Impact of overweight and obesity on women with urinary incontinence: pilot study

Magdalena Muryelle Silva Brilhante (✉ mury_brilhante@hotmail.com)

Universidade do Estado do Rio Grande do Norte Faculdade de Ciencias da Saude <https://orcid.org/0000-0002-4246-4351>

Maria Thereza Albuquerque Barbosa Cabral Micussi

Universidade Federal do Rio Grande do Norte Centro de Ciencias da Saude

Diego de Sousa Dantas

Universidade Federal do Rio Grande do Norte Faculdade de Ciências da Saúde

Ana Isabele Andrade Neves

Faculdade de Ciências da Saúde do Trairi (FACISA-UFRN)

Camila Vasconcelos de Arruda Oliveira

Faculdade de Ciências da Saúde do Trairi (FACISA - UFRN)

Jaine Maria De Pontes Oliveira

Faculdade de Ciências da Saúde do Trairi (FACISA-UFRN)

Adriana Gomes Magalhães

Faculdade de Ciências da Saúde do Trairi (FACISA-UFRN)

Grasiéla Nascimento Correia

Faculdade de Ciências da Saúde do Trairi (FACISA-UFRN)

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Abstract

Introduction

To assess whether obesity has a greater impact than overweight on urinary incontinence severity, pelvic floor muscle function, and quality of life in women with urinary incontinence. Methods

A pilot cross-sectional study using a convenience sample. Twenty-six volunteers were evaluated and divided into: Overweight Group (n=11) with BMI (body mass index) between 25.0-29.9kg/m²; Obesity Group (n=15) BMI≥30.0kg/m². The volunteers performed the urogynecological evaluation, Incontinence Severity Index (ISI), the King's Health Questionnaire (KHQ), 1-hour pad test and evaluation of pelvic floor muscle function. Statistical analysis: Shapiro–Wilk test and the Mann-Whitney test for intergroup analysis. The significance level: p≤0.05. Results

The average age was 61.09(12.51) in the Overweight Group and 55.93(9.03) years in the Obesity Group. The Overweight Group presented better fast fiber contraction (p=0.03) of the pelvic floor muscle. There were no differences in the ISI and quality of life between the groups. Conclusions

There was no difference in the impact caused by being overweight or obese in relation to urinary incontinence severity, pelvic floor muscle function and quality of life, except for fast fiber contraction in which Overweight Group showed better results.

Introduction

Obesity is one of the biggest public health problems in the world, affecting around 300 million people¹. The increase in obesity in Brazil is worrying because it is a risk factor for diseases such as hypertension, diabetes² and pelvic floor muscle dysfunction (PFMD)³. Subak (2009)⁴ found that a 5-unit increase in body mass index (BMI) increases the risk of urinary incontinence (UI) by 20–70%^{4,5}.

The pathophysiological explanation for UI development in women with obesity is due to the increase in intra-abdominal pressure (IAP) caused by an elevated BMI which can chronically overload the pelvic floor muscles (PFM)^{6,7}. In addition, obesity can cause neurogenic diseases such as disc herniation, contributing to developing PFMD and increasing the risk of UI in women⁸.

As stated above, various studies^{3–7} have shown the relationship of obesity with the presence of PFMD, especially UI^{3,4,6,7}. However, there are few studies in the literature evaluating whether overweight women have the same characteristics in PFM function and UI severity as obese women. Therefore, it is necessary to assess whether obesity has a greater impact than being overweight on UI severity, PFM function, and quality of life (QL) of women with UI.

Methods

A pilot cross-sectional study following the methodological guidelines of STROBE, using a convenience sample conducted from April/2016 to June/2017. The inclusion criteria were: UI; age ≥ 35 years; and BMI ≥ 25Kg/m². The exclusion criteria included: latex allergy; urinary or vaginal infection; pelvic organ prolapse; cognitive and neurological disorders; uncontrolled hypertension; inability to perform the assessment; hormone replacement therapy^{9–11}.

The research was conducted in accordance with the World Medical Association's Code of Ethics (Declaration of Helsinki), and Resolution 466/2012. The study was approved by the Research Ethics Committee: 1.475.807. All procedures were performed after being explained about the study, and signing the free and informed consent form.

Twenty-six women were evaluated and divided into two groups according to BMI: the Overweight Group (OWG) with BMI between 25.0-29.9 kg/m², and the Obese Group (OG) with BMI ≥ 30.0 kg/m²¹².

Women were submitted to anamnesis with gynecological, obstetric and urological information, the Incontinence Severity Index (ISI), and the King's Health Questionnaire (KHQ). The physical assessment was performed by the 1-hour pad test and evaluation of PFM function.

