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CARDIOVASCULAR RISK AND DIETARY HABITS IN TRANSGENDER ADULTS RECEIVING HORMONE THERAPY

RISCO CARDIOVASCULAR E HÁBITOS ALIMENTARES EM ADULTOS TRANSGÊNEROS EM TERAPIA HORMONAL

CORVALAN, Lucia[1]; MESSINA, Diego Nicolás; AVENA ÁLVAREZ, María Virginia[3*]

[1] Universidad de Mendoza, Facultad de Ciencias de la Salud. Argentina. ORCID: 0009-0002-4532-9152

[2] Universidad Juan Agustín Maza, Facultad de Ciencias de la Nutrición. Argentina. ORCID: 0000-0002-4240-2505

[3] Universidad de Mendoza, Facultad de Ciencias de la Salud. Argentina: ORCID: 0000-0003-0752-7713

*Corresponding author: maria.avena@um.edu.ar

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ABSTRACT

Background: Transgender and gender-diverse individuals experience health inequities that may increase cardiometabolic risk. Gender-affirming hormone therapy has been associated with changes in body composition, lipid metabolism, and cardiovascular risk markers. However, limited evidence is available regarding dietary habits and cardiovascular risk profiles in transgender populations in Latin America. **Objective**: To evaluate cardiovascular risk factors and cardioprotective food consumption among transgender adults receiving gender-affirming hormone therapy. **Methods:** A quantitative, observational, descriptive, and cross-sectional study was conducted in transgender adults undergoing gender-affirming hormone therapy in Mendoza, Argentina. Eighty-seven participants completed surveys regarding sociodemographic characteristics, lifestyle habits, nutritional counseling, and consumption of cardioprotective foods. We assessed anthropometric indicators and biochemical parameters related to cardiovascular risk. Statistical analyses were performed using GraphPad Prism 8. Data were analyzed using Spearman correlation, the chi-square test, and the Mann-Whitney U test. **Results:** A high prevalence of modifiable cardiovascular risk factors was identified, including overweight, sedentary behavior, smoking, and low intake of cardioprotective foods. More than half of the participants had never received nutritional counseling. No statistically significant differences were observed between transgender women and transgender men in the evaluated anthropometric and biochemical variables. Nevertheless, significant correlations were identified between body mass index, waist circumference, waist-to-height ratio, and atherogenic lipid markers. Dietary quality showed limited associations with cardiovascular risk indicators, although higher dietary quality was positively associated with HDL cholesterol levels in transgender men. **Conclusion:** The study highlights the presence of multiple cardiovascular risk factors in transgender individuals receiving gender-affirming hormone therapy and emphasizes the importance of integrating nutritional assessment and cardiometabolic monitoring into comprehensive transgender healthcare. These findings support the need for inclusive nutritional interventions and longitudinal studies addressing cardiovascular health in transgender populations.

Keywords: *transgender health; nutrition; gender-affirming hormone therapy; cardiometabolic health.*

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RESUMO

Introdução: Pessoas transgênero e com diversidade de gênero enfrentam desigualdades em saúde que podem aumentar o risco cardiometabólico. A terapia hormonal de afirmação de gênero tem sido associada a alterações na composição corporal, no metabolismo lipídico e em marcadores de risco cardiovascular. No entanto, existem evidências limitadas sobre hábitos alimentares e perfis de risco cardiovascular em populações transgênero na América Latina. **Objetivo**: Avaliar fatores de risco cardiovascular e o consumo de alimentos cardioprotetores entre adultos transgênero em terapia hormonal de afirmação de gênero. **Métodos**: Foi realizado um estudo quantitativo, observacional, descritivo e transversal com adultos transgênero em terapia hormonal de afirmação de gênero na província de Mendoza, Argentina. Oitenta e sete participantes responderam a questionários sobre características sociodemográficas, hábitos de vida, aconselhamento nutricional e consumo de alimentos cardioprotetores. Foram avaliados indicadores antropométricos e parâmetros bioquímicos relacionados ao risco cardiovascular. As análises estatísticas foram realizadas no GraphPad Prism 8. Os dados foram analisados por meio da correlação de Spearman, teste do qui-quadrado e teste U de Mann-Whitney. **Resultados**: Foi identificada uma alta prevalência de fatores de risco cardiovascular modificáveis, incluindo excesso de peso, sedentarismo, tabagismo e baixo consumo de alimentos cardioprotetores. Mais da metade dos participantes nunca havia recebido aconselhamento nutricional. Não foram observadas diferenças estatisticamente significativas entre mulheres trans e homens trans nas variáveis antropométricas e bioquímicas avaliadas. Entretanto, foram identificadas correlações significativas entre índice de massa corporal, circunferência da cintura, razão cintura-estatura e marcadores lipídicos aterogênicos. A qualidade da alimentação apresentou associações limitadas com os indicadores de risco cardiovascular, embora uma melhor qualidade da dieta tenha sido positivamente associada aos níveis de colesterol HDL em homens trans. **Conclusão**: O estudo destaca a presença de múltiplos fatores de risco cardiovascular em indivíduos transgênero em terapia hormonal de afirmação de gênero e enfatiza a importância da integração da avaliação nutricional e do monitoramento cardiometabólico ao cuidado integral da população trans. Esses achados reforçam a necessidade de intervenções nutricionais inclusivas e de estudos longitudinais voltados à saúde cardiovascular em populações transgênero.

