Editorial

Undernutrition and sarcopenic obesity: underrecognised conditions in patients with Sjögren's syndrome?

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Introduction

Sjögren's syndrome (SS) is a chronic, systemic autoimmune disease affecting the exocrine glands (1). Clinical manifestations of pSS include dry mouth and related problems like poor dental status, swallowing problems, and loss of taste and smell. Because of the reduced saliva production, many patients with pSS experience problems with food intake. Patients with pSS may have difficulty with swallowing hard and sticky food products (2). They need additional fluids to enable food transport in the mouth and oesophagus. Moreover, the lack of saliva often results in rampant caries and tooth loss (2). The poor dental status may further hinder eating hard food products. From other patient populations, *e.g.* patients with head and neck cancer, it is known that oral symptoms like dry mouth, swallowing and chewing problems, and poor dentition may impact dietary intake, especially protein intake. These oral symptoms have been associated with malnutrition (3-5). pSS also affects the digestive tract directly. Gastrointestinal dysmotility that is characterised by reflux and passage problems in the oesophagus, stomach and intestines is also frequently present in patients with pSS (6). Dysfunction of the liver and pancreas may further disturb the digestive process (7). These symptoms and manifestations of the digestive tract hinder adequate intake and absorption of both macro- and micronutrients, and may thus result in malnutrition, characterised by loss of muscle mass. In addition, other manifestations, like fatigue, a prominent symptom in patients with pSS (8, 9) that may result from psychological distress, anaemia, or inflammation (8, 10), as well as systemic inflammation and systemic treatment like anti-inflammatory therapy with corticosteroids (*e.g.* prednisone) (11) may contribute to loss of muscle mass. Recently, it was demonstrated that patients with pSS have a low intake of ω-3 and ω-6 fatty acids, and that higher levels of serum ω-3 (α-linolenic acid and docosahexaoanic acid) correlate with lower ocular symptoms and disease activity, thus suggesting a possible role of chronic inflammation (12). From other populations with rheumatoid diseases, chronic inflammation is known to contribute to loss of muscle mass (13). Whether malnutrition is reflected by the observed change in intestinal microbiota in pSS patients (14), and herewith contributes to the disease progress, remains to be further studied.

Undernutrition and sarcopenic obesity

Malnutrition can present as two different phenotypes, *i.e.* undernutrition or sarcopenic obesity. Undernutrition has been defined as "a state resulting from lack of intake or uptake of nutrition that leads to altered body composition (decreased fat free mass) and body cell mass leading to diminished physical and mental function and impaired clinical outcome from disease" (15). To diagnose undernutrition, the Global Leadership Initiative on Malnutrition (GLIM) criteria have been developed (16). According to the GLIM criteria, undernutrition is present if at least one of the phenotypic criteria and at least one etiologic criterion is present (Fig. 1). While a consensus-based definition for sarcopenic obesity is lacking, it is primarily characterised by low muscle mass in combination with excess of fat mass (17). In practice, excess of fat mass is considered when the BMI is ≥30 kg/m^2. It remains unclear to which extent patients with pSS are undernourished or have sarcopenic obesity.
Malnutrition may result in a negative

