

## Hypertension as a risk factor for female sexual dysfunction: cross-sectional study

*Hipertensão como fator de risco para disfunção sexual feminina: estudo transversal*  
*La hipertensión como un factor de riesgo para la disfunción sexual femenina: estudio transversal*

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### ABSTRACT

**Objective:** to evaluate the sexual dysfunction in hypertensive patients compared to normotensive patients. **Method:** this was a cross-sectional study. Samples were composed of 54 hypertensive patients and 54 normotensive patients. The female sexual dysfunction was evaluated by the Female Sexual Function Index (FSFI). **Results:** the average FSFI score differed highly between hypertensive and normotensive patients ( $22.4 \pm 7.4$  versus  $26.8 \pm 5.4$ ,  $p < 0.001$ ). Among hypertensive patients, 63% showed sexual dysfunction in opposition to 39% of normotensive patients ( $p = 0.02$ ). Hypertensive women had 1.67 more chances of showing the dysfunction than women with normal blood pressure. **Conclusion:** the sexual dysfunction prevalence is higher in hypertensive than in normotensive women hence, hypertension is a potentiator factor for female sexual dysfunction.

**Descriptors:** Sexual Dysfunction; Physiological; Hypertension; Questionnaires; Cross-Sectional Studies.

### RESUMO

**Objetivo:** avaliar a disfunção sexual em pacientes hipertensas em comparação com pacientes normotensas. **Método:** estudo transversal. As amostras foram compostas por 54 pacientes hipertensas e 54 normotensas. A disfunção sexual feminina foi avaliada pelo Female Sexual Function Index (FSFI). **Resultados:** a pontuação média do FSFI foi muito diferente entre pacientes hipertensas e normotensas ( $22,4 \pm 7,4$  versus  $26,8 \pm 5,4$ ,  $p < 0,001$ ). Da amostra de pacientes hipertensas, 63% apresentaram disfunção sexual, ante 39% da amostra de pacientes normotensas ( $p = 0,02$ ). As mulheres hipertensas apresentaram 1,67 vezes mais chances de ter a disfunção do que mulheres com pressão arterial normal. **Conclusão:** a prevalência de disfunção sexual é maior em mulheres hipertensas do que em mulheres normotensas. Portanto, a hipertensão é um fator que potencializa a disfunção sexual feminina.

**Descritores:** Disfunção Sexual; Fisiológico; Hipertensão; Questionário; Estudos Transversais.

### RESUMEN

**Objetivo:** evaluar la disfunción sexual en pacientes hipertensos en comparación con pacientes normotensos. **Método:** estudio transversal. Las muestras estaban compuestas por 54 pacientes hipertensos y 54 normotensos. La disfunción sexual femenina fue evaluada por el Índice de Función Sexual Femenina (FSFI). **Resultados:** el puntaje FSFI promedio fue muy diferente entre pacientes hipertensos y normotensos ( $22.4 \pm 7.4$  versus  $26.8 \pm 5.4$ ,  $p < 0.001$ ). El 63% de los pacientes de la muestra de hipertensos demostraron disfunción sexual, en oposición al 39% de la muestra de pacientes normotensos ( $p = 0,02$ ). Las mujeres hipertensas presentaron 1.67 más posibilidad de mostrar la disfunción que las mujeres con presión arterial normal. **Conclusión:** la prevalencia de disfunción sexual es mayor en mujeres hipertensas que en mujeres normotensas. Entonces, la hipertensión es un potenciador de la disfunción sexual femenina.

**Descriptor:** Disfunción Sexual; Fisiológico; Hipertensión; Cuestionarios; Estudios Transversales.

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## INTRODUCTION

According to the American Psychiatric Association, in the latest version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), sexual dysfunctions are a heterogeneous group of general disorders characterized by a clinically significant disruption in a person's capacity to sexually respond or experience sexual pleasure. The female orgasmic disorder, the female sexual interest/arousal disorder and the disorder of the genito-pelvic pain/penetration disorder are all part of female sexual dysfunctions<sup>(1)</sup>.

