v. 3, n. 42, 2023

International Journal of Human Sciences Research

NUTRITIONAL ASSESSMENT OF INDIVIDUALS WITH GENDER DYSPHORIA: A SENSITIVE LOOK AT WHERE WE ARE AND WHERE WE MUST GO

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Abstract: As the transgender community grows worldwide, along with the health demands that the transsexualization process involves, it will become increasingly common to provide nutritional care aimed at this population. Even in this scenario, there are currently no guidelines that train the nutritionist regarding the tools that are considered safer in relation to the health of the transgender individual, considering that all components of nutritional assessment are based on reference values. based on biological sex. The present work sought to clarify, through the available literature, which guidelines represent the most appropriate in relation to the processes of care and nutritional assessment of transgender individuals. The chosen methodology was developed through an integrative review, using the following keywords: "nutrition and transgender" and "nutrition and transsexuality" applied to indexed databases and also considered as inclusion criteria the publications made between 2012 and 2022, in Portuguese, English and Spanish. The scarcity of studies aimed at exploring the nutritional health aspects of these individuals was evident. However, it was possible to conclude that in their conduct, professional nutritionists choose to use references according to the patient's gender identity and that they individualize nutritional care, taking into consideration, the range of values between recommendations for both sexes, when deemed appropriate. It is necessary for professional nutritionists to seek greater knowledge regarding transgender health, understand their unique needs and be prepared to act in a multidisciplinary way to guarantee the health and well-being of this population, so that, this way, they can reduce barriers to health and alleviate the stigma faced by the transgender population.
Keywords: nutrition; nutritional assessment; transgender; health.

INTRODUCTION

Transgender people are those who have a gender identity that is different from the sex they were assigned at birth. A transgender or trans person can identify as a man, woman, trans-man, trans-woman, as a non-binary person or with other terms, such as transvestite, gender queer, third gender, two-spirit. Gender identity is different from sexual orientation: transgender people can have any sexual orientation, including heterosexual, homosexual, bisexual, and asexual (1).

One of the specific needs of this population is the prescription and supply of hormones, considering that hormoneization (also known as hormone therapy or hormone therapy) makes up the transition process. In the vast majority of cases, transsexuals and transvestites who arrive at the health service with this demand already use hormones and are clear that they want to continue using them. The difficulty in accessing care in health services leads to self-medication, most often with hormones of inappropriate types, doses and/or forms of application, which usually leads to many adverse effects and health problems such as a decrease in high-density lipoprotein. (HDL) and in contrast the increase in low-density lipoprotein (LDL), acne, obesity, psychological and emotional disorders, osteoporosis, coronary artery disease, hypertension, erythrocytosis, cerebrovascular disease, severe liver dysfunction and even breast or uterine cancer in transgender men and osteoporosis, obesity, altered resistance to insulin action (type 2 diabetes), decreased lean mass, breast cancer, thromboembolic disease, cholelithiasis, coronary artery disease and cerebrovascular disease in transgender women (2,3).

Considering the risks and bodily transformations associated with hormonal therapy in the transsexualization process, the high social vulnerability of this population

and also, considering the lack of clinical understanding about the health and nutritional assessment of this population, nutritional considerations for the trans population are not only of clinical origin, but also of a social nature.

Therefore, considering the current scenario in which there are insufficient Brazilian studies in the field of nutrition related to the trans population and, furthermore, considering the lack of clinical understanding about the health and nutritional assessment of this population, this work intended to investigate the scientific literature, intrinsic and extrinsic aspects associated with the health and psychosocial conditions of the trans population.

LITERATURE REVIEW

WHAT IS UNDERSTOOD ABOUT GENDER IDENTITY

There are regularly misunderstandings about the understanding of gender identity, as its conception is easily confused with biological sex or sexual orientation. Sex is defined as a set of anatomophysiological characteristics that distinguish men and women: male sex; female (4). In common perception, sex is a label assigned to us at birth, in accordance with a collection of physiological factors such as genitalia, hormones and chromosomes that we carry. Most individuals are assigned the gender of male or female, and this is what is generally expressed in publicly accessible documents, such as the birth certificate. However, gender is even more complex than sex: it includes habits and expectations that society has about behaviors, thoughts and characteristics that accompany a person's assigned sex. For example, concepts about the way some expect men and women to behave, dress and communicate help to construct the conception of gender (5).

