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RESEARCH ARTICLE

Reproductive and Metabolic Aspects of Women in a Public and University Reproductive Counseling Program

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Abstract

Objective: Infertility affects one in six couples worldwide, significantly impacting reproductive capacity. Beyond the inability to conceive, it carries profound social, economic, and psychological consequences. This study describes the reproductive and metabolic characteristics of women receiving preconception counseling in a university-based reproductive health program. **Methods:** This retrospective, cross-sectional study analyzed medical records of infertile women (18–45 years) enrolled in the APOIAR program at HUPES, Salvador, between 2021 and 2023. Data included sociodemographic, reproductive, and metabolic factors. Ethical approval was obtained, and descriptive statistical analysis was performed. **Results:** Among 204 infertile women, 77% had been trying to conceive for over 12 months, and 84% had no living children. Obesity was observed in 36%, and 71% had an increased waist circumference. Polycystic Ovary Syndrome (20%) and thyroid diseases (15%) were common. Regarding lifestyle, 52% were physically inactive, 98% were non-smokers, and 79% did not consume alcohol. Dyslipidemia was frequent, with 73% presenting high LDL and 54% low HDL. FSH and TSH levels were mostly within normal ranges, while AMH was unassessed in 80% of cases. **Conclusion:** Findings underscore the need for early reproductive counseling and lifestyle interventions. The high prevalence of obesity highlights the importance of promoting healthier habits to improve metabolic control. Early evaluation and treatment of endocrine-metabolic disorders may enhance reproductive outcomes. Future studies and continued follow-up could further assess the impact of these strategies on reproductive health.

Keywords: Preconception Care; Reproductive Health Services; Obesity; Women's Health.

Introduction

The reproductive profile of Brazilian women has undergone significant transformations in recent decades. In the 1960s, the fertility rate was approximately six children per woman, influenced by urbanization and improvements in health conditions[1]. However, between 2002 and 2006, there was a significant decline, reaching around two children per woman[2,3]. Currently, there is a trend toward postponing pregnancy until the fourth decade of life, with decreasing fertility rates among women aged 20 to 24 years and an increase among those aged 35 to 39 years[4,5].

Infertility is a medical condition characterized by the inability to achieve a successful pregnancy, defined as the failure to conceive after 12 months of unprotected intercourse (or six months for women over 35 years old) without medical assistance[6]. This condition affects approximately 48 million couples worldwide each year, leading to significant social and economic impacts[7]. Among the causes of female infertility, physiological, behavioral, and metabolic factors stand out, including obesity, smoking, alcohol consumption, and a sedentary lifestyle[8,9].

Obesity, which affects nearly 54% of Brazilian women, is associated with ovulatory dysfunctions, dysregulation of the hypothalamic-pituitary-ovarian axis, and reduced embryo implantation, impairing both natural fertility and the outcomes of assisted reproduction treatments. Ideally, a patient seeking preconception counseling should have a Body Mass Index (BMI) below 27 kg/m[8-10]. Moreover, polycystic ovary syndrome (PCOS), which affects between 5% and 10% of women

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of reproductive age, is one of the leading causes of chronic anovulation. Studies indicate that obesity exacerbates the effects of PCOS, negatively impacting fertility[11,12].

This study includes women seeking reproductive counseling at the Outpatient Clinic for Research and Integrated Guidelines in Reproductive Assistance (APOIAR), regardless of a prior infertility diagnosis. Reproductive counseling is not limited to the diagnosis and treatment of infertility but also involves preventive guidance and health optimization strategies before conception. Many of these patients seek counseling early due to known risk factors such as advanced age, medical history, or metabolic disorders. Including these women allows for a more preventive and proactive approach to reproductive care.

In this context, reproductive counseling and fertility assessment for women with risk factors such as advanced age, obesity, and chronic diseases are essential for improving reproductive and obstetric outcomes[6-13]. This approach involves identifying and managing conditions that may affect fertility, as well as promoting lifestyle modifications such as weight loss and comorbidity control[14,15].