The characteristics of Female Sexual Dysfunctions (FSD) range from instinctive alterations to the absence of stimulus concerning the phases of desire, arousal and orgasm. It is presented as a multi-dimensional problem involving desire disorders and psychophysiological changes; therefore, it may cause distress and interpersonal difficulties in women's lives. In the literature, there is data reporting that 49% of women in Brazil have FSD with an increasing level of FSD in pre- and postmenopausal periods<sup>(2)</sup>. The *National Health and Social Life Survey* shows the sexual dysfunction affects 20-50% of women and is more common in women (43%) than in men (31%)<sup>(3)</sup>. The prevalence of sexual dysfunction in 20 to 70-year-old women in mainland China was estimated at 29.7%<sup>(4)</sup>.

Data on the association of female and male sexual dysfunctions and cardiovascular diseases are alarming. According to the *Massachusetts Male Aging Study*, 52% of erectile dysfunction is directly related to coronary heart disease, diabetes, hypertension and drug consumption, and depression is inversely proportional to cholesterol. FSD and male dysfunction may be developed in association with comorbidities such as hypertension and cardiovascular disease<sup>(5)</sup>, in addition to other non-hormonal factors that cause progressive worsening of the sexual function. Among these factors, the most frequent are diabetes, a sedentary lifestyle, cigarette smoking and age > 50 years old. When it comes to the partner, some events are related, such as increased age, poor health, long relationships and adverse feelings<sup>(6)</sup>.

Sexual dysfunction is found in the general population and also in cardiac patients. In the literature, there are many studies concerning men, but very few concerning women. This means there is still a need for more studies with the purposes of firstly, encouraging women to verbalize on sexual function, and secondly, encouraging women to understand the diseases related to their sexual dysfunction.

Sexual dysfunction and hypertension may have consequences for the subjects' quality of life. It is appropriate to evaluate the sexual function of hypertensive women since, as mentioned above, studies addressing FSD related to hypertension are still scarce.

## OBJECTIVE

To evaluate the sexual function of hypertensive and normotensive women, comparing the scores of the two groups with socio-demographic variables.

## METHOD

### Ethical aspects

The study complied with the requirements of the National Health Council Resolution 466/12. It was approved by the Ethics

Committee in Local Research, and all participants signed the Informed Consent (IC) form.

### Study design, location and period

This is a cross-sectional study. It was carried out from March 2011 through June 2012 in the Multidisciplinary Outpatient Clinic (MULTIHAS) at the Cardiology Institute, University of Cardiology Foundation, Rio Grande do Sul (IC-FUC).

### Population or sample, inclusion and exclusion criteria

The study participants were female subjects monitored for hypertension diagnosis in the outpatient clinic, and normotensive voluntary female employees. Considering a prevalence of 57% of sexual dysfunction in normotensive women, 80% of power, a significance level of 5% and the expected higher prevalence of 25% in hypertensive patients, was used a sample of 54 hypertensive patients and 54 normotensive participants. The study was conducted by the researcher, who is a nurse and a member of the MULTIHAS, a multidisciplinary team consisting of a cardiologist, a nurse, a nutritionist, a psychologist and a physical therapist.

Participants were aged  $\geq 18$  years old, and were all supposed to have had an active sexual life in the previous four weeks before the trial. Non-sexually active women or female patients who had been hospitalized for over 30 days were excluded from the trial.

The sample was split into two groups: Hypertensive Group (HG) and Normotensive Group (NG). The HG was monitored at the MULTIHAS two days/week. On average, six patients were cared for on each day. The service was individualized and performed by a multidisciplinary team. The study in which the researcher made interviews was performed before the care of the team. The NG comprised normotensive employees from various sectors, such as nutrition, hygiene, clothing, administration and vocational school, whose activities were performed on the day shift. These subjects were separated by age and the research was explained to coordinators of each sector. After the employees' agreement and informed consent, the interview was performed.

