Current Hypertension Reports (2019) 21: 25
https://doi.org/10.1007/s11906-019-0925-z

GUIDELINES/CLINICAL TRIALS/META-ANALYSIS (WILLIAM J. KOSTIS, SECTION EDITOR)

Sexual Dysfunction in Women with Hypertension: a Systematic Review and Meta-analysis

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Published online: 3 April 2019

Abstract

Purpose of Review We aimed to evaluate the prevalence of sexual dysfunction in hypertensive women and compare sexual dysfunction between hypertensive and non-hypertensive women.

Recent Findings Conducted a systematic review in the following databases: PubMed, EMBASE, Scopus, Web of Science, IBECS, and Lilacs.

We included articles evaluating the prevalence of sexual dysfunction in a woman and/or comparing sexual dysfunction between hypertensive and non-hypertensive women. Studies were excluded if they evaluated patients with secondary hypertension, examined sexual dysfunction caused by drugs, did not distinguish by gender, or included patients with hypertension and other comorbidities/pathologies.

We conducted an I^2 test to calculate heterogeneity and a meta-analysis to compare sexual dysfunction between hypertensive and non-hypertensive women. A meta-regression equation calculated the relationship between sexual dysfunction risk for hypertensive and age.

Eleven articles were included: five were included in the meta-analysis (1057 hypertensive and 715 normotensive). The prevalence of sexual dysfunction in articles varied from 14.1 to 90.1%. In the meta-analysis of the sexual dysfunction, the relative risk between hypertensive and normotensive women was found to be significant and has a high heterogeneity (I^2 =92.6%, $p < 0.001$); the pooled results revealed a significant risk ratio of 1.81 (95% CI 1.10–2.97, $p < 0.05$). The relative risk for hypertensive women showed an association with age ($b = 0.0333$, $p < 0.0001$).

Summary The studies analyzed presented significant limitations in relation to methodology and a small sample size. Consequently, the meta-analysis was highly heterogeneous and reinforced the need for further research in this area.

Keywords Hypertension · Systolic · Meta-analysis · Women · Sexuality · Sexual dysfunctions · Psychological

This article is part of Topical Collection on *Guidelines/Clinical Trials/Meta-Analysis*

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Introduction

Sexual dysfunction in systemic hypertension is often observed in clinical practice and can be considered a consequence of the natural progression of the disease or a side effect of antihypertensive medication [1••, 2]. Sexual dysfunction is a common medical disorder associated with the pathology, psychological state, and social behaviors of the general population. Consequently, this disorder greatly influences the quality of life of patients. Furthermore, it is considered a multifactorial condition which may include vascular, neurogenic, hormonal, muscular, and endothelial problems [3, 4].

Sexual dysfunction affects between 20 and 50% of women and is more common in women (43%) than in men (31%) [5, 6]. Female sexual dysfunction includes contextual factors such as dissatisfaction, emotional frustration, mental impairment, and severe gynecological impairment that should be included in the pathophysiology of the disorder spectrum [7, 8].

Chronic diseases such as systemic hypertension and antihypertensive drug therapy can contribute to dysfunction [9]. Systemic hypertension may lead to various functional and structural disorders, such as vascular impairment, which may consequently lead to sexual dysfunction due to its negative effect on the genitals and other closely related organ systems [10••]. According to the European Society of Hypertension and the European Society of Cardiology (2013), the prevalence of hypertension in the general population is approximately 30–45% and increases markedly with age [11].

According to Doumas et al., 19.4% of healthy women and 42.1% of hypertensive women have sexual dysfunction [1••]. However, other studies show limited data on the effects of hypertension on sexual dysfunction in females, instead concentrating primarily on male sexual dysfunction [10••, 12–14]. Another limitation is that women are generally less likely to discuss matters of a sexual nature. Additionally, when making diagnoses, providers tend not to investigate the causes of female sexual dysfunction, which, according to the literature, can be pathological and multifactorial in origin [12]. Thus, the aim of this study was to evaluate the prevalence of sexual dysfunction in hypertensive women and compare sexual dysfunction between hypertensive and non-hypertensive women.