When the assigned sex and the individual's gender identity are aligned, they are called cisgender people. Individuals who feel that the sex assigned to them at birth differs from their gender identity are called transsexuals or transgender people (5). This identification of sexual identity can occur in all cycles of an individual's life, from early childhood, adolescence, adulthood and even old age and concerns self-recognition, regardless of their biological characteristics (6).

It is pertinent to highlight that these terms can evolve over time and be interpreted in different ways based on the cultural context and local realities, thus emphasizing the relevance of updating the mode of ethical and social conduct on the part of of health professionals when providing care to this population (7).

EATING DISORDERS

The transsexual population is identified as a subgroup at risk for eating and image disorders, due to their relationship with their body and possible dissatisfaction with body image. Due to the lack of acceptance and transphobia reproduced by society, there is a need to adapt to imposed gender standards, that is, to create an image that allows passability, even to ensure one's own safety (8). These aspects can impact actions involving the act of eating, from food choice to eating frequency, promoting consequences for physical and psychosocial health.

Due to the role of the media, eating disorders have gained some attention on the social scene in recent years. However, a brief historical review of the literature makes it clear that the first highly suggestive case of an eating disorder dates back to the year 895, where a servant named Friderada, after recovering from an unspecified illness, began to show a voracious appetite. To reduce her appetite, she decided to live in a convent. In this new home, she began fasting, which ended up resulting in

her death by failure (9).

Among the factors that contribute to the development of ED in trans people, the literature indicates that the social stigma imposed on them, combined with discrimination, and also the stress of belonging to a gender minority, where the perspective of an observer as an observer is internalized. primary view of your physical self, contribute to a scenario of disordered eating (10).

Currently, there is limited guidance for eating disorders in this understudied population. Therefore, it is noteworthy that clinical monitoring must preserve control of body satisfaction as a whole, not paying attention only to the sexual parts, to avoid eating disorders. The most pertinent intervention qualifies as one directed at psychosocial aspects, and not just pharmacotherapeutic therapies; and, when necessary, referral to psychological care (11).

ANTHROPOMETRIC ASSESSMENT

Currently, it has not yet been defined which resources, such as equations, reference values and cut-off points, are considered most appropriate for classifying the transsexual population, considering that all parameters used are based on the individual's biological sex. Furthermore, there is a lack of studies that clarify whether or not methodologies built based on binary genders (and not based on self-determined gender) are in fact appropriate for evaluating body composition in transgender people. Although nutritional assessment is an essential instrument in clinical practice, its applicability to the transsexual public is still uncertain, as due to the use of HT, there are modifications and redistributions of lean mass and fat mass, creating new metric parameters that complicate the comparison of this population. within the cutoff points present for the male and female cisgender population (12).

To reduce interpretation tendencies, it is considered necessary that, when carrying out the anthropometric assessment of these individuals, it is necessary to take into account all available anthropometric indicators and subjective aspects of each individual's experience, such as monitoring pre- and post-hormonization, time elapsed since the beginning of the transsexualization process, current stage, body modifications already carried out (surgeries and aesthetic procedures), characteristics of hormone therapy (type of hormone, route of administration, dose, frequency, start date, schedule changes) and its impacts on the patient's body composition, such as fluid retention and changes in body composition. All of these factors can help to establish personal parameters, on which the nutritionist can base his interventions (13,14).

GOAL

The objective of this study was to identify, through the available literature, which guidelines represent the most appropriate in relation to the processes of care and nutritional assessment of transgender individuals.