### Study protocol

In the interview was collected data on the following: use of medications, family history, presence of risk factors for cardiovascular disease (CVD) and menopause. Risk factors such as hypertension, sedentary lifestyle, cigarette smoking and obesity were classified according to the 2016 VII Brazilian Guidelines on Hypertension<sup>(7)</sup>. The groups had their blood pressure (BP), weight and height measured before the questionnaire. The Omron HEM-705 device, validated by the Association for the Advancement of Medical Instrumentation (AAMI) and the British Hypertension Society (BHS), was used for BP measurements, following the rules of the VII Brazilian Guidelines on Hypertension<sup>(7)</sup>. For weight and height measurements, were used a scale and stadiometer validated by the National Institute of Metrology.

The previous four weeks of sexual function were assessed by the *Female Sexual Function Index* (FSFI) questionnaire, which is validated in English, and has been translated and validated for use with Portuguese-speaking patients. It has 19 questions grouped into six areas, as follows: sexual desire, sexual arousal,

vaginal lubrication, orgasm, sexual satisfaction, pain or discomfort. The score ranges from 2 to 36, whereas the lower the score the worse the sexual function. Women with scores  $\leq 26.5$  were considered as having sexual dysfunction<sup>(8)</sup>.

**Analysis of results and statistics**

The Statistical Package for Social Sciences (SPSS) software, version 19 was used for data analysis. Quantitative variables were expressed as mean and standard or median deviation and interquartile range. Qualitative variables were expressed as absolute and relative frequency. The chi-squared test was used for the association between the groups and qualitative variables, and the student's t test was used for the comparison between the groups and quantitative variables. The Pearson correlation coefficient was used for the correlation between quantitative variables and the scores of FSFI domains. Multivariate logistic regression was used based on the variables where there was a significant association with the presence of sexual dysfunction, considering that  $p \leq 0.05$  was statistically significant.

**RESULTS**

The total number of participants in the trial was 108 women, including 54 hypertensive (HG) individuals and 54 normotensive (NG) individuals. The average age in the HG was  $49.2 \pm 9.2$  years old, and in the NG was  $49.0 \pm 9.6$  years old. The predominant ethnicity (self-declared) in both groups was white, representing 78% in the NG and 74% in the HG. The average levels of systolic blood pressure (SBP) and diastolic blood pressure (DBP) in the HG were  $138.7 \pm 29.1$  and  $87.1 \pm 12.2$ . In the NG, the SBP and DBP levels were  $115.2 \pm 11.2$  and  $74.3 \pm 7.5$ , respectively. In the HG, the period since hypertension diagnosis was seven years (average). Risk factors for CVD were predominant among women in the HG, with a positive family history ( $p = 0.006$ ), body mass index (BMI)  $p = 0.002$ , dyslipidemia ( $p = 0.001$ ) (Table 1).

Continuous variables are expressed as mean  $\pm$  standard deviation. Categorical variables are expressed as absolute frequency (n) and relative frequency (%); Chi-squared test, Student's t test. HG - Hypertensive Group; NG - Normotensive Group; SH - systemic hypertension; DM- Diabetes mellitus; BMI - body mass index; ACEI - Angiotensin-Converting Enzyme Inhibitors; DBP - diastolic blood pressure; SBP - systolic blood pressure.

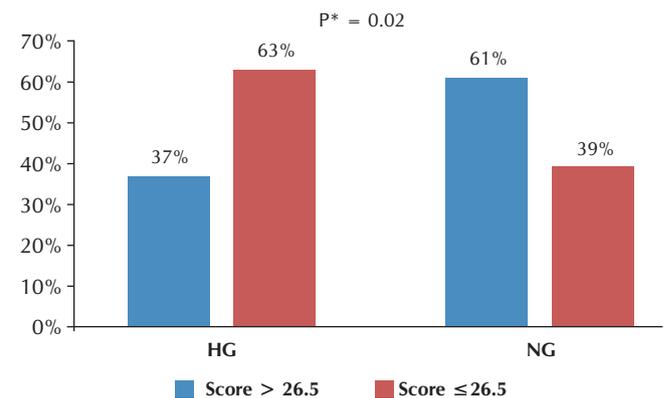
Figure 1 shows the prevalence of female sexual dysfunction was 63% in the HG and 39% in the NG ( $p = 0.02$ ). Hypertensive subjects were 1.67 times more likely to have sexual dysfunction compared to normotensives. Multivariate analysis considered the following variables: age, group, and marital status. However, only the 'group' and 'age' variables (odds 2.92), remained in the adjusted model, in relation to controls with 1.92 times more chances to have the dysfunction when compared to hypertensive patients. The increase of one year in the age variable means an 8% higher chance of having sexual dysfunction (Table 2).