1. INTRODUCTION

Cardiovascular diseases remain the leading cause of morbidity and mortality worldwide and are strongly associated with modifiable lifestyle-related factors, including dietary habits, obesity, physical inactivity, and smoking. In recent years, growing attention has been directed toward the cardiovascular health of transgender and gender-diverse populations, particularly in relation to the metabolic effects associated with gender-affirming hormone therapy (GAHT) (Streed *et al*., 2021).

Gender-affirming hormone therapy constitutes a fundamental component of healthcare for many transgender individuals and contributes positively to psychological well-being and quality of life (Coleman *et al*., 2022). Nevertheless, hormonal treatment may induce changes in lipid metabolism, body composition, insulin sensitivity, and vascular function, potentially influencing long-term cardiovascular risk profiles. Previous studies have reported alterations in total cholesterol, triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and fat distribution patterns among transgender individuals receiving GAHT, although findings remain heterogeneous and influenced by treatment duration, hormonal regimens, lifestyle factors, and baseline metabolic status (Waters & Linsenmeyer, 2024; Rahman *et al*., 2024).

Recent evidence suggests that transgender populations may experience disproportionate exposure to cardiovascular risk factors due not only to biological and hormonal influences but also to social determinants of health, including barriers to healthcare access, discrimination, food insecurity, and reduced access to preventive nutritional counseling or mental health services (del Río Martín *et al*., 2024; Sánchez-Reyes *et al*., 2024; Mattacotta *et al*., 2026). The American Heart Association has emphasized the importance of comprehensive cardiovascular assessment in transgender individuals, including evaluation of dietary patterns, anthropometric indicators, smoking habits, and physical activity levels (Streed *et al*., 2021).

Dietary quality plays a critical role in cardiovascular prevention. Increased consumption of fruits, vegetables, legumes, whole grains, fiber-rich foods, and unsaturated fats has consistently been associated with lower cardiovascular morbidity and mortality. Conversely, excessive intake of saturated fats, ultra-processed foods, sodium, and refined carbohydrates contributes to dyslipidemia, obesity, insulin resistance, and systemic inflammation (Diab *et al*., 2023). Despite the recognized role of nutrition in cardiometabolic health, evidence regarding dietary habits and cardioprotective food consumption in transgender populations remains scarce, particularly in Latin American settings.

Current evidence regarding cardiovascular risk in transgender populations remains inconclusive. While some studies have reported an increased incidence of thromboembolic events, stroke, and cardiovascular mortality, particularly among transgender women, others have demonstrated variable effects depending on the type, duration, and route of hormone administration (Rahman *et al*., 2024; Van Zijverden *et al*., 2024). This heterogeneity underscores the importance of evaluating cardiovascular risk factors within specific populations and healthcare settings.

In Argentina, despite advances in gender identity legislation and improved access to gender-affirming healthcare, transgender individuals continue to encounter barriers to healthcare access and disparities in health outcomes (Cordero & Saletti-Cuesta, 2025). Moreover, local evidence regarding nutritional status, dietary habits, and cardiovascular risk in this population remains limited. Therefore, understanding the relationship between cardiometabolic risk factors and cardioprotective food consumption among transgender adults receiving GAHT may contribute to the development of preventive strategies and more inclusive healthcare interventions.

The present study aimed to assess cardiovascular risk factors and cardioprotective food consumption among transgender individuals receiving GAHT in Mendoza, Argentina. By providing local evidence, this study seeks to contribute to the development of tailored nutritional interventions and cardiovascular prevention strategies for this population.

2. MATERIALS AND METHODS

2.1. Materials

Anthropometric measurements were performed using a portable stadiometer (MEDNIB®, measurement range: 1–210 cm; accuracy: 0.5 cm) for height and a bioelectrical impedance scale (OMRON BF-511, capacity: 150 kg; accuracy: 100 g) for body weight. Waist and hip circumferences were measured using a flexible anthropometric tape measure (Calibres Argentinos®, Rosario, Argentina; scale: 10 mm; measurement error: 1 mm) (Capone *et al*., 2025; Mussi *et al*., 2026).

2.2. Study design

A quantitative, observational, descriptive, and cross-sectional study was conducted in transgender adults receiving GAHT at Hospital Central in Mendoza, Argentina.

2.3. Participants and Sampling

Participants were recruited through convenience sampling. Inclusion criteria consisted of transgender adults aged 18 years or older who were undergoing GAHT (> 3 months) and voluntarily agreed to participate in the study. Individuals who did not complete the survey or lacked essential anthropometric or biochemical data were excluded. The final sample consisted of 87 participants, including transgender women (TW, n = 34) and transgender men (TM, n = 53).

2.4. Data Collection

Data collection was performed through structured questionnaires and clinical assessments. Sociodemographic variables included age, gender identity, smoking habits, physical activity, family history of cardiovascular and metabolic diseases, and history of nutritional counseling. We assessed dietary habits through questions about consumption of cardioprotective and non-cardioprotective foods and dietary practices, including the type of fat used, added sugar, beverage choices, dairy products, and habitual intake of major food groups (Table 2). To summarize these heterogeneous dietary data into a single indicator, we developed a study-specific dietary quality score inspired by the conceptual framework of the PREDIMED dietary score (Downer *et al*., 2016), but not corresponding to the validated PREDIMED questionnaire. We assigned each dietary component a positive, neutral, or negative weight based on current evidence and dietary recommendations for cardiovascular health. Beneficial dietary practices and food groups received positive scores, neutral practices received 0 points, and less favorable foods or practices received negative scores. Dichotomous variables (e.g., olive oil use) were scored according to the predefined weights shown in Table 2, whereas food groups assessed by intake frequency were assigned scores by multiplying the corresponding weight by the reported number of daily or weekly servings, categorized as 0, 1, 2, 3, 4, or ≥ 5 servings (with values ≥ 5 capped at 5). The overall dietary quality score was calculated as the sum of all component scores, with theoretical values ranging from -12 to +19. Higher scores reflected greater adherence to a cardioprotective dietary pattern, whereas lower scores indicated poorer dietary quality. We developed this score specifically for this study as an exploratory measure of overall dietary quality, and it has not been previously validated.