The findings of this study may contribute to the formulation of public policies aimed at reproductive health, improving strategies for counseling, early diagnosis, and access to treatments within the Brazilian Unified Health System (SUS). Analyzing the metabolic and reproductive profile of these women can help develop more effective guidelines for infertility prevention and maternal health promotion.

This study aims to describe the reproductive and metabolic aspects of women receiving preconception care at APOIAR, a program within SUS.

Methods

This descriptive, cross-sectional study employs a retrospective approach, utilizing medical records to assess the distribution of metabolic profiles among infertile women attending a reproductive counseling service. The sample consists of women participating in the APOIAR program, which focuses on reproductive health and is integrated into Brazil's Unified Health System (SUS) at the Edgar Santos University Hospital (HUPES) in Salvador, Bahia.

Inclusion criteria encompassed women of reproductive age (18–45 years) seeking preconception counseling between September 2021 and March 2023. Those attempting to conceive for less than 12 months were excluded, as they did not meet the infertility criteria established by the American Society for Reproductive Medicine[6].

Data collection included sociodemographic characteristics (age, marital status, education, and income), reproductive history (menstrual cycle characteristics, obstetric background, contraceptive use, and duration of attempts to conceive), and metabolic profile (weight, height, BMI, waist circumference, and comorbidities such as obesity, diabetes mellitus, and thyroid disorders).

The project was approved by the HUPES Management Committee for feasibility analysis (SGPIT), received a favorable opinion, and was submitted to the Research Ethics Committee via Plataforma Brasil (CAAE 74655123.9.0000.0049). As it relied on medical records, the requirement for informed consent was waived.

Data were tabulated and analyzed using Microsoft Excel (msexcel2023). Descriptive statistical analysis was performed, with categorical variables presented as absolute and relative frequencies, while continuous variables were described using the mean and standard deviation or the median and interquartile range, depending on data distribution.

Results

Among the 204 patients seeking reproductive counseling between September 2021 and March 2023, the majority had been trying to conceive for more than 12 months, representing 77% (158/204) of the sample. Table 1 shows the average age of the women was 35 years (ranging from 19 to 51 years), while the average age of their partners was 37 years (ranging from 23 to 60 years).

A significant reproductive characteristic of the participants was the predominance of women over 35 years old, who comprised the majority of the study population. Half of the patients, representing 50% (103/204) of the sample, had never been pregnant (nulligravida), whereas the other half had experienced at least one pregnancy.

Regarding pregnancy loss, 70% (142/204) of the women had no history of abortion, while 20% (41/204) had a history of one abortion, and 10% (21/204) had experienced two or more abortions. Additionally, 84% (172/204) of the patients had no living children, highlighting challenges in achieving successful live births.

Menstrual cycle characteristics were also analyzed. Among the patients, 73% (150/204) reported regular menstrual cycles, while 24% (54/204) had irregular cycles. Regarding menstrual flow, 64% (113/176) of the women reported a moderate flow, while 18% (31/176) had a low flow, and another 18% (32/176) experienced intense menstrual flow.

Table 1 – Clinical characteristics of women in the study based on medical records.

	n	%
Age group		
<35 years	87	43
35-39 years	50	33
≥40 years	67	23
Time trying to conceive		
< 6 months	22	11
6 a 12 months	24	12
≥ 12 months	158	77
Average sexual intercourse per week	3	
Number of pregnancies		
Nulligravida	103	50
1 or more pregnancies	101	49
Number of abortions		
No abortion	142	70
1 abortion	41	20
≥ 2 abortion	21	10
Number of living children		
None	172	84
≥ 1	32	16
Menstrual cycles		
Regular	150	73
Irregular	54	24
Menstrual flow		
Low	31	18
Moderate	113	64
Intense	32	18

Total sample N= 204. In twenty-eight medical records, records of the partner's previous relationships and menstrual flow were not found (14% of the total sample).

The metabolic profile data are presented in Table 2. Among the 204 patients studied, 20% (40/204) reported a previous diagnosis of Polycystic Ovary Syndrome, and 15% (30/204) had thyroid diseases. Regarding anthropometric evaluation, obesity was observed in 36% (61/169) of the patients.

