

REVIEW

Undereating and undernutrition in old age: integrating bio-psychosocial aspects

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Introduction

Much emphasis is placed on the importance of good diet, usually in the context of concern about the health hazards of obesity [1]. Paradoxically, many elderly people are underweight and undernourished, as a result of a combination of age-related physical, social and psychological factors. This so-called 'failure to thrive' [2] or 'anorexia of the elderly' [3] is associated with morbidity and increased mortality. Active identification and nutritional support improve clinical outcome.

Epidemiology and social aspects

Studies of the prevalence of undernutrition in elderly subjects are summarized in Table 1. Subnutrition occurs in 10–20% of older people at home and up to 60% of patients in long-term care facilities and acute hospitals. Assessments vary depending on which criteria are used, and what is considered 'normal' in this population is important [24, 25]. It is inappropriate, for instance, to use norms derived from younger adult populations [26]. Nevertheless, the prevalence of undernutrition is high, and increases with age and physical dependence [27]. Much of this undernutrition is not recognized [13, 15].

Factors contributing to undernutrition in elderly people are summarized in Table 2. Social factors, including isolation and lack of social support, lack of transport, relative poverty and reduced access to preferred foods, are important [3, 28]. Low income is particularly a risk factor for women [29]. These factors reduce availability of foods and limit the social aspects of eating. In addition, there is an association between

undernutrition and depressed mood. There is no sex difference in the prevalence of undernutrition [10, 13].

Ageing and its biological consequences for nutrition

Several physical changes are observed with increasing age. First, there is the 'normal' change in body composition—a reduction in lean body mass and a redistribution of fat—which is more marked in women [26]. Secondly, appetite is reduced due to a weakened opioid-mediated eating drive and loss of sensory-specific satiety, leading to a loss of interest in food and the consumption of monotonous diets [30–32]. Drugs may impair taste and smell: examples are angiotensin-converting enzyme inhibitors, calcium channel blockers, diuretics, lipid-lowering drugs, antibiotics, non-steroidal anti-inflammatory drugs, steroids and psychotropic agents [33]. Thirdly, there is impairment in organ function, particularly of the gastrointestinal tract. Such impairment includes loss of dentition, ageing changes in the oesophagus, impaired gastrointestinal motility, gastric atrophy and hypochlorhydria [34].

The combination of these physical changes and the reduced availability and social context of food can lead to low levels of nutrition. With reduced physical exercise and energy requirements, nutritional intake may be reduced to levels of undernutrition. Paradoxically, it may be the health- and diet-conscious individuals who, having already reduced their intake of fat and sugar, become vulnerable at this time. Dietary fat, for instance, something to be minimized in early adult life, may be a valuable source of energy and nutrition

Table 1. Prevalence studies of undernutrition in elderly subjects

Patients						Undernutrition		Notes
Reference	Group/location	n	Age (years)	Sex (% F)	Definition	Prevalence	Notes	
Miller <i>et al.</i> , 1991 [4]	Medical outpatients, California, USA	183	≥70	0	Mid-arm circumference < 26.4 cm	19% 11%		
Euronut-SENECA, 1991 [5, 6]	Community dwelling, European towns	2332	70-75	50%	Adjusted weight BMI < 20 kg/m ² Anaemia Serum albumin < 35 g/l BMI < 22 kg/m ²	≤15% 5.2-5.7% 2% 16%	28% consumed less than 75% of the recommended dietary allowance for three or more key nutrients; 42% were overweight	
Posner <i>et al.</i> , 1994 [7]	Community dwelling, New England, USA	1156	≥70	57%				
Maaravi <i>et al.</i> , 1996 [8]	Community dwelling, Jerusalem, Israel	463	70	46%	BMI < 19 kg/m ² Serum albumin < 35 g/l	1.1% 11.4% (M), 16.9% (F)		
Bistrain <i>et al.</i> , 1976 [9]	Acute hospital, Boston, USA	251	57	-	Weight for height < 80% Triceps skinfold < 80% Arm-muscle circumference < 80% Serum albumin < 35 g/l	24% 71% 24% 45%	Medical patients were more depleted calorically than surgical patients but had better protein status	
Albiin <i>et al.</i> , 1982 [10]	Acute hospital, Sweden	75	75 ^a	50%	Weight for height < 80% Triceps skinfold < 80% Arm-muscle circumference < 90% Serum albumin < 38 g/l Serum transferrin < 2.0 g/l	15% 37% 15% 18% 37%	Overall prevalence of 22% (29% M, 16% F); chronic undernutrition found exclusively in patients >75 years	
Bienia <i>et al.</i> , 1982 [11]	Acute hospital, Virginia, USA	59	≥65	0	Any two of weight for height < 90%, arm-muscle circumference < 90%, serum albumin < 35 g/l and transferrin < 2.0 g/l Serum albumin < 35 g/l	61%	Malnutrition predicted risk of infection and death	
Agarwal <i>et al.</i> , 1988 [12]	Acute hospital, New York, USA	27	91 ^b	-		35%	Patients admitted from nursing home were no worse nutritionally than those admitted from home	
Mowe & Bohmer, 1991 [13]	Acute hospital, Oslo, Norway	121	≥70	59%	Weight for height < 75% Triceps skinfold < 5%ile Arm-muscle circumference < 5%ile Serum albumin < 30 g/l	21% 21% 17% 31%	Overall prevalence: 50% (62% F, 44% M); 36% was unrecognized	