Anthropometric variables included height, weight, body mass index (BMI), waist and hip circumferences, waist-to-height and waist-to-hip ratios. A single evaluator trained in anthropometry obtained all measurements, following the standardized protocols established by the International Society for the Advancement of Kinanthropometry (ISAK), as previously described (Capone *et al*., 2025; Mussi *et al*., 2026).

Biochemical parameters related to cardiovascular risk included total cholesterol, HDL-C, and TG. Participants were asked to provide the results of their most recent clinical laboratory tests, performed within the previous three months. Additionally, we calculated lipid-derived cardiovascular risk indicators, including the triglyceride-to-HDL cholesterol ratio (TG/HDL-C), Non-high-density lipoprotein cholesterol (Non-HDL-C; total cholesterol minus HDL-C), and the Castelli I Atherogenic Index (total cholesterol divided by HDL-C). These indicators were used as complementary markers of cardiometabolic and atherogenic risk. A TG/HDL-C ratio ≥ 3.5 was considered indicative of increased insulin resistance and cardiovascular risk, as previously reported in the literature (Baez-Duarte 2022). Likewise, a Castelli I Atherogenic Index > 4 was considered suggestive of elevated cardiovascular risk and has been associated with the presence of coronary atherosclerotic plaques (Raaj *et al*., 2024). Non-HDL-C was included as an additional marker of atherogenic lipoprotein burden and cardiovascular risk (Katsi *et al*., 2025).

2.5. Statistical Analysis

Descriptive analyses were performed for all variables included in the study. Statistical analyses were conducted using GraphPad Prism 8 software. Quantitative variables were expressed as mean ± standard deviation (SD) or median ± interquartile range (IQR), while qualitative variables were described using absolute and relative frequencies. The normality of quantitative variables was evaluated using the Shapiro–Wilk test. Since several variables did not present normal distribution, non-parametric tests were applied for inferential analyses. Analyses were stratified by gender identity, treating TW and TM as independent groups. Comparisons between groups were performed using the Mann–Whitney U test for continuous variables. Correlation analyses between anthropometric or dietary and biochemical variables were performed using Spearman's correlation coefficient. Associations between qualitative variables were evaluated with the Chi-square test or Fisher's exact test. Statistical significance was established at $p < 0.05$.

3. RESULTS AND DISCUSSION

3.1. Results

Sociodemographic Characteristics and Lifestyle Habits

Most participants were young adults, with the highest proportion aged 18 to 34 years (median: 30 years). Table 1 details sociodemographic variables, including health history. Regarding hormone therapy, most participants reported receiving treatment for more than two years, indicating prolonged exposure to hormonal interventions. Family history of cardiovascular disease was reported by 47.1% (n = 41) of participants, whereas 49.4% (n = 43) reported no family history and 3.4% (n = 3) were unaware of their family medical history. Metabolic diseases were also frequently reported among first-degree relatives. Diabetes mellitus was the most prevalent condition (50.6%, n = 44), followed by hypertension (37.9%, n = 33), dyslipidemia (20.7%, n = 18), and overweight or obesity (17.2%, n = 15). Physical activity patterns varied among participants. Although more than half of the sample reported engaging in regular exercise, sedentary behavior remained common. Participants reported different types of physical activity, including walking, gym-based exercise, recreational sports, and structured training programs. Smoking was identified as a frequent lifestyle risk factor. The prevalence and intensity of tobacco consumption varied between TW and TM, with daily cigarette use reported in both groups.

Nutritional Counseling and Dietary Habits

When asked whether they had ever attended a consultation with a nutrition professional during the transition process, 51.7% (n = 45) reported never having received nutritional counseling, whereas 48.3% (n = 42) had attended at least one consultation. Among those who had received nutritional care, weight management was the most frequently reported reason for consultation.

Analysis of dietary habits revealed heterogeneous patterns of cardioprotective food consumption, as described in **Table 2**. Most participants reported regular consumption of vegetable oils as their primary source of dietary fat, although they also used other fat sources, including animal fats. Milk consumption was reported by 69.0% (n = 60) of participants. Whole milk represented the most frequently consumed option, while low-fat milk and plant-based alternatives were reported less frequently. Other dairy products, including yogurt, cheese, and ricotta cheese, were consumed by 82.8% (n = 72) of participants. Among dairy consumers, most reported choosing full-fat products, while nearly 20% reported consuming reduced-fat or plant-based alternatives.

Fruit consumption was generally below current dietary recommendations. A substantial proportion of participants reported consuming fewer than the recommended daily servings. Similar findings were observed for vegetable intake, with most participants failing to achieve recommended consumption levels. Regarding protein-rich foods, egg consumption was common throughout the sample. Participants frequently consumed red meat and pork weekly, while poultry was consumed more regularly. Fish consumption was notably low, with many participants reporting infrequent intake or complete absence of fish in their habitual diet. The intake of foods traditionally associated with cardioprotective dietary patterns was also limited. Participants reported low consumption of nuts, seeds, legumes, and soy-based products. In particular, participants rarely consumed legumes and nuts regularly. Overall dietary quality did not differ significantly between TW and TM.