Average FSFI scores  $> 26.5$  points mean absence of female sexual dysfunction, and average scores  $\leq 26.5$  points indicate presence of female sexual dysfunction.

**Table 1** – Clinical and social demographic characteristics of the sample (N = 108)

Clinical variables	HG n (%)	NG n (%)	p
Age (years old)	49.2 $\pm$ 9.2	49.0 $\pm$ 9.6	0.911
Ethnicity: white	40(74)	42(78)	0.233
Married	45(83)	38(70)	0.079
Have children	51(94)	45(83)	0.126
Schooling - years	7.8 $\pm$ 3.6	11.2 $\pm$ 3.0	0.001
1 minimum wage	35(65)	24(44)	0.007
$\geq 3$ minimum wages	07(13)	14(26)	
Average Systolic Blood Pressure	138.7 $\pm$ 29.1	115.2 $\pm$ 11.2	0.001
Average Diastolic Blood Pressure	87.1 $\pm$ 12.2	74.3 $\pm$ 7.5	0.001
Systemic Arterial Hypertension Time	07(3-15)	-	
Body Mass Index	31.6 $\pm$ 12.4	25.7 $\pm$ 5.6	0.002
Sedentary Life	37(68)	36(67)	1.000
Cigarette Smokers	10(18)	16(30)	0.260
Family History	45(83)	31(57)	0.006
Diabetes Mellitus	11(20)	02(04)	0.018
Dyslipidemia	27(50)	06(11)	0.001
Menopause	35(65)	36(67)	1.000
Angiotensin-converting enzyme inhibitors (ACEI)	27(50)	-	0.001
Diuretics	32(60)	-	0.001
B-blockers	26(48)	-	0.001
Oral Contraceptives	13(24)	06(11)	0.128

Note: HG - Hypertensive Group; NG - Normotensive Group.



Note - \* X<sup>2</sup> test; HG - Hypertensive Group; NG - Normotensive Group.

**Figure 1** – Prevalence of Female Sexual Dysfunction between HG and NG Groups

**Table 2** – Multivariate logistic regression for female sexual dysfunction

Analysis	Odds	CI 95%
HG	2.92	1.28 – 6.65
Age	1.08	1.03 – 1.14

Note - CI - Confidence interval; HG - Hypertensive Group.

The comparison between the scores of FSFI domains between groups has shown a significant difference ( $p < 0.005$ ) in five out of the six analyzed domains. The average FSFI score in hypertensive and normotensive subjects was, respectively,  $22.4 \pm 7.4$  versus  $26.8 \pm 5.4$  ( $p < 0.001$ ) (Table 3).

**Table 3** – Comparison between the means of Female Sexual Function Index variables in each group (N = 108)

Variables	HG (54)	NG (54)	p*
Desire	$2.98 \pm 1.15$	$3.47 \pm 1.15$	0.030
Excitement*	$3.30 \pm 1.31$	$4.13 \pm 1.14$	0.001
Lubrication	$3.94 \pm 1.70$	$4.51 \pm 1.52$	0.069
Orgasm*	$3.91 \pm 1.51$	$4.80 \pm 1.11$	0.001
Satisfaction*	$3.97 \pm 1.55$	$4.71 \pm 1.26$	0.008
Pain*	$4.36 \pm 1.83$	$5.14 \pm 1.17$	0.009

Note - \*Student's t test; HG - Hypertensive Group; NG - Normotensive Group.

In the HG, sexual dysfunction prevailed in 69% of postmenopausal women and 53% of women at reproductive age, without an association between variables. In the NG, sexual dysfunction predominated in 50% of postmenopausal and only 17% of women at reproductive age.