Among the lifestyle habits evaluated in Table 2, it is highlighted that the majority of patients (52%, 97/186) did not engage in regular physical activity (at least three times a week). Additionally, 98% (189/193) reported not smoking, and 79% (124/156) did not consume alcoholic beverages. Regarding diet, 43% (83/195) of the patients reported maintaining a balanced diet.

Concerning anthropometric variables, BMI was above the expected preconception levels (≥27 kg/m^2) in 57% (97/169) of the patients, while only 34% (60/169) had a BMI within the normal range. Furthermore, waist circumference exceeded the recommended threshold in 71% (107/151) of the patients, with an average measurement of 90 cm.

The nutritional status assessment based on weight categories showed that 27% (46/169) of the patients were overweight (BMI between 25-29.9 kg/m^2), while 36% (61/169) were classified as obese (BMI >30 kg/m^2).

Table 2 – Clinical, anthropometric characteristics, and habits of women seeking pre-conception care.

	n	%
Thyroid diseases	30	15
Polycystic Ovary Syndrome	40	20
Obesity	61	36
Physical activity		
None	97	52
Mild/Moderate	87	47
Excessive	2	1
Smoking		
No smoker	189	98
1-10 cigarettes/day	3	1
>10 cigarettes/day	1	1
Alcoholism		
0	124	79
1-6 doses/ week	23	15
>7 doses/ week	9	6
Balanced diet		
Yes	83	43
No	112	57
BMI kg/m²		
<27 kg/m²	72	43
≥27 kg/m²	97	57
Nutritional status		
Low weight < 18,5 kg/m²	2	1
Normal weight 18,5-25,9 kg/m²	60	34
Overweight 25-29,9 kg/m²	46	28
Obesity30-34,9 kg/m²	31	19
Extreme Obesity >35 kg/m²	30	18
Average weight (kg)	75	-
Average BMI (kg/m²)	28	-
Abdominal circumference		
<80 cm	44	29
80-90 cm	35	23
>90 cm	72	48

Total sample N= 204. In thirty-five medical records, no records of Body Mass Index were found (17% of the total sample). In eighteen medical records, records of physical activity were not found (9% of the total sample). In eleven patients, smoking records were not found (5% of the total sample). In forty-eight patients, no records of alcohol intake were found (24% of the total sample). In nine patients, no diet records were found (4% of the total sample)**.** In fifty-three medical records, no records of abdominal circumference were found (25.9% of the total sample).

Among the lifestyle habits evaluated in Table 2, it is highlighted that the majority of patients studied do not perform physical activity at least 3 times a week (52%), do not have a smoking habit (98%) and do not use alcoholic beverages (79%). Regarding diet, 43% of patients reported a balanced diet.

Regarding anthropometric variables, the BMI was above expected pre-conception levels in 57% of patients (≥ 27kg/m^2). Only 34% of the sample studied was of normal weight. Furthermore, waist circumference was greater than expected for women by 71% (Table 2), with an average of 90 cm.

Assessment of nutritional status by weight range shows that 27% are overweight (25-29.9kg/m^2) and 36% are obese (>30kg/m^2) as seen in Figure 1.