Hydration habits were also evaluated. Water was the most frequently consumed beverage; however, a considerable proportion of participants also reported consuming sugar-sweetened beverages and other caloric drinks.

Anthropometric and Biochemical Indicators

These variables were analyzed in the whole sample as well as its two groups: TW and TM (**Table 3**), since hormonal factors can promote differences between sexes regarding anthropometry (Fragala *et al*., 2012, Rezende *et al*., 2015, Stein *et al*., 2024) and serum lipids (Gupta *et al*., 2016, Holven & Roeters van Lennep, 2023). Anthropometric assessment demonstrated the presence of overweight and obesity in both groups. Although no statistically significant differences were observed between TW and TM in mean BMI, TM showed a higher prevalence of overweight and obesity.

Central adiposity indicators were also evaluated through waist circumference and waist-to-height ratio measurements. Strong positive correlations were identified between BMI and waist circumference, as well as between BMI and waist-to-height ratio, indicating a close relationship between general and abdominal adiposity.

No statistically significant differences were observed between TW and TM for the primary lipid parameters evaluated. Correlation analyses revealed several significant associations between anthropometric and biochemical variables. In TW, BMI showed a negative correlation with HDL–C concentrations and positive correlations with atherogenic markers, including TG/HDL-C ratio, Non-HDL-C, and atherogenic index values. In TM, the relationship between anthropometric indicators and lipid parameters was less pronounced. However, we observed a positive correlation between dietary quality score and HDL-C concentrations. Comparisons of atherogenic index values between groups showed no statistically significant differences. Likewise, dietary quality scores did not differ significantly by gender identity. Finally, analyses of adherence to fruit and vegetable recommendations showed no significant differences in atherogenic index values by compliance status.

Although BMI categories were similarly distributed between groups, indicators of central adiposity differed significantly, with TW showing higher waist circumference categories and TM showing a higher prevalence of elevated waist-to-height ratio categories (**Figure 1**).

Regarding biochemical risk classification, TW showed a higher prevalence of low HDL-C values, whereas TM more frequently exhibited elevated atherogenic index categories. No significant between-group differences were observed for the remaining lipid markers (**Figure 2**).

Associations Between Nutritional Status, Diet Quality and Cardiometabolic Risk

The relationship between nutritional status and cardiometabolic risk markers was evaluated through correlation analyses between BMI and lipid parameters (Figure 3). Significant associations were observed in both TW and TM, although the correlations were generally stronger among TW. In this group, BMI was moderately and negatively correlated with HDL-C concentrations ($r = -0.5147$, $p = 0.0022$), indicating that higher BMI values were associated with lower levels of this cardioprotective lipoprotein. Additionally, moderate positive correlations were identified between BMI and the TG/HDL-C ratio ($r = 0.5864$, $p = 0.0003$), as well as between BMI and the atherogenic index ($r = 0.5868$, $p = 0.0003$). These markers have been widely recognized as indirect indicators of insulin resistance and cardiovascular risk, suggesting that excess body weight may contribute to a more unfavorable cardiometabolic profile among TW receiving GAHT.

Diet quality was further examined in relation to cardiovascular risk indicators (Figure 4). No significant association was observed between diet quality score and HDL-C concentrations among TW. In contrast, a positive correlation was identified among TM ($r = 0.2873$, $p = 0.0410$), indicating that higher diet quality scores were associated with higher HDL-C levels. No additional significant associations were identified between diet quality and the remaining cardiometabolic markers evaluated.

3.2. Discussions

To our knowledge, this is the first study conducted in Argentina to assess cardiovascular risk factors and cardioprotective dietary habits among transgender individuals receiving GAHT. Overall, the findings suggest that cardiovascular risk in this population is associated with nutritional status, central adiposity, lifestyle-related factors and hormone therapy. These associations highlight the multifactorial nature of cardiometabolic health among transgender individuals receiving GATH. Although mean BMI did not differ significantly between TW and TM, BMI category distribution showed a higher prevalence of overweight and obesity among TM, whereas normal weight predominated among TW. These findings are consistent with previous reports indicating that testosterone therapy may contribute to increases in body weight and BMI (Waters, 2022). However, the prevalence of obesity in the present sample was comparable to, or even lower than, that reported for the Argentine population as a whole, which has been estimated at approximately 30% in recent national surveys (Pou *et al*., 2021; Pou *et al*., 2023). Given the well-established association between excess body weight, insulin resistance, and dyslipidemia, these findings support the incorporation of nutritional assessment and counseling into comprehensive transgender healthcare, particularly for individuals with overweight or obesity.

A strong positive association was observed between BMI and indicators of central adiposity, including waist circumference and waist-to-height ratio. Since central adiposity is more closely linked to cardiometabolic risk factor than BMI alone, this finding reinforces the relevance of assessing body fat distribution in addition to overall body weight. Hormone therapy has been shown to influence body composition, particularly in individuals receiving testosterone (Kolla & Kalra, 2025), which may partially contribute to the observed associations.