McWhirter & Pennington, 1994 [15]	Acute hospital, Dundee, UK	500	55% ≥65	-	BMI < 18 Triceps skinfold < 5%ile Mid-arm circumference < 5%ile	24% 18% 35%	Of the 200 undernourished patients, 96 had nutritional information documented
Mowe <i>et al.</i> , 1994 [16]	Acute hospital, Oslo, Norway	311	≥70	53%	BMI < 5%ile Triceps skinfold < 5%ile Arm-muscle circumference < 5%ile Serum albumin < 35 g/l	29% (M), 34% (F) 17% (M), 28% (F) 20% (M), 25% (F) 38% (M), 38% (F)	65% of men and 69% of women had insufficient energy intake the month before hospitalization
Potter <i>et al.</i> , 1995 [17]	Acute geriatric hospital, Glasgow, UK	69	69-96	65%	BMI < 5%ile Triceps skinfold < 5%ile Arm-muscle area < 16 cm ² (16.9 for women) Serum albumin < 35 g/l Anaemia	22% 10% 26% 15% 22%	Malnutrition associated with increased sepsis
Stiedmann <i>et al.</i> , 1978 [18]	Long-term care, Colorado, USA	46	≥62	50%	Weight for height Triceps skinfold Serum albumin Anaemia	43% 37% 32% 52% (M), 14% (F)	
Shaver <i>et al.</i> , 1980 [19]	Long-term care, Columbus, OH, USA	115	80 ^b	82%			
Pinchofsky-Devin & Kaminski, 1986 [20]	Long-term care, Chicago, USA	232	73 ^a	45%	Combination of triceps skinfold, arm muscle circumference, serum albumin and others	7.3% (S), 52% (M/M)	All patients with pressure sores were severely malnourished
Silver <i>et al.</i> , 1988 [21]	Long-term care, California, USA	88	≥65	5%	< 80% average body weight Triceps skinfold < 5%ile Arm-muscle circumference < 5%ile	23% 0 62% (M)	
Abbasi & Rudman, 1993 [22]	Long-term care, Wisconsin, USA	2811	-	-	Serum albumin < 30 g/l Weight < 80% Serum albumin < 35 g/l	6% 12% 28%	Noted differences between nursing homes and frequent absence of documentation
Keller, 1993 [23]	Long-term care, Ontario, Canada	200	≥65	17%	Composite including BMI < 20 kg/m ² , skinfolds < 5%ile, arm-muscle circumference < 5%ile	18% (S), 28% (M/M)	Malnutrition was associated with poor appetite, dysphagia, dependency for eating, poor intake and age

^aMedian. ^bMean. -, not given; BMI, body mass index; F, female; M, male; S, severe; M/M, mild/moderate.