In the HG, there was a correlation between schooling and the following domains: arousal, orgasm and satisfaction ( $p < 0.005$ ). In hypertensive patients, increasing age and the FSFI score were inversely correlated ( $r = -0.281$ ), similarly to normotensive subjects ( $r = -0.356$ ) with  $p < 0.005$ . In both groups, the marriage time and FSFI score were inversely correlated (Table 4).

In the HG, BMI was higher among patients with sexual dysfunction ( $32.6 \pm 14$ ) than among patients without sexual dysfunction ( $30 \pm 6.8$ ). In the NG, values were similar between patients with ( $25.5 \pm 4.1$ ) and without sexual dysfunction ( $25.8 \pm 6.5$ ).

Sexual dysfunction was identified in a large number of patients using antihypertensive medication (diuretics, beta-blockers, inhibitors of angiotensin converting enzyme {ACE}, and calcium channel blockers).

**Table 4** – Correlation between Female Sexual Function Index scores with the following variables: age, years of hypertension, schooling and marriage time between groups (N = 108)

FSFI scores	Groups						
	HG= 54			NG= 54			
	Years of Systemic Arterial Hypertension	Age	Marriage time	Schooling	Age	marriage time	Schooling
Total	0.074	-0.281*	0.301*	0.249*	-0.356*	-0.361*	0.099
Desire	0.218	-0.285	-0.385*	0.128	-0.473	-0.458*	-0.082
Excitement	0.232	-0.240	-0.272	0.302	-0.282	-0.158	0.182
Lubrication	0.056	-0.385	-0.242	0.144	-0.302	-0.460*	0.015
Orgasm	0.189	-0.186	-0.157	0.276	-0.135	-0.138	0.181
Satisfaction	0.004	-0.213	-0.261	0.274	-0.159	-0.182	0.223
Pain	-0.156	-0.103	-0.099	0.169	-0.234	-0.163	0.023

Note - Significant Correlation:  $p < 0.05$ ; HG - Hypertensive Group; NG - Normotensive Group; FSFI - Female Sexual Function Index.

## DISCUSSION

Although not often studied, sexual dysfunction in hypertensive women is an outstanding factor concerning sexual issues. Data have shown a prevalence of 63% of FSD in hypertensive women and 39% in normotensive women. This means that hypertensive women are 1.67 times more likely to have sexual dysfunction compared to normotensives. Based on the FSFI, a similar study has found the presence of sexual dysfunction in 42.1% of hypertensive women and in 19.4% of normotensive women (odds ratio 3.2)<sup>(9)</sup>. In a recent publication, hypertension appeared as a determining factor in FSD ( $p < 0.001$ )<sup>(10)</sup> for 90% of hypertensive women and 41% of normotensives. Likewise, another study by Okeahialam and Obeka, (2006)<sup>(11)</sup> confirmed the results of our trial. The Sexual Function (SF) has shown a significant role for accurately estimating the prevalence and incidence of sexual dysfunction (SD). Understanding that sexuality is a biological human function not limited to genitality, but to overall physicality is important, since it has unquestionable importance in individuals' quality of life<sup>(12)</sup>.

Systemic arterial hypertension (SAH) causes serious damage to health. Moreover, it has a negative impact on female sexual response by causing vascular changes due to high BP levels. These elevated BP levels cause a decrease in the blood flow of the vagina and clitoris, which result in loss of the smooth muscle, and fibrous tissue development. As a consequence, the stiffening and sclerosis of cavernous arteries of the clitoris may interfere with the relaxation response and dilation occurring when there is sexual stimulation, hence causing vaginal dryness and dyspareunia<sup>(9)</sup>. TOMHS (1997) has also shown that hypertensive women had fewer orgasms, more frequent pain and reduced vaginal lubrication compared to normotensive women. In a comparative analysis with different populations, including hypertensive patients and by using a similar evaluation method, the authors suggested a relation between the high prevalence of female sexual dysfunction and the diagnosis of hypertension<sup>(13-14)</sup>.