The relationship between nutritional status and lipid profile was particularly evident among TW. Higher BMI was associated with lower HDL-C levels and higher TG/HDL-C ratio and atherogenic index values, markers commonly associated with insulin resistance and cardiovascular risk. Although these correlations were of moderate magnitude, they are clinically relevant because they suggest that routine assessment of body weight and central adiposity may help identify transgender women who could benefit from early nutritional and lifestyle interventions aimed at reducing cardiometabolic risk. Overall, these findings support the inclusion of nutritional status and central adiposity as relevant components of cardiovascular risk assessment in transgender populations. While GAHT may influence metabolic outcomes, the observed associations suggest that excess body weight and fat distribution patterns should also be considered when evaluating cardiometabolic risk in this population.

Additionally, lifestyle-related factors such as smoking, which was more prevalent than in the general Argentine population (Franzoy *et al.*, 2023), and physical inactivity may have contributed to the observed lipid alterations. Obesity, smoking, hypertension, dyslipidemia, and diabetes remain well-established cardiovascular risk factors among transgender individuals (Irwig, 2018). Therefore, these findings reinforce the importance of comprehensive cardiovascular risk assessment and multidisciplinary follow-up that includes nutritional counseling, smoking cessation, and promotion of regular physical activity, in addition to hormone therapy. Recent longitudinal and population-based studies have reported heterogeneous cardiometabolic effects of GAHT. While some investigations have described unfavorable changes in lipid profile and increased prevalence of metabolic syndrome, others have found more modest effects after adjusting for baseline cardiovascular risk factors (Hashemi *et al.*, 2024; Glintborg *et al.*, 2024). In this context, the present findings suggest that nutritional status and body fat distribution are important factors associated with cardiometabolic risk.

No significant differences in overall diet quality were observed between TW and TM, suggesting that dietary patterns may be influenced more strongly by socioeconomic and environmental factors than by gender identity. Similarly, adherence to fruit and vegetable intake recommendations was not associated with differences in atherogenic index. While higher consumption of these foods has been associated with lower cardiovascular risk in the general population (Wang *et al.*, 2023), their isolated effect may be insufficient to explain variations in lipid profile within this population. Interestingly, higher diet quality was associated with higher HDL-C concentrations among TM, in agreement with previous studies linking healthy dietary patterns to improved lipid profiles (Peñalvo *et al.*, 2015; Avena Álvarez *et al.*, 2019; Schwingshackl *et al.*, 2021; Lopes *et al.*, 2023; Flatscher *et al.*, 2023). Although this association was modest in magnitude, it may still be clinically relevant because even small improvements in HDL-C have been associated with better cardiometabolic health. These findings support the promotion of healthy dietary patterns as part of comprehensive cardiovascular care in transgender men.

Overall, these findings suggest that cardiometabolic health among transgender individuals receiving GAHT is associated with a complex interplay between nutritional status, body fat distribution, lifestyle behaviors and hormone therapy. Although the observed associations do not imply causality, they highlight the importance of integrating nutritional assessment and counseling into gender-affirming healthcare as part of a comprehensive strategy to support cardiovascular health and identify individuals who may benefit from early preventive interventions.

Several observed correlations were of moderate magnitude, but they are consistent with the multifactorial nature of cardiovascular risk, where individual lifestyle-related factors are not expected to explain a large proportion of overall variability. Therefore, even modest associations may be biologically meaningful, particularly when they involve modifiable behaviors such as dietary quality, and could contribute to cardiovascular risk reduction when considered with other lifestyle and clinical factors. Consequently, interpret these findings in terms of potential clinical relevance rather than solely on the basis of statistical significance.

4. CONCLUSIONS

This study identified a high prevalence of modifiable cardiovascular risk factors among transgender adults receiving gender-affirming hormone therapy, including excess body weight, sedentary behavior, smoking, and low consumption of cardioprotective foods. These findings highlight the importance of integrating nutritional assessment, dietary counseling, and cardiometabolic monitoring into comprehensive transgender healthcare. Further longitudinal studies are needed to clarify the long-term relationship between nutrition, hormone therapy, and cardiovascular risk in this population.

5. DECLARATIONS

5.1. Study Limitations

This study has some limitations that should be considered when interpreting the findings. First,its cross-sectional design does not allow causal relationships to be established between the variables analyzed. In addition, the use of a non-probabilistic convenience sample recruited from a single healthcare center may have introduced selection bias and limits the generalizability of the results to the broader transgender population. The relatively small sample size may have reduced the statistical power to detect differences between transgender women and transgender men.

Although all participants had been receiving GAHT for at least three months, detailed information on hormone formulation, route of administration, dosage, treatment adherence, antiandrogen use, previous hormonal regimens, and cumulative treatment exposure was not systematically collected. Consequently, the specific contribution of different GAHT regimens to the observed cardiometabolic profiles could not be assessed.

Dietary information was obtained through self-reported food frequency questionnaires, making the results susceptible to recall bias. Biochemical parameters were obtained from participants' recent laboratory reports rather than being analyzed under standardized study conditions. As these tests may have been performed in different laboratories across the province and at different time points, inter-laboratory variability and differences in analytical procedures could have influenced the comparability of the biochemical measurements.

Although the observed effect sizes were modest, they provide evidence of meaningful associations that warrant confirmation in prospective and interventional studies. Finally, the absence of cardiovascular risk assessment tools and nutritional guidelines specifically validated for transgender populations required the use of criteria developed for cisgender individuals, which may not fully capture the particularities of cardiovascular risk in this population.

5.2. Acknowledgments

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5.3. Funding source

This research received no funding.

5.4. Competing Interests

The authors declare no conflicts of interest.