Table 2. Causes of inadequate eating in elderly people

Physical	
Reduced energy requirements	
Reduced metabolic rate	
Decreased physical activity	
Altered sensation	
Impaired taste	
Impaired smell	
Impaired vision	
Medication effects	
Impaired feeding drive	
Zinc deficiency	
Reduced opioid drive	
Increased satiety effect of cholecystokinin	
Impaired gastrointestinal function	
Age-related changes in the oesophagus	
Hypochlorhydria	
Reduced gastrointestinal motility	
Physical disease states	
Local—oral or gastrointestinal	
General—cancer, infection	
Neurological—Parkinson's disease	
Psychological	
Cognitive impairment	
Delirium	
Dementia	
Mental retardation	
Depression	
Loss of interest, enjoyment and drive	
Food anxieties	
Phobias	
Obsessionality	
Chronic or tardive anorexia nervosa	
Chronic psychoses	
Social and cultural	
Social isolation	
Reduced mobility and lack of transport	
Reduced access to preferred foods	
Lack of adequate carer	
Poverty	
Cultural values regarding appropriate diet	

for the elderly person. Community surveys have shown that up to 40% of men and women over the age of 65 years of age have insufficient nutritional intake [16, 35, 36]. Elderly people on a low-protein diet lose muscle and cell mass [37]. Reduced mobility and lowered plasma steroid concentrations further contribute to skeletal muscle loss and demineralization of bone [38, 39].

Co-existence of psychiatric disorders

The main psychiatric disorder associated with undernutrition is anorexia nervosa. This syndrome occurs

predominantly in adolescent girls and involves deliberate weight loss or maintenance of low weight driven by a fear of becoming fat and/or a disturbance of body image whereby the person thinks of themselves as fat when in fact they are underweight. The low weight is maintained by food restriction or by purging or exercising. Although there are reports of this syndrome occurring in elderly subjects [40, 41], it is extremely rare. However, some of the psychopathology may not be. Miller *et al.* [4] studied 34 undernourished men, over 69 years of age. Using the Eating Attitudes Test [42], they found that 60% had inappropriate self-control of eating, 26% other unsuitable attitudes to eating and 50% some degree of body image disturbance. In other words, degrees of psychopathology seen in anorexia nervosa are seen in some elderly undernourished patients.

Anxiety disorders are commonly associated with undereating. These are not just inappropriate attitudes to eating, but encompass phobic, obsessional and hypochondriacal states [43]. Food anxieties are common in elderly subjects and are contributed to by a tendency to obsessionality [44] and an over-developed concern about food and weight, features such patients share with others with eating disorders and which are influenced by cultural values and attitudes [4].

Other, more commonly recognized, psychiatric disorders contribute to undernutrition in old age. Depression is common [45] and is associated with loss of appetite, decreased energy, loss of interest in activities including food and cooking and self-neglect, which all contribute to reduced food intake. Unfortunately, depression is underestimated in elderly people, being overlooked or mistakenly seen as a normal reaction to the losses associated with old age [46].

Dementia is also common in the community and strongly associated with undernutrition [21, 47, 48]. Its incidence increases with age, with a 40% prevalence over the age of 80 years [49, 50]. Dementia occurs more commonly in malnourished than nourished patients [21] and protein-energy malnutrition occurs in most demented patients, despite an apparently sufficient dietary intake [51, 52]. There might be increased energy expenditure associated with dementia, as in Parkinson's disease [53]. Some patients with dementia have treatable or partly reversible underlying pathological processes, some caused by nutritional deficits [48, 54].

Consequences of nutritional disorders in late life

Undernutrition in elderly people includes reductions in fat, lean body mass and protein, reduction in bone density [55] and micronutrients [13] and impairment in immune function [56]. Deficiencies in micronutrients such as zinc may further reduce appetite

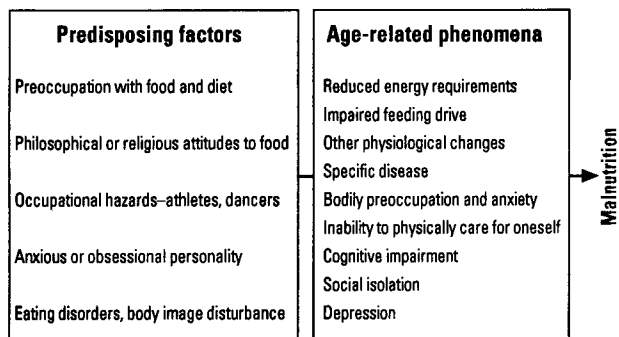


Figure 1. The development of malnutrition in elderly people

and taste sensation [57]. It may make individuals prone to depression and lethargy, weakness, falls, decreased bone density and increased fracture risk, and susceptible to infection, neurosensory changes, skin breakdown and delayed wound healing [20, 50, 58, 59].