METHODS

This work was prepared through an integrative review through the analysis of scientific publications on the health and nutrition of the transgender public, using as a primary source the reading of government documents at national and global levels, such as laws, ordinances, public policies and primers. The contextualized articles and documents contributed to the following moments in the preparation of the work: the construction of the discourse and the documentation for the development of the results. The inclusion criteria were publications carried out between 2012 and 2022, in Portuguese, English and Spanish,

Author (year)	Goals	Methods	Results	Conclusion
Bretherton., *et al* (2021)(15)	Exame the relationships between body fat distribution and insulin resistance in individuals on LT.	The study recruited a total of 41 MT (~41.1 years), 43 HT (~28.8 years) who had been on HT for at least 1 year, and a control group of 30 cisgender men (~32 years) and 48 women cisgender women (~28.1 years). All participants underwent DXA and HOMA2-IR examination.	HT: Compared to cisgender control women, there was a ±7.8 kg gain in lean mass and a greater android/ gynoid ratio, but no difference in overall fat mass or insulin resistance. MT: compared to control cisgender men, there was a loss of ± 6.9 kg of lean mass, a gain of ± 9.8 kg of fat mass, a lower android/gynoid ratio and greater insulin resistance. Higher HOMA2-IR indices were correlated with higher proportions of body fat in the android and gynoid areas in MT and HT.	Android fat correlates more strongly with insulin resistance than gynoid fat in transgender individuals. Greater fat mass and insulin resistance in MT may predispose to increased CVR. Despite adverse fat distribution, insulin resistance was not greater in HT.
Kirby S.A; Linde J.A, (2020) (16)	Determination of nutritional needs and barriers in a group of transgender students.	Qualitative/quantitative interviews applied to 26 transgender students (~ 22.7 years old) from a public university in the USA about diet characteristics, frequency and eating habits.	47.3% were on AI, 31% had episodes of binge eating in the last year, 88% changed their eating behaviors/physical activity routines to change their body and 42% had some type of ED.	The nutritional barriers most cited by participants were economic conditions, lack of family financial support and the cost of foods considered "healthy"".
Klaver *et al.,* (2020) (17)	Investigate the effects of HT on the cardiovascular risk profile of transgender adolescents.	71 MT and 121 HT who started HT at the age of 15 were subjected to anthropometric measurements, BP, HOMA-IR index, glucose and lipids at 3 moments: at the beginning of HT, at the increasing the TH protocol concentration and upon reaching 22 years of age.	MT: BMI +3.0, SBP -2 mm Hg, DBP +10 mm Hg, HOMA-IR +0.6, no glycemic changes and lipid values were similar or more favorable compared to cis population. HT: +2.3 BMI, SBP +7 mm Hg, DBP +7 mm Hg, glucose + 0.1 mmol/L, HOMA-IR -0.2, no lipid changes. The prevalence of obesity was 9.9% in MT and 6.6% in HT.	Generally, HT in transgender adolescents is safe in terms of cardiovascular risks. However, obesity was more prevalent in a subset of transgender individuals compared to the general population of young adults.
Chen *et al.,* (2019) (18) hormonal treatment (HT	To investigate the effects of TH on concentrations of vitamin D binding protein (PAD), total, bioavailable and free 25(OH)D.	Blood samples were collected from 29 MT (~26 years) and 30 HT (~22 years) before starting HT and 3 months after the baseline date.	DBP tended to increase in trans women, but did not change in trans men. HT does not interfere in the assessment of vitamin D status in transgender individuals.	
Vlot *et al.,* (2019) (19)	To investigate change in markers of bone turnover (MRO) and evaluate correlations with changes in BMD in transgender adults.	121 MT (~ 30 years old) and 132 HT (~ 24 years old) were subjected to immunoassay and DXA at three moments: beginning of the study, after 3 months and after 1 year of HT.	MT: alkaline phostase (ALP) decreased by 19%, the bone resorption marker that exhibits osteoclastic activity (CTx) decreased by 11% and sclerostin by 8%. HT: bone formation marker that exhibits osteoblastic activity (P1NP), ALP and sclerostin increased by 33%, 16% and 15% respectively.	1 year of HT resulted in decreased bone turnover in older MT and HT, while it increased in younger trans men. Decreased bone resorption in older trans men highlights the importance of estrogen as a key regulator of bone turnover.
Scharff *et al.,* (2019) (20)	Investigate possible changes in HGS in trans people and their association with MM and BMD.	249 MT and 278 HT in age groups (<25 years, 25–40 years, ≥40 years) underwent handgrip dynamometry, DXA and immunoassay at the beginning of the study, after 3, 6, 9 and 12 months of TH.	MT: HGS decreased by -1.8 kg. HT: +6.1 kg increase in HGS associated with lean mass gain. No differences were found in handgrip strength between age groups, BMI groups, routes of administration/ hormonal concentrations. Change in HGS was not associated with change in BMD in MT and HT.	After 1 year of HT, HGS decreased in trans women and increased in trans men. Only in trans men was change in handgrip strength associated with change in lean mass.