5.5. Open Access

6. HUMAN AND ANIMAL-RELATED STUDIES

6.1. Ethical Approval

This study was approved by the Research Ethics Committee of Hospital Central, Mendoza, Argentina (Ethical Approval No. 03/2025).

The study was conducted in accordance with the ethical principles established in the Declaration of Helsinki.

6.2. Informed Consent

Written informed consent was obtained from all participants before participation in the study. Participants received detailed information regarding the study objectives and procedures and were informed that participation was voluntary and that all collected information would remain confidential and be analyzed anonymously.

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Table 1. *Sociodemographic variables. Source: the authors*

	n	%
Time of treatment		
3 - 12 months	15	17.24%
12 - 24 months	9	10.34%
> 24 months	63	72.41%
Family history		
CVD	41	47.13%
HBP	33	37.93%
DM	44	50.57%
Obesity	15	17.24%
Dyslipidemia	18	20.69%
No history	43	49.43%
Doesn't know	3	3.45%
Diagnosed		
DM	1	1.15%
HBP	1	1.15%
Dyslipidemia	11	12.64%
No diagnosis	74	85.06%
Physical activity	49	56.32%
Smoking	34	39.08%

CVD: cardiovascular disease; HBP: high blood pressure; DM: diabetes mellitus

Table 2. *Dietary habits and quality score. Source: the authors*

Food groups	**n**	**%**	**Quality Score**	
Oils and fats			**Yes**	**No**
Olive	16	18.39%	1	0
Seeds	78	89.66%	-1	0
Butter	44	50.57%	-1	0
Margarine	7	8.05%	-1	0
Fats	5	5.75%	-1	0
Coconut	1	1.15%	0.5	0
Carbohydrates				
Adds sugar	65	74.71%	-1	0
Doesn't add sugar	22	25.29%	0.5	0
Hydration				
Only water	47	54.02%	0.5	0
Adds sweet and caloric beverages	40	45.98%	-0.5	0
Dairy products				
Full- fat	70	80.46	-1	0
Reduced fat	10	11.49	0	0
No intake (only vegetal)	7	8.05	0	0
Weekly frequency	**Median**	**IQR**	**Per portion**	
Fruits	1	0 - 2	1	
Nuts	0	0 - 1	1	
Vegetables	1	1 - 2	1	
Seeds	0	0 - 1	0.5	
Legumes	1	1 - 2	1	
Soy	0	0 - 1	1	
Egg	1	0 - 2	0.5	
Red meat	1	1 - 2	-1	
Poultry	2	1 - 2	0.5	
Fish	0	0 - 1	1	

Table 3. *Comparison of Anthropometric and Biochemical Variables Between Transgender Women and Transgender Men Receiving Gender-Affirming Hormone Therapy. Source: the authors*

Variable	Total	Transgender Women	Transgender Men	*p*-value
Age (years)	29.78 ± 8.55	31.97 ± 9.65	28.38 ± 7.52	0.1252
Weight (kg)	73.26 ± 18.46	76.22 ± 17.53	71.37 ± 18.95	0.1500
Height (m)	1.651 ± 0.08	1.70 ± 0.08	1.62 ± 0.06	<0.001
BMI (kg/m²)	26.80 ± 6.26	26.37 ± 5.77	27.08 ± 6.59	0.6418
Waist Circumference (cm)	82.19 ± 13.09	82.54 ± 13.82	81.95 ± 12.71	0.7562
Hip Circumference (cm)	100.60 ± 10.90	101.10 ± 11.64	100.20 ± 10.47	0.7595
Waist-to-Hip Ratio	0.81 ± 0.07	0.81 ± 0.07	0.81 ± 0.06	0.9693
Waist-to-Height Ratio	0.50 ± 0.08	0.50 ± 0.08	0.49 ± 0.08	0.1321
Total Cholesterol (mg/dL)	177.5 ± 34.51	176.40 ± 38.16	178.20 ± 32.27	0.7870
HDL Cholesterol (mg/dL)	52.17 ± 15.21	55.70 ± 18.49	49.88 ± 12.31	0.2287
Triglycerides (mg/dL)	125.50 ± 69.64	123.00 ± 59.05	127.20 ± 76.29	0.9213
TG/HDL-C Ratio	2.66 ±1.82	2.39 ± 1.34	2.83 ± 2.07	0.4561
Non-HDL Cholesterol (mg/dL)	126.50 ± 37.69	122.30 ± 37.20	129.30 ± 38.11	0.3636
Atherogenic Index	2.63 ± 1.22	2.36 ± 1.06	2.81 ± 1.29	0.0943