Methods

Protocol and Registration

This systematic review is reported in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) statement and is registered in the Prospero (International Prospective Register of Systematic Reviews) database under the number CRD42014008704 [15•].

Eligibility Criteria

We included articles that assessed the prevalence of sexual dysfunction in a woman or compared sexual dysfunction between hypertensive and non-hypertensive women. Studies that evaluated patients with secondary hypertension, reported data solely concerning sexual dysfunction caused by drugs, made no distinction in gender, and included patients with comorbidities were excluded.

Information Sources

We searched the following electronic databases: PubMed, EMBASE, Scopus, Web of Science, IBECS, and Lilacs. Additionally, we manually searched the references of the included articles and performed a citation analysis of the included studies using Google Scholar.

Search

The initial search comprised the Mesh terms "Sexual Dysfunction," "Physiological," "Hypertension," "Women," "Female," and any related entry terms. The complete search strategy used for the PubMed database is shown in Appendix 1. We did not use limits for language or date when performing the searches.

Study Selection

The titles and abstracts of the retrieved articles were independently evaluated by two reviewers (S.M.L and P.L). Abstracts that did not provide enough information regarding the eligibility criteria were kept for full-text evaluation. Reviewers independently evaluated full-text articles and determined study eligibility. Disagreements were solved by consensus; when consensus could not be reached, a third reviewer's opinion (G.S) was sought.

Quality of Studies

Risk of bias was evaluated by ranking each study according to an instrument published by Loney PL et al. [23]. The following items were considered: study design and sampling method, sampling frame, sample size, appropriate measurement, unbiased measurement, response rate, results, and study subjects. This tool evaluated the validity of the methods, the interpretation of the results, and the applicability of the results. The tool consisted of eight questions, each worth one point, for a maximum possible score of eight. The quality of the

articles was independently evaluated by two reviewers (S.M.L and G.S).

Data Extraction and Critical Appraisal

Each included study was reviewed independently by two investigators (S.M.L and G.S). The risk of bias was evaluated using the Newcastle Ottawa Quality Assessment Scale adapted for cross-sectional studies. Disagreements were resolved by consensus.

Data Extraction

Two reviewers (S.M.L and P.L) independently conducted the data extraction; disagreements were solved by the third reviewer (G.S.). General study characteristics were collected, including the first author's last name, year of publication, country where the study took place, aim of the study, study design, settings, eligibility criteria, data collection time range, study groups, age, gender, menopausal status, total number of subjects evaluated, and prevalence of sexual dysfunction.

Data Analysis

A Cochran Q test was used to quantitatively assess heterogeneity, and a P value of less than 0.1 was considered statistically significant. I^2 testing was also used to measure the magnitude of the heterogeneity. High values indicated heterogeneity; values were categorized as low (25%), moderate (45%), and high (75%) [24].

We conducted direct meta-analysis pooling the results using fixed and random effect and calculated 95% confidence intervals and two-sided P values. Risk ratios were pooled to compare hypertensive with normotensive subjects. A sensitivity analysis was also performed, omitting each one of the included studies in the meta-analysis in an attempt to assess heterogeneity and its possible causes.

After identifying that age could be a possible factor influencing the sexual dysfunction risk ratio in hypertensive women, a meta-regression was calculated considering age as a covariate. The risk ratio was transformed on the logarithmic scale, and the effects were pooled using a used a random effects model. Z-statistics were calculated for the intercept and linear coefficient obtained by the model. Finally, the proportion of variance explained by the model was quantified [25]. Forest and bubble plots were constructed to graphically represent the results. All analyses were performed using an R language software (R-project, version 3.1.2, 2014), through the packages Meta and Metafor [26•].

Results

Study Selection

The initial search identified 2864 articles. After removing duplicates, 2738 articles were left to be evaluated by title and abstract. From those, 58 articles were selected for full-text analysis, and 11 met the inclusion criteria. After reference and citation analysis, one additional article was included for full-text analysis. Eleven articles were included in the systematic review, from which five were included in the meta-analysis. Figure 1 shows the flow diagram of studies in this review.

