR care institution OR long term care)