Our data is similar to the literature, which shows the negative influence of aging and menopause on the female sexual response, given that sexual dysfunction was predominantly present in hypertensive postmenopausal women and in normotensive ones (p

= 0.03). Previous studies indicated that 42% to 86.5% of sexual complaints in menopausal women had a negative influence on FSD by causing a significant increase in dyspareunia and decrease of desire, libido and orgasm<sup>(13-17)</sup>. Systolic Blood Pressure Intervention Trial (SPRINT) is a multicenter randomized controlled trial. It indicates the association of use of hormone therapy with poorer sexual function scores [beta -3.42 (-6.74, -0.10), p = 0.044]<sup>(18)</sup>. In recent studies, the average Female Sexual Function Index score was  $18.8 \pm 8.7$ , while the average total Sexual Quality of Life Questionnaire-Female score was  $72.7 \pm 13.7$ . Sexual dysfunction was found in 82% of the sample<sup>(19)</sup>. There is need for more data in the literature concerning the symptoms of menopause with hypertension and their influence on sexual dysfunction. In this study, the results provide evidence of a correlation between age and sexual dysfunction in both groups, and it affected the sexual desire, vaginal lubrication, sex arousal and the total FSFI score in both groups.

In the HG, there was a direct correlation between high educational level with an increasing FSFI score by characterizing a reduced FSD (p = 0.009), as demonstrated in similar studies by Kütmeç et al. (2011) (p = 0.001)<sup>(10)</sup> and Zhang et al. (2017)<sup>(4)</sup>.

Although long-term relationships may appear to bring stable conditions, our study has shown a correlation between long-term relationships and decreased desire, decreased vaginal lubrication, and decreased FSFI scores in both groups of patients. A similar survey in the 80s showed a 50% reduction in the frequency of orgasm in the first year of marriage, a further reduction of 50%, and decreased desire after 20 years of marriage<sup>(20)</sup>. According to Fisher et al. (2002), intercourse is motivated by the instinctive predisposition, in which passion is the driving element and a daily relationship can diminish it or even extinguish it<sup>(21)</sup>. A study with functional magnetic resonance imaging (MRI) has shown the brain areas activated in women in love are different from those activated in women in long-term relationships with the same partner<sup>(22)</sup>.

A similar finding by Silva et al (2010) with no statistical significance has shown that some hypertensive patients with sexual dysfunction were obese<sup>(23)</sup>. Other studies have also shown obese hypertensive women with sexual dysfunction presented a decreased FSFI score with negative impact on their sexuality<sup>(10)</sup>.

No significant difference was found when analyzing the use of antihypertensive drugs in women with sexual dysfunction. However,

when evaluating the use of diuretics, beta-blockers, angiotensin converting enzyme inhibitors (ACEI) and calcium channel blockers, there was sexual dysfunction in the group of hypertensive women. These data corroborate some studies by Doumas et al, (2006), in which hypertensive postmenopausal women in continuous use of antihypertensive drugs had their sexual function affected<sup>(24)</sup>. In 2012, a Chinese study with hypertensive women evaluated the combination of antihypertensive drugs, and suggested that *felodipine* and *irbesartan* improved the sexual function<sup>(25)</sup>.

### Limitations of the study

Some limitations of this study are worth being mentioned. As this was a cross-sectional study, causalities could not be attributed to the associations found in this experiment. Moreover, the difficulty in pairing both groups prevented the assessment of the psychological factors involved. Furthermore, it was impossible to evaluate the influence of the hypotensive drug class on women with FSD.

### Contributions to the area of nursing and public health

The findings in this trial are important for providing greater knowledge and understanding on the influence of hypertension and its effects on female sexual dysfunction. Hypertension plays an important role in female sexual dysfunction. The FSFI scores show that FSD is greater in hypertensive women rather than in normotensive. Although the results have some limitations, as mentioned above, they do not differ from national and international data, which are consistent with our findings. The correct interpretation of results may help with the understanding and interest in the treatment of sexual dysfunction in hypertensive women in different healthcare areas.

### CONCLUSION

Hypertension plays an important role in female sexual dysfunction. The FSFI scores show that FSD is greater in hypertensive women than in normotensive. Although the results have some limitations, as mentioned above, they do not differ from national and international data, which are consistent with our findings. The correct interpretation of results may help with the understanding and interest in the treatment of sexual dysfunction in hypertensive women.

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