Characteristics of Studies

The included studies were published between 2002 and 2018, and the sample size varied from 67 to 1390 women. Length of follow-up ranged from 2 months to 1 year. Most studies did not separate women based on their menopausal status. Information about the included studies is presented in Table 1.

Risk of Bias

Of the 11 articles included, ten received a perfect score (eight points) in the quality analysis. Studies' scores ranged from two to five points. Some aspects are important to note, as they can influence the synthesis of results. The instrument used to assess sexual dysfunction varied among the studies. Of the articles included only in the systematic review, two used the Malay Version of the Female Sexual Function Index [18•, 20••], and two did not use a validated questionnaire [14•, 17]. Of the five articles included in the meta-analysis, three used the Female Sexual Function Index [1••, 10••, 19••], one used a non-validated questionnaire [21], and one did not note the tool used [12]. The Franciscis and Spatz studies have composite samples for postmenopausal women only [19••, 21]. The Kütmeç study did not include menopausal women in its sample [10••]. The other studies did not differentiate menopausal status in their population samples. Four of the five articles in the meta-analysis excluded other chronic diseases, such as diabetes mellitus and cardiovascular diseases, that can interfere with female sexual function [1••, 10••, 12, 19••]. The other two articles did not differentiate or were not clear in their methodology. Table 2 shows the summary of the quality assessment.

Qualitative Synthesis of Results

Nascimento concluded that the sexual dysfunction in all domains was found to be highly prevalent in women with arterial hypertension [22••]. Latif concluded that both the duration of hypertension and the types of drugs used for its treatment affect female sexual function [18•]. Chen found a difference between