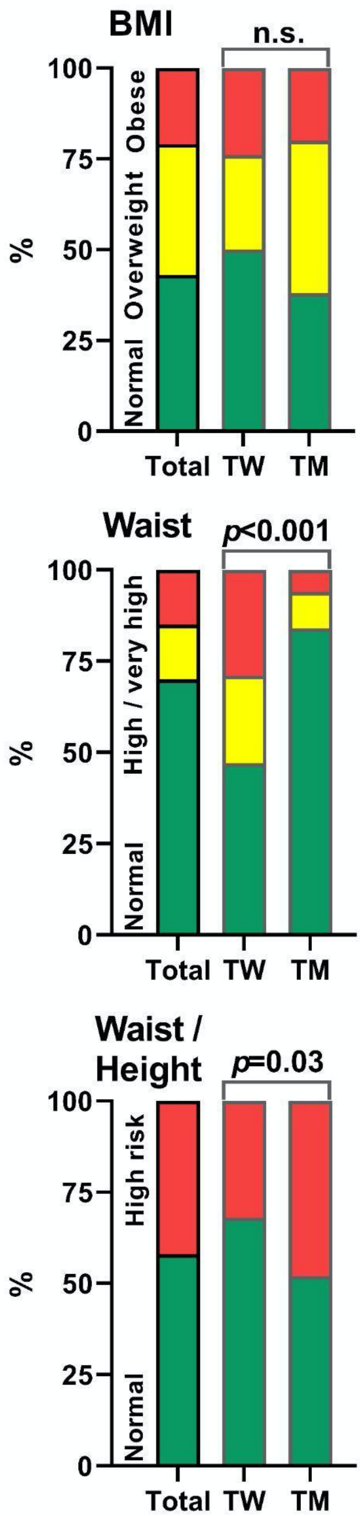

***Figure 1**. Distribution of BMI, waist circumference, and waist-to-height ratio categories among transgender women (TW) and transgender men (TM). No significant differences were observed in BMI categories between groups. TW showed a higher prevalence of elevated waist circumference categories (p < 0.001), whereas TM showed a higher prevalence of high-risk waist-to-height ratio (p = 0.03). P values were obtained using the chi-square test.*

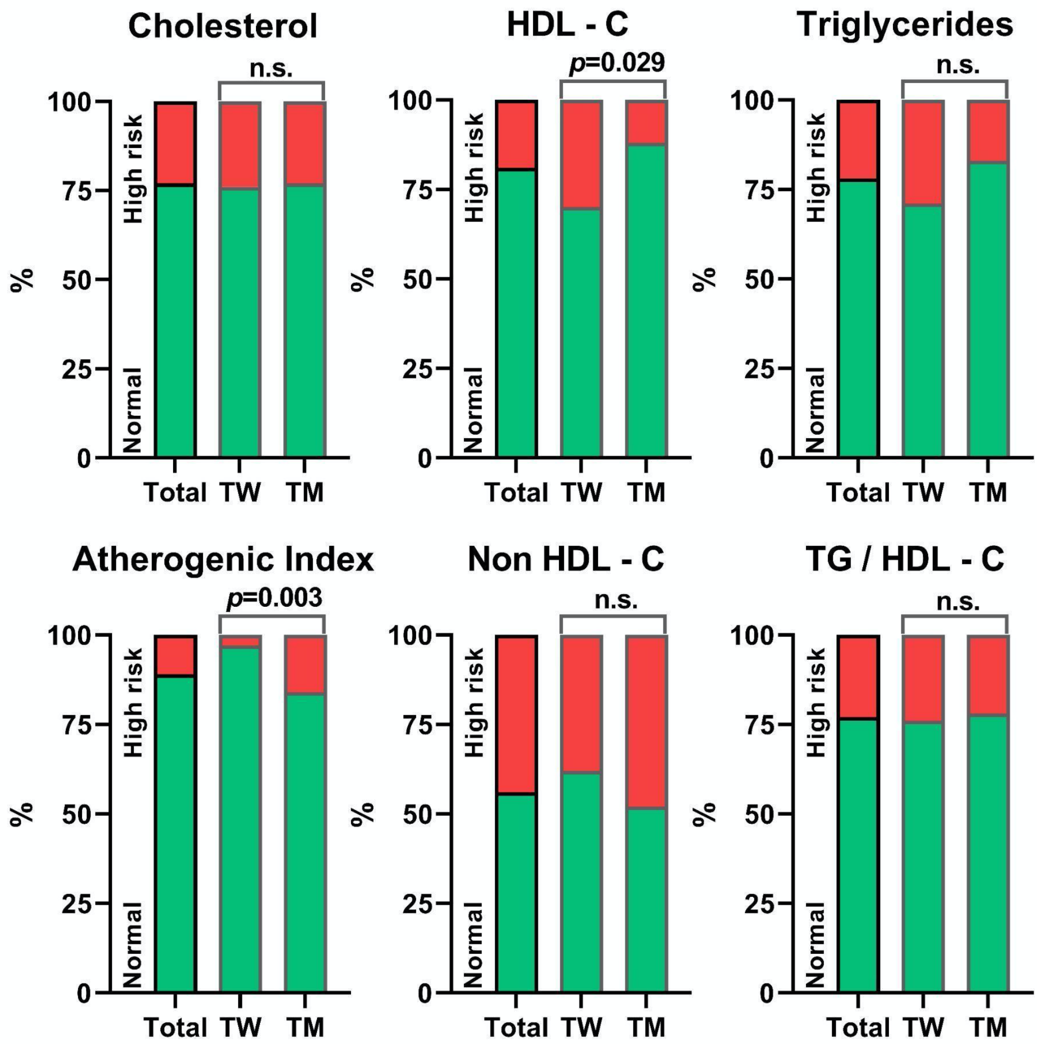

Figure 2. *Distribution of normal- and high-risk categories for biochemical cardiovascular risk markers among transgender women (TW) and transgender men (TM). TW showed a higher prevalence of high-risk HDL-C values (p = 0.029), whereas TM exhibited a higher prevalence of elevated atherogenic index values (p = 0.003). No significant differences were observed between groups for total cholesterol, triglycerides, non-HDL cholesterol, or triglyceride-to-HDL ratio categories. P values were obtained using the chi-square test.*