Klaver *et al.*, (2018) (17)	Analysis of changes in the percentage of total body fat and in different regions of the body in trans people after one year of HT.	179 MT (~29 years) and 162 HT (~24 years) underwent whole-body DXA at baseline and after one year of HT.	MT: +28% total body fat being: + 33% in the arm region + 18% in the android region, + 34% in the gynoid region, + 42% in the leg region, -0.7 cm WC and +3.2cm of QC. HT: -10% total body fat, being: -10% arm region, +1% android region, -14% gnoid region, -16% leg region, -0.4 cm WC and -1.9 cm of QC.	HT causes a more feminine body fat distribution and lower WHR in MT and a lower HC body fat distribution in HT. Trans men experience greater changes in some outcomes than others, possibly due to higher testosterone levels.
Wiepjs *et al.*, (2018) (19)	Investigate possible changes in lumbar BMD during the first 10 years of LT.	711 MT (~35 years) and 543 HT (~25 years) were subjected to DXA at three moments: before starting HT, after 2.5 and 10 years of HT.	MT: BMD of the lumbar spine did not change but the Z score of the same region increased +0.22 after 10 years of LT. In HT: the BMD of the lumbar spine did not change, but the Z score of the same region increased by +0.34 after 10 years of HT.	TH has no negative effects on BMD, indicating that regular assessment of BMD during HT is not necessary. However, a high percentage of low BMD was found before TH, mainly in MT.
Watson *et al.*, (2017) (21)	Explore patterns of ED among transgender youth.	Online survey open to 923 young Canadian transgender people between 14 and 25 years old.	14 to 18 years old: 42% reported binge eating (at least once in the last year) and during the same period practiced fasting (48%), using diet pills (7%), laxatives (5%) and inducing vomiting (18 %). 19 to 25 years old: 29% reported binge eating (at least once in the last year) and practiced fasting (27%), diet pills (4%), laxatives (3%) and induced vomiting (5%) during the same period.	There was a high level of prevalence of ED. The risks for these disorders were linked to social stigma and exposure to violence.
Vilas *et al.*, (2014) (22)	Assess the nutritional status, eating behavior and lifestyle of transgender people.	FFQ, R24H and physical activity, and anthropometric assessment were applied to 157 healthy transgender individuals (91 MT and 66 HT), without metabolic diseases, with a mean age of 32.9 years.	The sample consumes an average of 3,614.3 ± 1,314 kcal/day with hyperlipidic, hyperproteic and hypoglycemic characteristics. 79% tend to eat outside the home. Average BMI of 24.0 kg/m². 5.05% were underweight. Both groups (HT and MT) had a mean WHR of 81 cm and were considered sedentary (ALP<1.70). Average percentage of fat mass in MT was 29.7% and in HT it was 26.8%.	The characteristics of the diet, poor eating habits and insufficient physical exercise of this population make it susceptible to the development of chronic diseases, CVR, and increases the prevalence of overweight and obesity.

Table 1. Research articles aimed at investigating specific nutritional aspects in transgender populations*.

Source: the authors, based on data contained in the articles and research consulted. *list of abbreviations: CC = waist circumference; CQ = hip circumference; BMD = bone mineral density; DXA = dual energy x-ray; HGS = handgrip strength; HT = trans men; AI = food insecurity; MM = lean mass; MRO = bone remodeling markers; MT = trans women; PAL = physical activity level; BP = blood pressure; PAD = vitamin D binding protein; FFQ = food frequency questionnaire; WHR = waist-hip ratio; CVR = cardiovascular risk; R24h = 24-hour recall; ED = eating disorder; HT = hormonal treatment/therapy.

from indexed databases, using the following keywords: nutrition and transgender or nutrition and transsexuality.

RESULTS

Due to the scarcity of research articles produced in the Portuguese language that addressed the topic of nutrition dedicated to the transgender public, the search for references was expanded by inserting key words in the English language, such as "transgender nutrition", which resulted in a of 118 articles found in the Pubmed database, 208 on the CAPES platform and 176 in the SciELO electronic library. Each title was evaluated, resulting in the selection of 10 articles that corresponded to the work's inclusion criteria and that covered the nutritional aspects that must be observed during a nutritional assessment, as shown in Table 1.