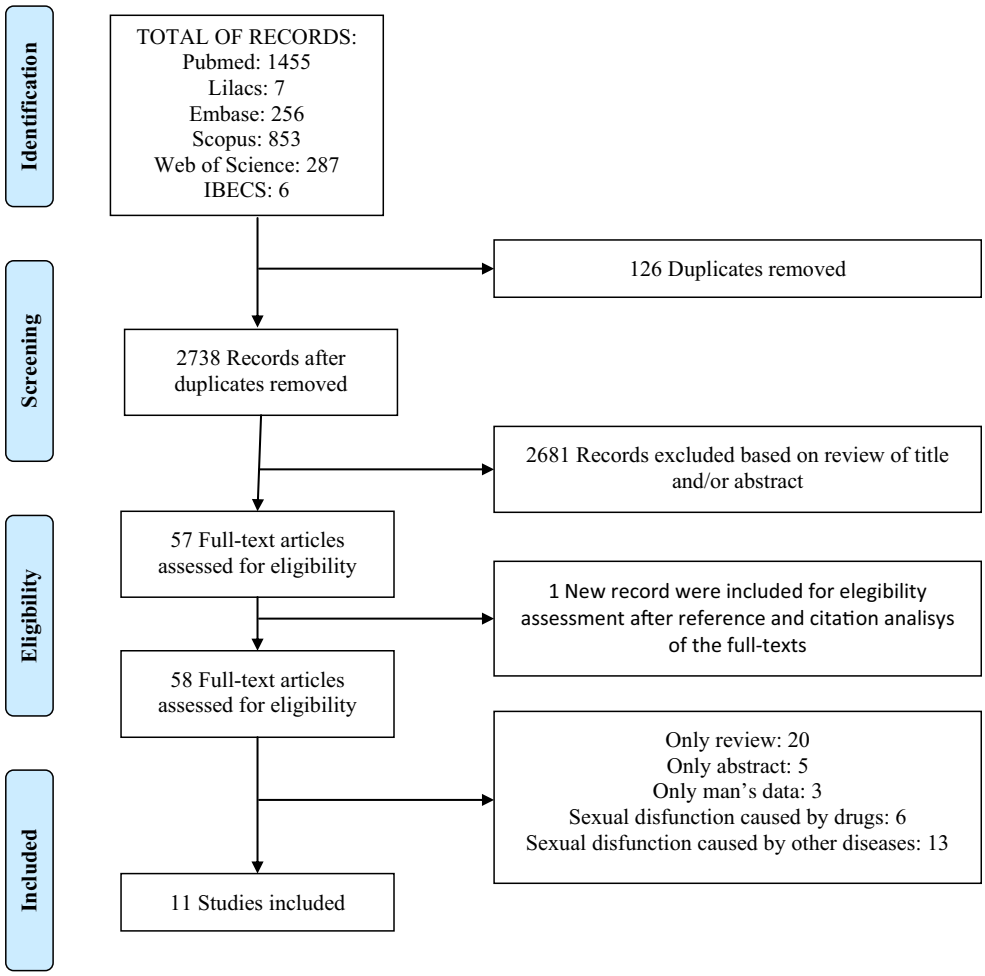

Fig. 1 Study flow diagrams

the frequency of orgasms and overall sexual satisfaction among hypertensive and normotensive women, with hypertensive women rating lower in both categories [14•]. Abdo found no significant difference between hypertensive and normotensive women, and Latif, despite using the same sample of the study published in 2012, concluded that the risk of sexual dysfunction was relatively low in women with hypertension [17]. Doumas, Kütmeç, and Okeahialam found that female sexual dysfunction was observed more often in hypertensive than in normotensive women [1••, 10••, 12]. Spatz [21] in turn did not find a significant association between systemic hypertension and female sexual dysfunction, regardless of treatment. Burchardt et al. [16•] only included hypertensive women in their sample and observed a high prevalence of sexual dysfunction. Franciscis [19••] found statistically significant differences between postmenopausal women with hypertension and normotensive women. Some articles evaluated sexual dysfunction by domains, and the most cited ones were desire, followed by orgasm and pain [12, 17, 20••, 21••]. Prevalence rates were different between studies.

As displayed in Table 2, we observed that the prevalence of sexual dysfunction varied from 14.1 to 90.1%. Only three studies used the same instrument and evaluated all domains to assess sexual dysfunction [1••, 10••, 19••].

Data Extraction and Critical Appraisal

The critical appraisal of the included studies is shown in Table 3.

Meta-Analysis

Of the 11 articles included in the systematic review, five were included in the meta-analysis to compare sexual dysfunction between hypertensive and normotensive. The reasons for the exclusion of the other five articles are available in Table 4.

In the meta-analysis of the sexual dysfunction relative risk between hypertensive and normotensive women, we found significant and high heterogeneity ($I^2 = 92.6\%$, $p < 0.001$); the pooled results revealed a significant risk ratio of 1.81

Table 1 Characteristics of studies

Trial, year	Country	Aim of the study	Study design	Uni or multicenter study?	Data collection time range	Age	Menopause status	Total number of subjects
Burchardt et al. (2002) [16•]	USA	To investigate sexual activity, behavior, dysfunction, and satisfaction in hypertensive women.	Cross-sectional	Unicenter	NA	18–75	Does not separate	67
Abdo et al. (2004) [17]	Brazil	Assess sexual dysfunction prevalence rates and respective odds ratios for sexual symptoms in 1219 women in seven Brazilian states vis-à-vis sociodemographic characteristics and specific common diseases.	Cross-sectional	Multicenter	2 months	≥ 18	Does not separate	1219
Doumas et al. (2006) [1••]	Greece	We evaluated the prevalence of sexual dysfunction in hypertensive women compared with normotensive women according to age, hypertension severity, hypertension duration, and antihypertensive treatment.	Cross-sectional	Unicenter	NA	31–60	Does not separate	417
Okeahialam et al. (2006) [12]	Nigeria	This study was done to determine if any dysfunction existed among women as is commonly reported in males.	Cross-sectional	Unicenter	1 year	33–61	Does not separate	116
Kütmeçt et al. (2011) [10••]	Turkey	This study was carried out in order to identify the sexual functions of essential hypertensive women.	Cross-sectional	Unicenter	4 months	≥ 18	Non-menopausal	156
Chen et al. (2012) [14•]	China	Investigate factors associated with the sexual domain and activity of people with hypertension in southern China.	Cross-sectional	Unicenter	1 year	31–63	Does not separate	368
Latif et al. (2012) [18•]	Malaysia	To determine the construct of the phases of the female sexual response cycle (SRC) in women with hypertension and their association with the duration of hypertension and types of antihypertensive agents.	Cross-sectional	Unicenter	5 months	35–65	Does not separate	348
Francicis et al. (2013) [19••]	Italy	Evaluate the relationship between essential hypertension and FSD in a sample of postmenopausal women, and the effect of administration of antihypertensive therapy.	Cross-sectional	Unicenter	NA	48–55	Menopausal	540
Latif et al. (2013) [20••]	Malaysia	Examine the risk of female sexual orgasmic disorder among a group of women with hypertension in Malaysia.	Cross-sectional	Unicenter	5 months	35–65	Does not separate	348
Spatz et al. (2013) [21••]	USA	Investigated the association of HTN status, using objective measurements of blood pressure and in-home assessment of antihypertensive medication use, with sexual activity and problems among a cohort of middle-aged and older adults, and whether these relationships varied by sex. We further examined the independent effects of the common classes of medication used to treat HTN in this population	Cross-sectional	Multicenter	9 months	57–85	Menopausal	1390
Nascimento et al. (2015) [22••]	Brazil	Identify the presence of sexual dysfunction, considering multiple domains, and to evaluate its relationship with the presence of symptoms of anxiety and depression in women with arterial hypertension	Cross-sectional	Unicenter	6 months	27–84	Does not separate	157