The ISI questionnaire¹³ is a brief instrument, translated and validated into Brazilian Portuguese¹⁴. The final score is obtained by multiplying the scores of the first (Frequency Domain) with the second (Amount Domain) question, being classified as: mild: 1–2; moderate: 3–6; severe: 8–9; very serious: 10-12¹³⁻¹⁵.

The QL was assessed by the KHQ¹⁶, translated and validated for Brazil¹⁷. It contains 30 questions divided into the following domains: General health perception, UI impact, Role limitations, Physical limitation, Social limitation, Personal relationships, Emotions, Sleep/energy and Severity measures ^{16,17}. The final score ranges from 0 to 100, with higher scores indicating worse QL¹⁷.

The 1-hour pad test was performed to measure urinary loss and in according with the protocol of Abrams et al¹⁸.

The evaluation of PFM function, the PERFECT scheme and Modified Oxford Scale were used¹⁹. The volunteers were in the supine position with their knees flexed and their hips abducted. The evaluator introduced two fingers up to one-third of the vaginal canal and instructed the volunteers to perform a maximal PFM contraction.

Statistical analysis was performed using the Statistical software 7.0 program (StatSoft Inc., Tulsa, United States). The Shapiro-Wilk test identified non-parametric distribution. The Mann-Whitney test was used for intergroup analysis. The significance level: $p \leq 0.05$.

Results

Twenty-six (26) women were evaluated, 11 in OWG and 15 in OG. The average age of OWG was 61.09 ± 12.51 and OG 55.93 ± 9.03 years old and with homogeneous distribution. Furthermore, 67% of OWG and 80% of OG were married. The obstetric variables did not differ (Table 1).

Table 1
Anthropometric and obstetric data.

	OWG	GO	P value
	Mean ± SD	Mean ± SD	
Body Mass Index (kg/m ²)	27.52 ± 1.22	34.96 ± 3.98	0.01*
Number of pregnancies	5.55 ± 4.41	3.20 ± 1.86	0.12
Number of deliveries	4.55 ± 4.59	2.7 ± 1.94	0.44
Legend: OWG: Group of women with overweight; GO: Group of Women with Obesity; SD: standard deviation; *p < 0.05			

Regarding the type of UI, 41.7% of the OWG had Stress Urinary Incontinence (SUI) and 33.3% Mixed Urinary Incontinence (MUI), and in OG 40.0% had SUI and 33.3% MUI. It was observed that 41.7% of the OWG had moderate UI and 25.5% severe or very severe, while 60.0% in the OG presented moderate severity and 33.3% severe. There was no statistical difference between the groups (Table 2).

The OWG presented better fast fiber contraction ($p = 0.03$) of the PFM than the OG. No significant difference was found in the other PERFECT steps and in the 1-hour pad test (Table 2).

Table 2
Incontinence Severity Index, Pad test and PERFECT

	OWG	GO	P value
	Mean $\pm$ SD	Mean $\pm$ SD	
ISI-Severity	5.40 $\pm$ 3.31	5.60 $\pm$ 2.20	0.65
1-Hour Pad Test(g)	1.13 $\pm$ 1.91	0.60 $\pm$ 0.31	0.25
Power	3.50 $\pm$ 1.08	3.00 $\pm$ 1.46	0.37
Endurance(seconds)	6.30 $\pm$ 2.36	5.47 $\pm$ 2.42	0.95
Repetition	7.50 $\pm$ 2.72	5.40 $\pm$ 3.04	0.11
Fast	6.30 $\pm$ 1.64	4.40 $\pm$ 2.29	0.03*
Legend: OWG: Group of women with overweight; GO: Group of Women with Obesity; SD: Standard Deviation: * $p \leq 0.05$.			

There was no significant difference between groups in the QL (Table 3). However, both groups had a negative impact on the general health perception and UI impact domains of KHQ.

Table 3
Results of King's Health Questionnaire domains.

Domains	OWG	GO	P value
	Mean $\pm$ SD	Mean $\pm$ SD	
General health perception	50.00 $\pm$ 15.8	55.00 $\pm$ 21.5	0.57
UI impact	48.48 $\pm$ 27.3	64.44 $\pm$ 34.4	0.23
Role limitations	34.85 $\pm$ 31.1	47.78 $\pm$ 37.2	0.38
Physical limitation	37.88 $\pm$ 36.5	35.56 $\pm$ 25.1	0.91
Social limitation	31.31 $\pm$ 26.3	38.15 $\pm$ 33.3	0.62
Personal relationships	22.73 $\pm$ 35.1	35.56 $\pm$ 32.6	0.24
Emotions	33.33 $\pm$ 33.3	31.11 $\pm$ 31.2	0.96
Sleep/energy	24.24 $\pm$ 34.4	20.00 $\pm$ 33.4	0.63
Severity measures	36.36 $\pm$ 21.5	43.11 $\pm$ 23.2	0.46
Legend: OWG: Group of women with overweight; GO: Group of Women with Obesity; SD: Standard Deviation; UI: Urinary incontinence; ADL: Activities of daily living; $p \leq 0.05$.			

