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Adapting Non-Pharmacological Treatment for People with Type 2 Diabetes and Frailty

1. TYPE 2 DIABETES MELLITUS AND FRAILTY

Type 2 diabetes mellitus (T2DM) and frailty affect a significant proportion of the population, especially in older adults. T2DM is associated with various metabo-

lic and cardiovascular complications and may lead to an increased risk of functional loss and morbidity-mortality (1). On the other hand, frailty, understood as a clinical syndrome, reflects a decrease in functional capacity and adaptation to stress, and has become a predictive fac-

tor of poor health. Frailty is a set of signs and symptoms characterized by weakness, weight loss, and decreased activity that are associated with adverse health indicators and increase the risk of: falls, functional decline, disability, dependence, institutionalization, and death (2). It »

» is not necessarily linked to chronological age, but to biological age, and therefore refers to the threshold from which the physiological reserve and the body's ability to adapt begin to be insufficient to maintain personal autonomy.

There would be no doubts about how to diagnose Diabetes, but there is controversy about when and how to diagnose frailty due to the lack of a single instrument to evaluate it (3).

The main models for conceptualizing frailty are:

a) Physical model or Fried phenotype: based on weight loss, decreased strength, fatigue, difficulty walking, and low physical activity.

b) Rockwood multidimensional model: its index is understood as an accumulation of deficits (comorbidity, cognitive impairment, activities of daily living, disability, signs and symptoms, tests), the greater the accumulation, the greater the possibility of frailty.

When someone is frail, knowing to what degree they are allows establishing objectives and adapting the therapeutic plan. The Comprehensive Geriatric Assessment (CGA) would allow a holistic view of the frail person. With this tool, the clinical, functional, mental, and social dimensions of the person are assessed, to then draw up an individualized plan according to the situation, possibilities, and preferences, to improve their health. We also have the Rockwood Clinical Frailty Scale (CFS), which categorizes the comprehensive clinical aspect of the person into 9 levels. Also, seeking a practical and agile tool in the clinical setting, the Frail-CGA index has been created (<https://es.c3rg.com/index-fragil-vig>), validated in both the primary care and hospital settings, which is administered in less than 10 minutes.

Of note, assessment and interventions must be reevaluated, since frailty is a dynamic and changing process (3).

Effective interventions to prevent or partially reverse frailty, especially in earlier stages, would be improving sarcopenia

and balance with exercises, treating the identified causes of weight loss or fatigue—anemia, hypothyroidism, hypotension, vitamin B12 deficiency, depression—and addressing polypharmacy.

The non-pharmacological strategies that health professionals perform to modulate lifestyles must be considered part of the treatment, since they impact quality of life and objectifiable biological parameters (such as HbA1c or weight, among others) and minimize risks and complications.

Individualization must govern both the plan and the objectives that will be set. People with diabetes and frailty form a very heterogeneous group and require careful individualization of their treatments. It would be about ensuring acceptable blood glucose levels, with safe ranges that avoid extreme values, that allow maintaining mental function and the general well-being of the person and their immediate environment. It is also essential to manage alarm signs, how to interpret the results of glycemic controls, and how to prevent potential complications.

2. NON-PHARMACOLOGICAL TREATMENT IN PEOPLE WITH FRAILTY AND TYPE 2 DIABETES MELLITUS: MAIN AREAS OF INTERVENTION

Non-pharmacological interventions aimed at T2DM revolve around therapeutic education as the key to self-care, focused on adaptation strategies. This must be personalized and adapted to the context, considering the person's level of knowledge, cognitive abilities, and resources. Recommendations should be simplified. Motivational interviewing would be the best communication strategy to maintain and promote healthy lifestyles by exploring ambivalences to provoke beneficial changes. It must be based on a multidisciplinary approach that values nutrition, physical exercise, and social interaction as areas of intervention.

2.1. Nutrition.

Regarding the consumption of toxins,

the recommendation for the frail person with T2DM is exactly the same as the one we must make to any other patient: the consumption of alcohol and tobacco should be avoided.

Nutritional recommendations must incorporate culture, preferences, personal skills, and metabolic objectives agreed with the person or their caregiver.

Nutrition, a fundamental part of comprehensive diabetes care at any age, deserves special considerations in frail older adults. We must be careful with restrictive dietary recommendations initiated in previous years, which are maintained by inertia (4). A lower caloric intake in a frail adult can expose them to a risk of deficiencies. In addition, older people with T2DM have a higher risk of hypoglycemia due to alterations in their autonomic nervous system, so caloric restriction could increase the potential number of hypoglycemic episodes.

Although energy requirements decrease with age, macro and micronutrient needs are similar throughout adulthood. In addition, the elderly are at potential risk of malnutrition due to anorexia, altered taste and smell, difficulty swallowing, oral/dental problems, and functional impediments that hinder the preparation and consumption of food (1).

For the assessment of nutritional status, the Mini Nutritional Assessment (MNA®) assesses the risk of malnutrition in primary care (PC) (5). In addition, it would be recommended to complement the nutritional study with a blood test, if feasible, with parameters such as albumin, vitamin B12 (especially in patients with prescribed metformin), folic acid, or vitamin D.