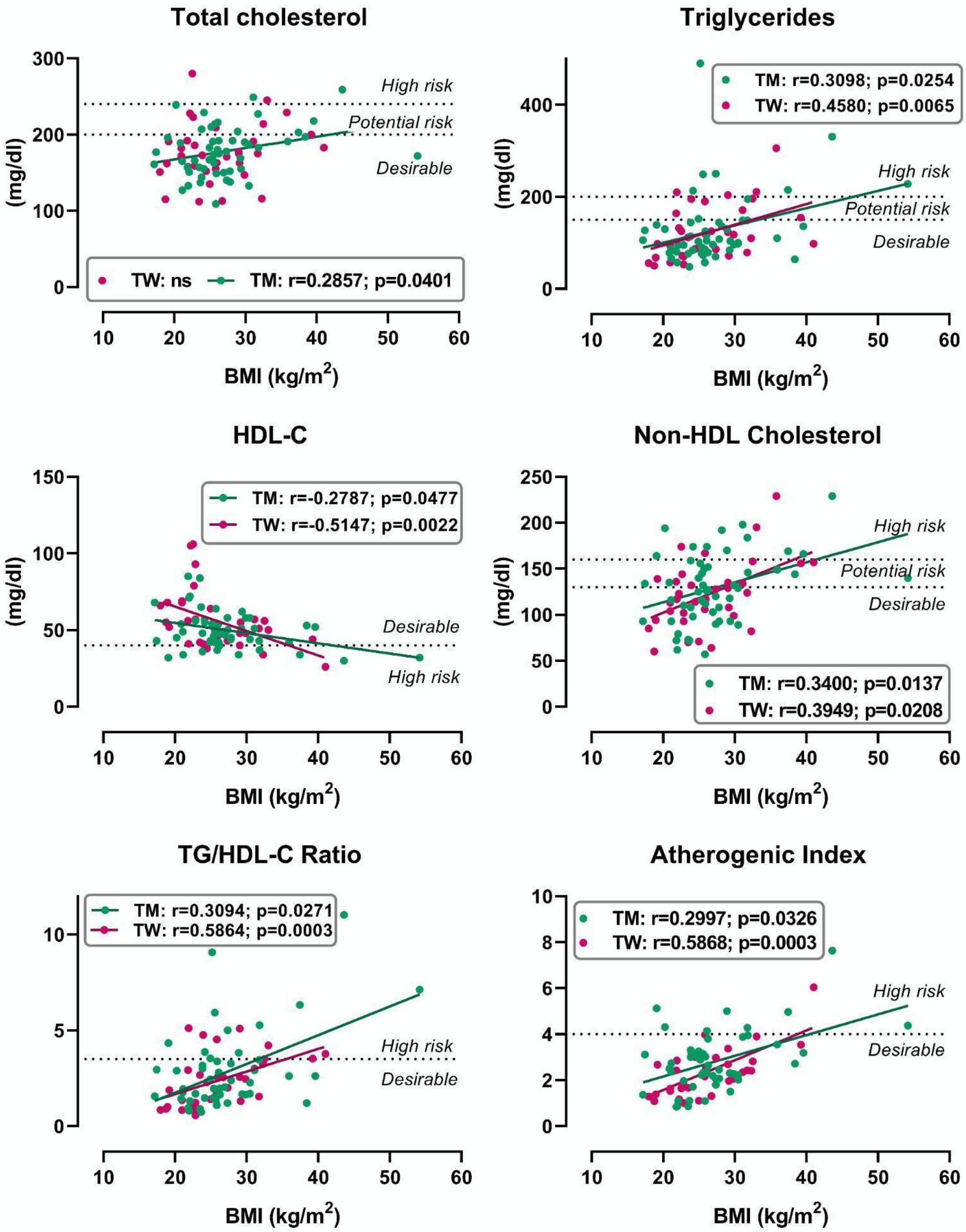

Figure 3. *BMI positively correlated with biochemical determinations. Spearman correlation.*

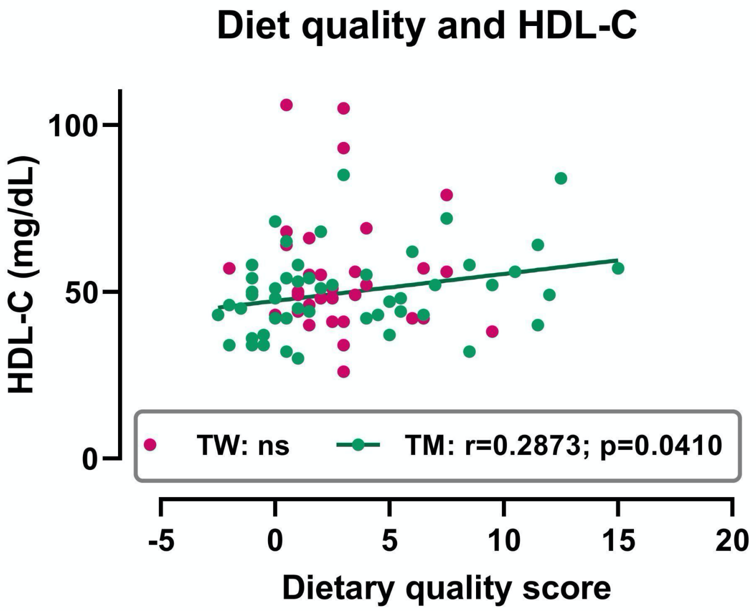

Figure 4. *Dietary quality score positively correlated with HDL-C in TM. Spearman correlation.*