Discussion

No significant differences were found between groups of overweight and obese women regarding the type and severity of UI, on the 1-hour pad test and in the steps power, endurance, and repetition for PERFECT; however, it was found that the OWG obtained a better PFM contraction of fast fibers.

Obesity may result in increased IAP, compromising PFM integrity, damaging nerves, muscles, and connective tissue, resulting in urethral hypermobility²⁰. Furthermore, obesity causes descent and rotation of the bladder neck and part of the urethra, changing the pressure gradient and generating urine leakage²⁰, justifying the most frequent type of UI was that the SUI in both groups.

The urge-incontinence may happen in obese women due to a reduced amount of the hormone ghrelin²⁰. This hormone inhibits the detrusor muscle contractile response, bringing adverse effects on urinary control²⁰. The decreased ghrelin may result in increased detrusor muscle contractile response in obese women, causing urgency and urge incontinence.

The prevalence of UI does not only occur in obese women. According to the study²¹, overweight women are 2.7 times more likely to have UI than those with normal weight. This study may justify the fact that the severity of UI, the pad test, the contraction capacity and resistance of PFM, and the QL in the present study did not present a significant difference between obese and overweight women.

Other studies have verified the association of the severity of UI with PFM strength, where lower force would result in a urethral closure deficit and higher UI severity, and may be associated with poorer QL^{22,23}. The majority of the women in the present study had moderate or severe UI in the OWG and moderate or very severe UI in the OG. In both groups this had a negative impact on the QL, highlighting this possible association between the severity of UI and the QL.

The OWG presented better contraction of the PFM fast fibers than the OG, corroborating the fact that weight gain is considered a risk factor for SUI, in which the fast fibers do not contract effectively^{8,24}. Another's studies comparing overweight and obese individuals with lean subjects identified a reduction in the percentage of oxidative muscle fibers and increase in glycolytic²⁵, but another study showed no change²⁶.

These controversial results which are presented in the literature may be influenced by genetic and ethnic factors^{25,26} which also influence the function of PFM, and so there is a limitation in justifying the obtained results. This is because our results indicate a worse contraction capacity of fast fibers in the OG, which besides being associated with increased IAP may also have other influencing factors which have not been evaluated.

Conclusion

Although the study presents relevant findings, the results should be carefully analyzed, as this is a pilot study with a small sample size, making it necessary to conduct more research with a larger sample number. Future studies may include in their analysis questionnaires that evaluate other types of PFMD and satisfaction with self-image.

From the obtained results, it can be concluded that there is no difference in the impact caused by being overweight or obese in relation to the severity of UI. The contraction and resistance capacity of PFM and the QL presented similar results between the groups, but the OWG presented better contraction of the fast fibers than the OG; thus, it can be said that obese women present a decrease in the contraction capacity of fast fibers of the PFM, which may worsen the UI severity.

The data from this study draws attention to UI in the obesity and the overweight investigating their relationship with PFM function. Highlighting the need for further research which may further investigate other factors which may contribute to reduce PFM functionality in overweight and obese women.

Abbreviations

BMI..... Body Mass Index

IAP..... Intra-Abdominal Pressure
ISI..... Incontinence Severity Index
KHQ..... King's Health Questionnaire
OG..... Obese Group
OWG..... Overweight Group
PFM..... Pelvic Floor Muscles
PFMD..... Floor Muscle Dysfunction
QL..... Quality Of Life
UI..... Urinary Incontinente

Declarations

Ethics and consent

The study was approved by the Faculty of Health Sciences of Trairi Research Ethics Committee: 1.475.807, research was conducted in accordance with the World Medical Association's Code of Ethics (Declaration of Helsinki), and Resolution 466/2012.

Consent for publication

All participants were informed about the steps of the research and the objective of the study, and agreed to sign the consent form.

Availability of data and materials

The datasets during and/or analysed during the current study available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

The MMSB, AIAN and CVAO contributed to obtaining, data analysis and writing. The JMPO contributed to data collection and writing. The DSD, AGM and GNC contributed to statistical analysis and critical review. The MTABCM contributed discussion. All authors read and approved the final manuscript.

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