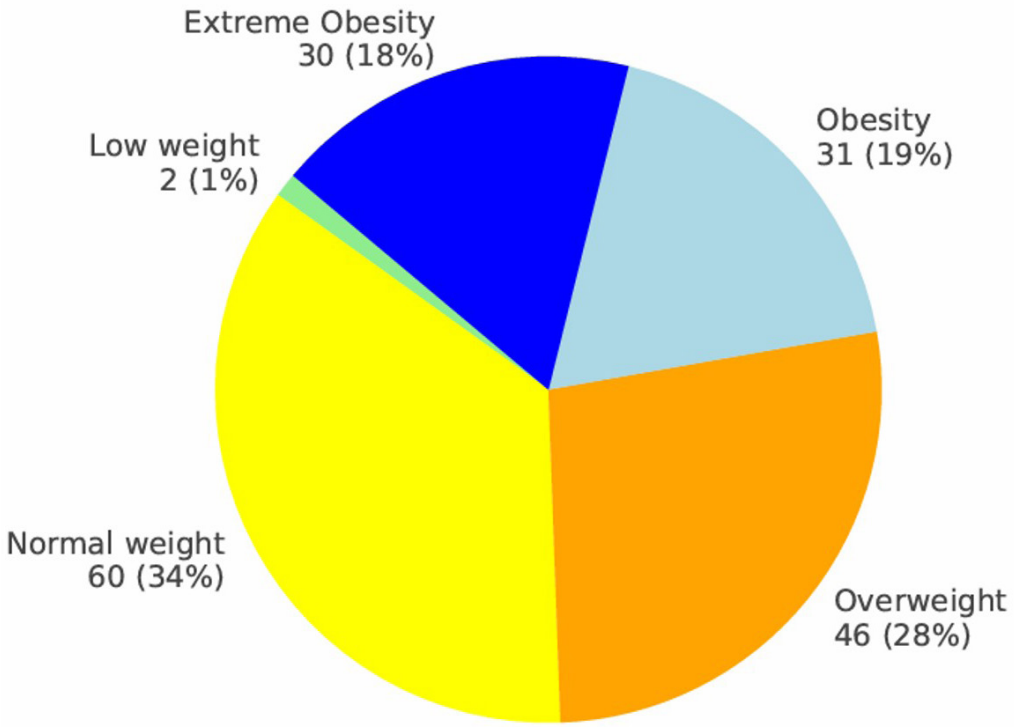

Figure 1 – Nutritional status of patients recorded in medical records between September 2021 and March 2023

Among the laboratory parameters evaluated in Table 3 it is noteworthy that 54% (110/204) of patients had low HDL levels (<50mg/dL), while 73% (149/204) had high LDL levels (>150mg/dL) and 14% (29/204) had elevated triglycerides, indicating that nearly a quarter of the sample presented with dyslipidemia.

FSH dosage was below 10 mg/dL and within the expected levels in 79% (161/204) of patients, with an average of 8.17 mg/dL. Additionally, 49% (100/204) of patients had TSH levels below 2.5 mg/dL, which is considered ideal for preconception levels.[16] However, anti-Müllerian hormone (AMH), which is used to assess ovarian reserve, was not evaluated in approximately 80% (163/204) of the sample, with an average of 1.73 ng/dL among the patients who underwent the test.

Discussion

The present study provides insights into the reproductive and metabolic challenges faced by women seeking preconception counseling within the SUS. The findings align with the global trend of delayed motherhood, as highlighted, which can negatively impact fertility due to the natural decline in oocyte quality with age[4,5]. This underscores the importance of early access to reproductive counseling, particularly for women over 35, as recommended, since infertility investigations should be initiated earlier in this age group[7-13].

Our results are consistent with existing Brazilian studies, particularly in terms of obesity rates, while also highlighting an important and underexplored factor: increased abdominal circumference[17]. This suggests a need for targeted interventions addressing central adiposity within this population. Considering the known link between central adiposity and insulin resistance, systemic inflammation, and hormonal imbalances, these findings highlight the need for targeted interventions to mitigate metabolic risks that could compromise fertility.

Table 3 – Laboratory data in the medical records of patients included in the sample attended at APOIAR between September 2021 and March 2023.

	n	%
Basal FSH		
<10mg/dL	89	79
10-15mg/dL	8	7
≥15 mg/dL	11	10
Estradiol ≥ 80mg/dL	5	4
AMH		
< 5ng/dL	35	83
≥ 5ng/dL	7	17
TSH		
< 2,55µUI/mL	100	82
≥ 2,55µUI/mL	22	18
HDL		
< 50mg/dL	33	54
≥ 50mg/dL	28	46
LDL		
< 100mg/dL	17	27
≥ 100mg/dL	45	73
Triglycerides		
< 150 mg/dL	46	76
≥ 150mg/dL	14	14

Total sample N= 204, one hundred and thirteen medical records with laboratory data without metodological padronization of assays sources or services.

