



Review

Determinants of protein–energy malnutrition in community-dwelling older adults: A systematic review of observational studies



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ABSTRACT

Protein–energy malnutrition is associated with numerous poor health outcomes, including high health care costs, mortality rates and poor physical functioning in older adults. This systematic literature review aims to identify and provide an evidence based overview of potential determinants of protein–energy malnutrition in community-dwelling older adults.

A systematic search was conducted in PUBMED, EMBASE, CINAHL and COCHRANE from the earliest possible date through January 2013. Observational studies that examined determinants of protein–energy malnutrition were selected and a best evidence synthesis was performed to summarize the results.

In total 28 studies were included in this review from which 122 unique potential determinants were derived. Thirty-seven determinants were examined in sufficient number of studies and were included in a best evidence synthesis. The best evidence score comprised design (cross-sectional, longitudinal) and quality of the study (high, moderate) to grade the evidence level. Strong evidence for an association with protein–energy malnutrition was found for poor appetite, and moderate evidence for edentulousness, having no diabetes, hospitalization and poor self-reported health. Strong evidence for no association was found for anxiety, chewing difficulty, few friends, living alone, feeling lonely, death of spouse, high number of diseases, heart failure and coronary failure, stroke (CVA) and the use of anti-inflammatory medications.

This review shows that protein–energy malnutrition is a multifactorial problem and that different domains likely play a role in the pathway of developing protein–energy malnutrition. These results provide important knowledge for the development of targeted, multifactorial interventions that aim to prevent the development of protein–energy malnutrition in community-dwelling older adults.

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1. Introduction

Protein–energy malnutrition (PEM) is a worldwide health problem among community-dwelling older adults in developed countries (Halfens et al., 2010; Health Council of the Netherlands, 2011; Schilp et al., 2012; de Hollander et al., 2012; Lee et al., 2005; Locher et al., 2007; Margetts et al., 2003; Martyn et al., 1998; Shahar et al., 2009; Wijnhoven et al., 2010) and could be defined as a wasting condition resulting from a diet inadequate in either protein or energy (calories) or both (Mosby, 2009). The World Health Organization emphasized the need for an accepted classification and definition of protein–calorie malnutrition already in 1972 (Waterlow, 1972). However, up to now, no generally accepted definition is available (White et al., 2012). Besides the challenge to define PEM, there is no gold standard to operationalize PEM. Many different criteria are currently used to measure PEM across different health care settings and target groups. The Academy of Nutrition and Dietetics and the American Society for Parenteral and Enteral Nutrition recommended in 2012 that no single criteria is definitive for PEM, and that the identification of two or more criteria is recommended for diagnosis (White et al., 2012). The upcoming ESPEN initiative for Diagnostic Criteria for PEM and approach for international consensus is expected in 2014 (personal communication) to provide a consensus statement for the diagnosis and operationalization of PEM.

Because there is no consensus on a set of criteria to operationalize PEM, we selected four criteria to operationalize PEM and to restrict our literature search: thinness (as measured by low body weight, low body mass index (BMI), or low mid-upper arm circumference (MUAC)), unintentional weight loss, low energy intake or poor appetite. The selection of these four criteria was supported by a consensus statement of the Academy of Nutrition and Dietetics and the American Society for Parenteral and Enteral Nutrition where insufficient energy intake and weight loss were defined as key criteria of PEM (White et al., 2012), a Delphi study among 30 nutritional expert (from nine different countries) where low BMI, involuntary weight loss and poor nutritional intake were mostly frequently indicated as criteria to operationalize PEM (Meijers et al., 2010). And finally, two recent Dutch reports on malnutrition (“Results Report: National Prevalence Survey of Care Problems” and “Malnutrition in the elderly” from the Dutch Health Council) described low BMI, weight loss and decreased food intake as criteria of PEM (Halfens et al., 2010; Health Council of the Netherlands, 2011). Poor appetite was included since it is included in several validated screening tools that assess (risk of) PEM in community-dwelling older adults (Kaiser et al., 2009; Wijnhoven et al., 2012; Keller et al., 2000, 2005) and because poor appetite is shown to be

an independent determinant of PEM (Dean et al., 2009; Schilp et al., 2011; Shahar et al., 2003).

Studies determining the prevalence of PEM in community-dwelling older adults are scarce and vary from 7 to 35% (Halfens et al., 2010; Schilp et al., 2012). In the Netherlands, the prevalence of PEM in older adults is estimated to be 33% in hospitals, 21% in nursing homes and 16% in home care. This is based on either a body mass index ≤ 20 kg/m², unintentional weight loss of 3 kg in the last month or 6 kg in the previous 6 months, or a recently decreased food intake (3 days hardly/no food intake, or 1 week a decreased food intake) in combination with a BMI between 20.1 and 23.0 kg/m². The percentage PEM in community-dwelling older adults without homecare was estimated at 7%, based on a BMI < 20 kg/m² or unintentional weight loss of 5% in the previous 6 months (Health Council of the Netherlands, 2011). Although the prevalence of PEM is lowest in the older home-living adults (with or without home care) compared to hospitals or nursing homes, the absolute number is highest in this community setting because 95% of the population aged 65 years and older live at home (Garsen and Harmsen, 2011).

PEM is associated with numerous poor health outcomes in individuals and adverse consequences for society. In several prospective studies among older community-dwelling adults, low BMI, low MUAC or unintentional weight loss were significantly associated with an increased risk of all-cause mortality (de Hollander et al., 2012; Locher et al., 2007; Wijnhoven et al., 2010), an increased risk for mobility limitations (Lee et al., 2005), and with a poor health status (Margetts et al., 2003). Two other studies show that low BMI and unintentional weight loss were associated with high use of health care resources ‘among older adults’ (Martyn et al., 1998) and high health care costs in hospitalized adults (aged > 18) (Freijer et al., 2013). Decreased food intake and poor appetite were found to be associated with an increased mortality risk among hospitalized (Sullivan et al., 2002) and well-functioning, community-dwelling older adults (Shahar et al., 2009). However, causality of the above mentioned associations cannot be established due to the observational nature of the studies.

Previous research mainly focused on the treatment of PEM by oral nutritional supplements or dietetic counseling, but these studies showed limited effects of health outcomes. On the other hand, little attention has been paid to the prevention of PEM targeting the potential underlying determinants. Recent systematic reviews that summarized the results of (quasi) randomized controlled trials on the effect of extra protein and energy supplementation in older undernourished adults found a small statistically significant effect on weight gain but not on mortality (Health Council of the Netherlands, 2011; Chapman et al., 2009; McMurdo et al., 2009; Persson et al., 2007; Rabadi et al., 2008; Neelemaat et al., 2011; Starke et al., 2011). Despite positive short-term effects on

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