Table 2 Prevalence of sexual dysfunction—summary of results from each study

Trial, year	Instrument used to evaluate sexual dysfunction	Prevalence of sexual dysfunction
Burchardt et al. (2002) [16•]	Brief Index of Sexual Function for Women	42.6%
Abdo et al., (2004) [17]	Self-applicable questionnaire (used after having been adjusted for adequacy)	49.1% (one domain of sexual dysfunction)
Doumas et al. (2006) [1••]	Female Sexual Function Index	42.1%
Okeahialam et al. (2006) [18•]	Questionnaire about libido, pain or discomfort during intercourse, and orgasm	15.1% (only 2 domains of FSD)
Kütmeçt et al. (2011) [10••]	Female Sexual Function Index	90.1%
Chen et al. (2012) [14•]	Self-administered questionnaire about sexual function and activity	62.1% (valued for orgasm)
Latif et al. (2012) [18•]	Malay version of the Female Sexual Function Index	Results showed the sexual function using four components were formed using Kaiser's criteria
Francicis et al. (2013) [19••]	Female Sexual Function Index	35.3%
Latif et al. (2013) [20••]	Malay version of the Female Sexual Function Index	14.1% (only orgasm prevalence)
Spatz et al. (2013) [21••]	Data from The National Social Health, Life and Aging Project (NSHAP), designed to better understand how sexual relationships	68.2%
Nascimento et al. (2015) [22••]	Female Sexual Function Index	55.4% (valued for orgasm)

(95% CI 1.10–2.97, $p < 0.05$). This analysis included 990 hypertensive and 715 normotensive women.

The meta-analysis forest plot, shown in Fig. 2, illustrates the random effects weight attributed to each study, the random effects pooled results, and the heterogeneity quantification and significance test. For each group, the forest plot shows the number of events that account for the number of women with sexual dysfunction.

The sensitivity analysis is resumed in Table 4. When omitting Franciscis et al., Doumas et al., or Kutmeç et al., the pooled risk ratio was not significant. When omitting Okeahialam 2006, the pooled risk ratio and heterogeneity both remain significant. When omitting Spatz et al., the pooled risk ratio increases (RR = 2.13, 95% CI 1.79–2.53) and the heterogeneity quantification reduces to $I^2 = 0\%$.

Considering the sensitivity analysis results and analyzing the studies groups characteristics, differences in age could be a possible cause for heterogeneity. The age of the included subjects in Spatz et al. [21] is higher than other studies, where all subjects were between 57 and 85 years old; additionally, all women were postmenopausal. Franciscis et al. [19••] also only included postmenopausal women; however, the age range was narrower and lower than Spatz et al. [21] (48–55 years Table 1 summaries the age range of each study).