International studies, including those consistently demonstrate that increased BMI and central adiposity are linked to adverse reproductive outcomes, such as reduced success rates in IVF treatments[18,19]. In our study, 57% of women had a BMI above 27 kg/m^2, and 71% had an abdominal circumference exceeding 80 cm, indicating a high prevalence of central adiposity. The similarities between our findings and international data emphasize the need for global strategies focused on weight management and metabolic health in assisted reproduction settings.

Addressing modifiable factors such as obesity through lifestyle interventions is essential. In our sample, 36% of women were classified as obese. Studies demonstrate that lifestyle modifications, including weight management and dietary adjustments, can improve metabolic health and enhance fertility rates[14,15]. These interventions contribute to better insulin sensitivity and reduce ovulatory dysfunction, which was present in 20% of our sample. Additionally, highlight that reducing central adiposity can significantly improve metabolic and reproductive outcomes. Our findings reinforce the need for targeted lifestyle interventions aimed at improving these aspects[20].

It is important to clarify that this study does not focus exclusively on an infertile population but rather on individuals undergoing reproductive counseling. Specifically, 46 women in our sample had been attempting conception for less than 12 months, which is below the clinical threshold for infertility. Unlike studies that exclusively examine infertile populations, our research encompasses a broader spectrum of preconception health, identifying risk factors before conception difficulties become clinically apparent.

The metabolic aspects of preconception health should also be considered, as demonstrated by studies such as PRESTO, which identified that preconception metabolic biomarkers, including insulin resistance and dyslipidemia, significantly impact fertility[21]. In our study, the high prevalence of dyslipidemia (73% with high LDL and 54% with low HDL) suggests that metabolic alterations may play a crucial role in conception difficulties. Recent studies, further corroborate this association, showing that preconception metabolic assessment is a key predictor of reproductive success[22]. These findings emphasize the necessity of routine metabolic screening in preconception care to identify at-risk individuals and implement timely interventions, aligning with PRESTO's recommendations for optimizing reproductive health through early metabolic control[21].

The primary limitations of this study include its retrospective design and focus on a single center, which may limit the generalizability of the findings. Future research should include prospective interventions and multicentric studies to validate these results and provide a broader understanding of reproductive challenges across different populations. Additionally, given the strong association between metabolic health and fertility, future studies should investigate the long-term effects of metabolic interventions on reproductive outcomes, particularly within public healthcare settings like the SUS.

In conclusion, this study underscores the impact of BMI on fertility and highlights the importance of addressing lifestyle factors to optimize reproductive outcomes. Strengthening preconception care and promoting healthier lifestyles are critical steps in supporting reproductive health within Brazil's public healthcare system, particularly given the increasing demand for reproductive assistance. Furthermore, improving equitable access to evaluation, diagnosis, guidance, and care is essential for ensuring comprehensive reproductive health support.

Conclusion

The findings of this study provide insights into the reproductive and metabolic aspects of women seeking preconception counseling in a public, university-based program. A high prevalence of risk factors such as obesity, metabolic syndrome, and thyroid disorders was identified, highlighting the need for targeted interventions. Additionally, the study emphasizes the importance of assessing cardiometabolic risk factors, including BMI and waist circumference, to optimize fertility outcomes and minimize pregnancy complications. The distinction that this population is not exclusively infertile but rather seeking preconception care reinforces the broader scope of reproductive health services.

These results contribute positively by supporting the development of more accessible and effective prevention and treatment strategies that integrate health promotion, early diagnosis, and management of modifiable conditions affecting fertility. Furthermore, public health policies should prioritize reproductive health by implementing educational initiatives focused on gynecologic, family planning, and preconception counseling. Strengthening the integration between primary care and specialized assisted reproduction services is essential for ensuring continuity of care, ultimately leading to improved reproductive outcomes for the population.

However, this study has certain limitations, including its retrospective design and focus on a single center, which may affect the generalizability of the findings. Future research should incorporate prospective, multicentric studies and interventional approaches to validate these results and provide a broader understanding of reproductive challenges across diverse populations. These efforts could further inform public health strategies aimed at enhancing reproductive health services and improving the quality of care provided.

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