Malnutrition not only brings increased morbidity but is also associated with increased mortality. For example, Ryan *et al.* [35] found that long-term care patients who had lost 5% or more of body weight over 1 month were more than four times more likely to die within 1 year. This increased risk also occurs in hospitalized patients [60, 61]. Low serum albumin concentration, hypocholesterolaemia and anaemia are all indicators of risk for death in hospitalized and long-term care patients [61–65]. They might be markers for severe disease [66], although increased risk also occurs in older people at home [64, 67–69]. Poor nutrition also correlates with measures of health care utilization such as length of hospital stay [60, 63, 70].

Prevention and management

As illustrated in Table 2 and Figure 1, the path to eating disorders in old age is multifactorial—a sequence of predisposing and age-related factors relating to physical, social and psychological status. Preventive measures could theoretically be targeted at both stages. For example, what might be considered a healthy attention to diet throughout young and middle life might need to be tempered in later life. Energy restriction intended to prolong life may lead to protein-energy malnutrition in elderly people. Eggs, for example, may be beneficial for protein intake despite their cholesterol content. Dietary fat may have little effect on low-density lipoproteins in an elderly person, whilst being a nutrient-dense and edible commodity. Small amounts of alcohol may stimulate appetite and promote regular bowel function [71].

Reducing isolation and encouraging the social aspects of eating are helpful. Exercise, particularly resistance training, preserves or increases skeletal

muscle mass, as well as increasing energy requirements, protein retention and bone mass [39]. Education about diet and other preventative strategies could be improved amongst both health professionals and the public. Although dietary supplementation with vitamins and/or minerals can be very useful, supplementation can occasionally result in excessive intake of certain nutrients and inadequate intake of others [72].

Secondary prevention requires early detection and patients should be screened for nutritional risk [73, 74], particularly when admitted to hospital: hospitalization is associated with worsening nutritional status [60, 75] and most older patients will have had reduced dietary intake just before admission [16]. One screening instrument, developed by the Nutrition Screening Initiative, uses the mnemonic 'DETERMINE' to present a checklist of risk factors: disease, eating poorly, tooth loss or pain, economic hardship, reduced social contact, multiple medicines, involuntary weight loss or gain, needs assistance in self-care, and elder years (80+) [76, 77]. There are other screening instruments [78]: for inpatients, the serum albumin concentration is a simple indicator of undernutrition and its associated risk [64, 79].

Psychiatric management will include treatment of depression and a combination of food education and cognitive-behavioural techniques to help reduce food anxieties. Even mild levels of dementia can lead to self-neglect. Oral nutritional support might include lean meat and fish, low-fat dairy products, nuts and dried fruits (if chewable) and formulated foods and drinks. Enteral nutrition may be required temporarily in severe undernutrition. Specific correction of thiamine or zinc deficiencies can reduce anorexia and loss of taste and help restore food intake [80]. Although there is evidence that nutritional support can be life-saving in some situations [81–83], its more general use requires further study.

Conclusion

Undernutrition is a common but under-recognized problem associated with increasing age, social isolation and physical disability. The physical changes associated with ageing reduce food intake and absorption and thus alter body composition. Subnutrition can be further compounded by culturally-determined attitudes to dieting and health which can lead to the disturbed eating attitudes, food anxieties and somatic preoccupations seen in some undernourished elderly people [4, 43]. Further study needs to address the effect of societal attitudes to food, and cross-cultural studies may help this [84]. Changes in the nutritional status in older subjects can be beguiling [85, 86]. A heightened awareness of the normal, as well as the pathological psychological and physiological changes in old age makes the compositional changes

understandable and treatable. With our present understanding, much can be achieved to prevent and treat eating and nutritional problems in later life.

More research is required to evaluate how effective primary preventative measures and psychological treatments are in preventing secondary morbidity and mortality and enhancing the quality of life of elderly people.

Key points

- Undernutrition is prevalent in old age, particularly in those hospitalized or in long-term care but, although associated with appreciable morbidity and mortality, is often unrecognized.
- In addition to social, psychological and biological factors, age-related undernutrition is associated with culturally-mediated influences which encourage a preoccupation with weight and dietary restriction and result in excessive concern about food, somatic preoccupation and poor nutrition in late-adult life.
- Better recognition and multi-disciplinary assessment is required, as well as research into cultural influences and the effects of interventions.

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