DISCUSSION

Knowledge about the health of the trans population is highly scarce, a fact that is reflected in the field of nutrition as demonstrated by Douglass et al. (23), who sought to test the knowledge of 305 licensed nutritionists (work experience between 1 and 10+ years) regarding the effects of HT on the lipid profile of trans patients, where only 27.3% of the sample achieved basic correct answers regarding the subject. In addition to this theme, the methodology clarified the health factors impacted by HT that can increase CVR: in trans men, an increase in total body weight and visceral fat and a decrease in HDL were found in samples studied by Elbers et al. (24), Ott et al. (25) and Bretherton et al. (15). Regarding insulin resistance and diabetes, the results were conflicting, considering that Elbers et al. (24) and Bretherton et al. (15) did not find any effect of insulin sensitivity, while Gooren and Giltay (26) found a decrease in this same parameter in their sample.

In relation to trans women, the health factors associated with CVR are: increased fat mass and total body weight and changes in BP found in samples from Klaver et al. (17), Bretherton et al. (15), Elbers et al. (24) and Ott et al. (25). In a sample studied by Wierckx et al. (27), there was a higher prevalence of DM 2 (when compared to the control group) and a decrease in insulin resistance was noted by Gooren and Giltay (26). According to the literature, the increase in CVR through HT with estrogen may depend on the particularities of the individual's health before starting therapy (28).

Considering that the transgender population using HT has a higher risk of developing cardiovascular diseases, the literature suggests that professional nutritionists encourage smoking cessation, exercise and dietary approaches to reduce hypertension and dyslipidemia, such as diet DASH (Dietary Approaches to Stop Hypertension), rich in fruits and vegetables, low-fat dairy products, whole grains, fish and nuts and low in animal protein and sugar, and/or the Mediterranean Diet, characterized by numerous portions of fruit and fresh vegetables, with an emphasis on root vegetables and greens, whole grains, fish, low-fat dairy products, nuts and legumes, use of olive oil, lean meats and less red meat. The Mediterranean diet is typically moderate in total fat, relatively low in saturated fat, high in polyunsaturated fatty acids (especially omega-3s) and high in fiber (29).

Changes in weight and body fat distribution to the detriment of feminizing and masculinizing HT were proven through this study. In research compatible with the study's inclusion criteria, trans men experience an increase in BMI, gain in body weight and lean mass, a greater android/gynoid ratio, loss of fat mass and increased handgrip strength (15,17,30). Trans women, on the other hand, experience a higher prevalence of obesity,

increased BMI, weight and total body fat, decreased lean mass and handgrip strength, however, a lower android/gynoid ratio (15,17,22,31).

The use of HT is not characterized as the only driver of changes in nutritional status: eating habits, lifestyle, genetic factors, risk of AI and AT are also responsible supporting factors. In fact, the literature demonstrates that estrogen therapy changes body composition with loss of lean mass (22).

The results found suggest that the classification of nutritional status, especially for trans men according to BMI, may be biased: considering that HT leads to greater loss of fat mass and greater gains in lean mass. In addition to this rationale, the literature suggests that the anthropometric measurements that more accurately reflect the nutritional status of trans patients would be the measurement of body weight, percentage of body fat and waist and hip circumference, analyzed according to the gender in which the patient identifies himself (32).

Using anthropometric reference values consistent with the patient's gender identity can be a step towards constructing a nutritional assessment that is more ethically compatible with the trans patient's idealizations of the female and male body. However, this approach also has the potential to distort the patient's nutritional status, for example: patient with WC of 80 cm; according to World Health Organization (33) it would be characterized as an increased risk for morbidity in the sex classification for women, whereas in the classification for men, it would be out of risk, according to the same organization. Regarding this impasse, Fergusson et al. (34) show that nutritionists must recognize nutritional risks when choosing classification parameters and improve their strategies in clinical practices to better care, evaluate and monitor the health of trans patients.