Usual anthropometric parameters, such as body mass index (BMI) or abdominal circumference (AC), are not always accurate predictors of the degree of adiposity in older adults, since their increase often masks a real loss of muscle mass due to changes in body composition typical of aging (6).

On the other hand, nutritional adaptation will also depend on the frail phe- »

THE MAIN RISK FACTOR FOR FRAILTY IS PHYSICAL INACTIVITY, EXPRESSED IN THE FORM OF SEDENTARY BEHAVIOR

» notype of sarcopenia (6), whether it is a tendency to:

a) Thinness and cachexia due to malnutrition due to an insufficient diet and/or poor nutrient absorption.

b) Sarcopenic obesity, the most frequent condition among older adults.

If nutritional needs are not met with usual intake, additional interventions would include: promoting fractionated and frequent meals, enriched foods, changing the texture, or adding supplements between meals (7).

Adherence to a typically Mediterranean diet, rich in fruits and vegetables, ensuring optimal protein consumption, can decrease the appearance of frailty and improve its prognosis (6). There are different nutritional guidelines that evidence identifies as healthy. Among them, the Mediterranean diet is the nutritional pattern recognized par excellence.

2.2. Physical Exercise: benefits and adaptations.

Physical exercise is another fundamental element in the non-pharmacological treatment of type 2 diabetes mellitus and frailty. Regular physical activity improves insulin sensitivity, controls blood glucose, reduces inflammation, and improves body composition by increasing muscle mass and reducing visceral fat.

The main risk factor for frailty is physical inactivity, expressed as sedentary lifestyle (9). This process produces a deterioration of strength (dynapenia) and muscle mass (sarcopenia) affecting balance, and determines a loss of cardiovascular resistance. Interventions focused on physical exercise are effective in delaying and even reversing frailty,

and would be the strategy with the best cost-effectiveness profile in the prevention of this syndrome (6).

That is why physical exercise must be prescribed as treatment and, like any other treatment, the correct dose must be adjusted (8). There is also evidence that group sessions also provide the advantages of socialization. Resistance exercises, such as weight training, and low-impact aerobic exercises, such as walking or swimming, are highly recommended. Balance and flexibility exercises, such as yoga or tai chi, can also be beneficial to improve stability. Therefore, the recommendations are aimed at performing multicomponent exercises to increase flexibility, muscle strength, and balance of the frail person with T2DM, with the ultimate goal of maintaining functional capacity and avoiding falls, caused by muscle weakness, diabetic neuropathy, and postural instability. Preventive strategies that include modifying the home environment to reduce risks, such as removing loose rugs, providing good lighting, or installing support bars in the bathroom, are also useful.

For healthy aging in T2DM, it would be suggested to perform a minimum of 150-300 minutes/week of moderate-intensity aerobic activity or 75-150 minutes/week of vigorous-intensity aerobic activity or a combination of both. Therefore, the need to maintain a life as active as possible must be insisted on older and frail people and those who care for them, as well as limiting time in sedentary activities, whether in people who go out into the community or those who remain at home (9).

2.3. Social Prescription.

Social interaction and participation, as well as personal autonomy, are funda-

mental axes for healthy aging. Promoting social care requires knowledge of the person's immediate environment (home, family, presence or absence of a caregiver), the characteristics of the neighborhood where they live, and the codes of their cultural group. A low socioeconomic level increases the risk of multimorbidity, frailty, and disability (10). The social factors that impact health outcomes in people with DM and frailty can be grouped into:

a) Axes of inequality, which include variables such as age, gender, social class, ethnicity, and territory. They must be taken into account by health professionals and minimized as much as possible to obtain better health outcomes.

b) Social determinants, which are the living conditions in which people are born, grow, live, work, and age, including the health system. They affect both the physical and mental health of people, including glycemic control in the case of diabetes (11). Living in a certain neighborhood could hinder access to certain food groups or the possibility of doing outdoor physical exercise. The environment could benefit health (2) with measures such as the elimination of architectural barriers, safety, lighting, and/or acoustics.

c) Social support, which refers to social relationships and their influence on health, contributing to survival and better recovery if there is illness. Primary care professionals must incorporate the resources of their environment when making a social prescription or promoting the community assets of a neighborhood. Social prescription programs that have shown the greatest effectiveness are those related to the indication of physical exercise in parks, art therapy, healthy living initiatives, or time banks. **D**



CONCLUSIONS

Non-pharmacological treatment is a fundamental component in the management of type 2 diabetes mellitus, especially when it is associated with frailty. The adoption of a multidisciplinary and personalized approach, and an approach that incorporates adequate nutrition, physical exercise, social interaction, management of comorbidities, and fall prevention, can improve health outcomes, reduce complications, and prevent premature institutionalization.

The care of frail people with T2DM also poses challenges. One of the main obstacles is the creation of solid evidence, since these groups are often understudied and the heterogeneity of their characteristics and the interventions used hinder the generation of robust evidence. Another important challenge is to incorporate frailty into the professional perspective and promote adequate training for its detection and approach. Health professionals must be sensitized and trained to identify frail people and provide them with adequate care, to improve their quality of life and well-being.

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