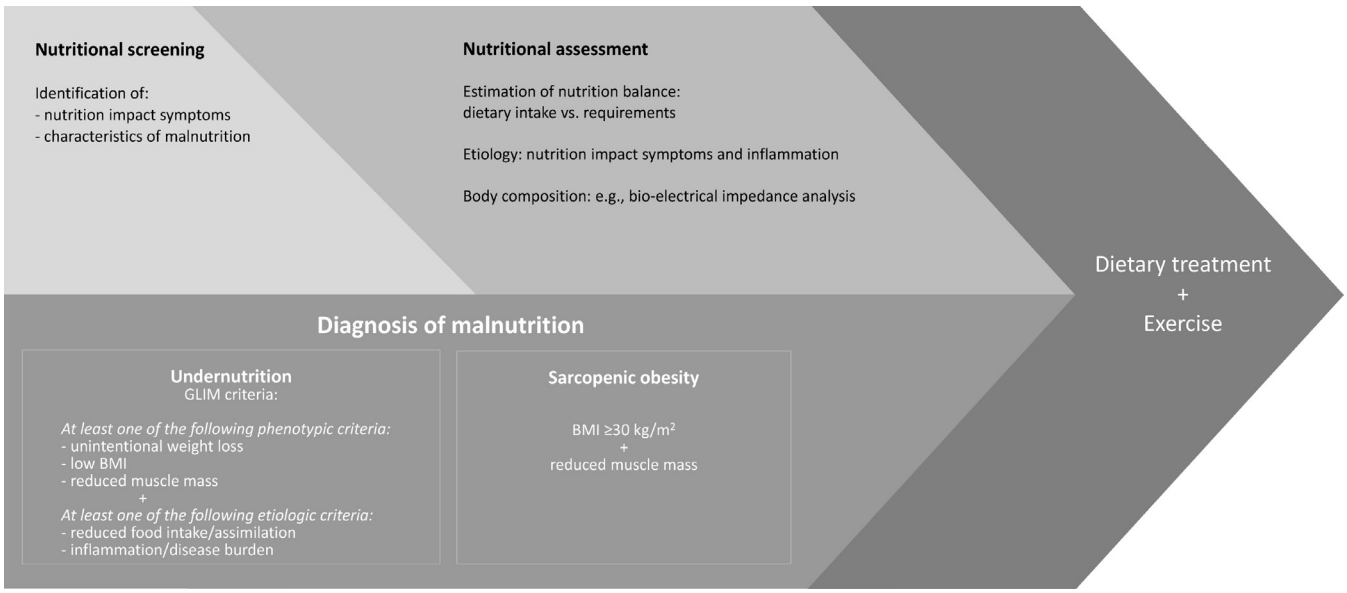

Fig. 1. Recommended nutritional risk screening, nutritional assessment and treatment of patients with pSS.
BMI: body mass index; GLIM: Global Leadership Initiative on Malnutrition (16).

spiral, because malnutrition is known to be associated with poorer clinical outcomes including lower tolerance of systematic therapy (18) and lower quality of life (19, 20). The decrease in muscle mass may contribute to or even increase fatigue, which may result in reduced physical activity in patients with pSS (21), which in turn may result in further loss of muscle mass due to disuse muscle atrophy (11).

Besides becoming undernourished, loss of muscle can also be accompanied by obesity. In a study in 39 patients with pSS classified according to the 2016 American College of Rheumatology/ European League Against Rheumatism (ACR/EULAR) classification criteria, we found a body mass index (BMI) of 25±5 kg/m^2, indicating that 95% of the population has a BMI between 15 kg/m^2 and 35 kg/m^2 (22). This finding suggests that in addition to underweight (*i.e.* BMI<18.5 kg/m^2, a characteristic of undernutrition), obesity (*i.e.* BMI≥30 kg/m^2) is also prevalent in patients with pSS (22). In the same study, we also found that a fair amount of patients with pSS use an unhealthy diet (22). In the same study, patients completed the Dutch Healthy Diet Food Frequency Questionnaire (DHD-FFQ). The DHD-FFQ is an instrument that evaluates intake of physical activity, vegetables, fruit, dietary fibre, saturated fatty acids, trans fatty acids, consumption occasions with acidic drinks and foods, sodium and alcohol. In our study, we found a mean score of 56±12, which on group level was above the cut-off for a healthy diet, *i.e.* 53 points but lower than DHD-FFQ scores of the Dutch population, *i.e.* 68.7±16.1 for men and 79.4±16.0 for women (23). This score of 56±12 in our study also indicated that a fair amount of the patients with pSS scored below the cut-off for a healthy diet. The unhealthy diet may be accompanied by higher energy intake, suggesting that the obesity may be related to the dietary pattern of the patient with pSS.

Knowledge gap on dietary intake in patients with Sjögren's syndrome

Since malnutrition (*i.e.* undernutrition or sarcopenic obesity) is known to negatively impact daily functioning, quality of life, and healthcare costs (19, 20, 24), adequate dietary intake, and maintenance of muscle mass and muscle function are of utmost importance in patients with pSS. However, thus far, studies that focused on dietary intake and nutritional status in patients with pSS are scarce, characterised by small study samples and showing conflicting data. Studies from Norway (25) and New Zealand (26) reported that dietary intake among patients with SS does not differ from recommended intake and did not alter body composition (24). On the contrary, an American study showed that women with pSS (n=24) had higher energy intake than healthy controls (27). Also a study in older patients with SS (n=28) reported multiple nutrient deficiencies including energy, protein, vitamin A, C, B1, B2, B6, fibre, iron, calcium and zinc (28).

What to do?

To enable improvement of quality of life of patients with pSS, it is of utmost importance to elucidate the relationship between diet, nutritional status, and the potential relationship with disease manifestations of patients with pSS. Better insight in the diet and nutritional status of these patients, as well as understanding how pSS-related factors influence food choices, will help to develop a personalised dietary treatment for patients with pSS. This insight and understanding will improve dietary intake and optimise nutritional status including muscle status. Moreover, it has to be assessed whether changes in the oral microbiome, intestines or both play a role and if so, how they can be influenced.

For daily practice, we recommend to include nutritional risk screening and nutritional assessment in the routine work up of patients with pSS at diagnosis and follow up. The nutritional

screening and assessment serve as basis to identify nutrition impact symptoms, *i.e.* oral and systemic disease manifestations that hinder food intake, to diagnose nutrition-related disorders like undernutrition and sarcopenic obesity, and to initiate multimodal treatment including dietary treatment and exercise to improve muscle status (Fig. 1).

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