Other important factors related to nutrition to be developed during basic care for trans patients are energy and nutritional determinations. According to the limited studies available, the ideal methodology that meets the caloric needs of trans patients would be the interval between male and female references. For example, when using the EER (Estimated Energy Need) equation for a 30-year-old patient, weighing 80 kg, 1.70 m tall and with an activity factor of "little active", it would result in the following caloric needs: 2,807 kcal/day for men and 2,368 kcal/day for women. Therefore, the energy needs for a trans man or woman of the same weight, height and activity level differ by just a few hundred calories, so the professional nutritionist can base the composition of the eating plan on the range of the two results: 2,360 to 2,807 kcal/day. The same applies to optimal daily micronutrient intake (32).

Corroborating the results found in studies conducted by Van Caenegem et al. (27) and Gooren and Giltay (26), changes in bone geometry were also found: decreased bone remodeling in trans women and older trans men (>40 years) and increased bone remodeling in young trans men when compared to the control group of cisgender population. Although there are impacts on bone remodeling, this fact does not change the bone mineral density of the trans population (28).

According to Gooren and Giltay (26), increased bone remodeling in trans men results in larger bones, however, without a compatible increase in bone mineral density, which represents a potential risk of osteopenia and osteoporosis. The same author believes that the gains in lean mass acquired at the expense of HT cause more pressure on your bones and, consequently, the stimulation of higher rates of bone remodeling.

Van Caenegem et al. (35) attributed three

factors to the results of bone loss in trans women: gain in fat mass (to the detriment of HT), low serum levels of 25(OH)D and the fact that trans women tend to have lower muscle mass than trans women. cis men of the same age (making their bones smaller than average, even before starting hormone replacement therapy).

To ensure the bone health of transgender individuals undergoing HT, the literature suggests that professional nutritionists must encourage the practice of physical activities, intake of whole foods and exposure to the sun in a safe way. The micronutrients to be considered when planning nutritional intervention are: calcium, vitamin D, phosphate and sodium. Calcium (1,000 mg/day) and vitamin D (800 to 1,000 units/day) are generally recommended for individuals who are at risk for or have been diagnosed with osteopenia or osteoporosis (36).

Furthermore, for trans women, it is advisable to follow a low-sodium diet (1500 mg/day) and refrain from excessive protein consumption to prevent calcium loss in the urine (37). In addition to the ideal intake of calcium and vitamin D, the literature advises a greater intake of fruits and vegetables (due to their beneficial effects on bone density during aging). It is important to note that vitamin K deficiency has been associated with low BMD and increased risk of fractures, and zinc is related to bone mineralization, which promotes higher rates of bone renewal (35).

Although nutritional considerations for the trans population are mostly clinical in origin, professional nutritionists must pay attention to the psychological issues involved in the process (38). In agreement with the results found by the methodology of the present work, Rahman and Linsenmeyer (39) state that research aimed at the trans public indicates a high prevalence of ED, unhealthy practices for weight loss, erroneous perception about their own weight and body dissatisfaction among this population.

Despite few studies aimed at exploring the etiologies of ED specific to the transgender population and the multifactorial nature that involves the incidence of these pathologies, it is possible to affirm the existence of a relationship between gender identity, body image and ED (39). Waisberg and Woods (40) state that, when the professional nutritionist applies nutritional interventions in an empathetic and non-discriminatory way regarding the control of ED symptoms, it has positive effects on behaviors related to binge eating, increased caloric intake and variety of food ingested. Supporting the present work, Zellers (28) reiterates the lack of research that evaluates nutritional interventions for the treatment of ED specific to the population under study.

FINAL CONSIDERATIONS

Even considering all the health risks to which the transgender population is exposed, and also, considering that all nutritional tools and behaviors are based on the individual's biological sex, there are still very few studies that investigate the effectiveness and effect of available interventions and recommendations, which limits the conclusions that can be drawn from the literature. Therefore, the need for more research to develop evidence-based guidelines is highlighted, so that nutritional assessment and counseling, as well as dietary interventions, are carried out safely for transgender patients, especially those undergoing therapy. hormonal.

It is essential that nutritionists are better trained regarding the health of this population and that in their conduct, they choose to use references according to the patient's gender identity and that they individualize nutrition care, through the use of the range of values between recommendations of both sexes

when deemed appropriate. However, more studies are essential to build the nutritional care process for the transgender population.

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