Table 3 Results of the critical appraisal of the included studies

Study (first author)	Study design	Selection				Comparability	Outcome	
		Representativeness of the sample	Sample size	Non-respondents	Ascertainment of exposure	Based on design and analysis	Assessment of outcome	Statistical test
Burchardt et al. (2002) [16•]	Cross-sectional	+			++		+	+
Abdo et al. (2004) [17]	Cross-sectional	+			+	++	+	+
Doumas et al. (2006) [1••]	Cross-sectional	+		+	++	++	+	+
Okeahialam et al. (2006) [12]	Cross-sectional	+			+		+	
Kütmeç et al. (2011) [10••]	Cross-sectional	+		+	++		+	+
Chen et al. (2012) [14•]	Cross-sectional	+			+		+	+
Latif et al. (2012) [18•]	Cross-sectional	+		+	++	++	+	+
Franciscis et al. (2013) [19••]	Cross-sectional	+			++		+	
Latif et al. (2013) [20••]	Cross-sectional	+		+	++		+	+
Spatz et al. (2013) [21••]	Cross-sectional	+		+	+	++	+	+
Nascimento et al. (2015) [22••]	Cross-sectional	+	+		++		+	+

Table 4 Sensitivity analysis—effects estimates and heterogeneity results

	Pooled risk ratio	95%-CI	Effect *p* value	tau^2	I^2 (%)
Omitting Spatz (2013)	2.13	[1.79; 2.53]	< 0.0001	0	0.0
Omitting Franciscis (2013)	1.85	[0.98; 3.49]	0.0595	0.34	93.9
Omitting Doumas (2006)	1.72	[0.96; 3.07]	0.066	0.28	93.0
Omitting Kutmec (2011)	1.63	[0.97; 2.76]	0.0653	0.22	90.6
Omitting Okeahialam (2006)	1.72	[1.03; 2.88]	< 0.05	0.26	94.3

Meta-regression by Age

The meta-regression was performed in order to assess the possible relationship between age and risk ratio of sexual dysfunction and explain the resultant heterogeneity. The meta-regression, expressed as log risk ratio, resulted in ln (RR) = 2.3307–0.0333 (age). The age slope is likely not zero for the risk ratio log ($b = -0.0333$, se = 0.0045, $p < 0.0001$); the intercept regression resulted in $a = 2.3307$(se = 0.2884, $p < 0.0001$). The variance between studies could be explained by the covariate age ($R^2 = 100\%$), meaning that the relationship between age and risk ratio is stronger than expected by chance, and 100% of the variance within studies can be explained by age.

Figure 3 shows the bubble plot of the obtained model; the size of each circle represents the weight attributed to each study. The straight blue line represents the linear meta-regression prediction line, the blue dashed lines displays the 95% confidence interval, and the black dotted line represents the risk ratio equal to the line of no effect. The prediction line demonstrates a decreasing SD risk ratio as age increases, and Fig. 3 shows that studies where the mean age is approximately 70 years have no expected difference in the SD risk between hypertensive and normotensive. On the other hand, studies where the mean age is approximately 45 years have an expected 130% increased risk of SD in hypertensive compared to normotensive.

Discussion

Eleven cross-sectional studies were included in this systematic review, and five were included in the meta-analysis. Most of the studies pointed to a higher prevalence of sexual dysfunction in hypertensive women when compared to the normotensive women.

Female sexual dysfunction remains an understudied area. Lack of research is influenced by emotional, gynecological, and psychological disorders in addition to aging. All of these factors are often difficult to control for in studies. Furthermore, cultural and religious differences between populations, as well as the different instruments used to analyze female sexual dysfunction [7], have also likely influenced the heterogeneity of the studies [7, 8]. A study on how cultural factors affect sexual function concluded that certain parts of the Non-Western world have much higher rates of particular forms of sexual dysfunction compared to the West. Culture plays a role in defining what is abnormal and underlying acceptable patterns [27].

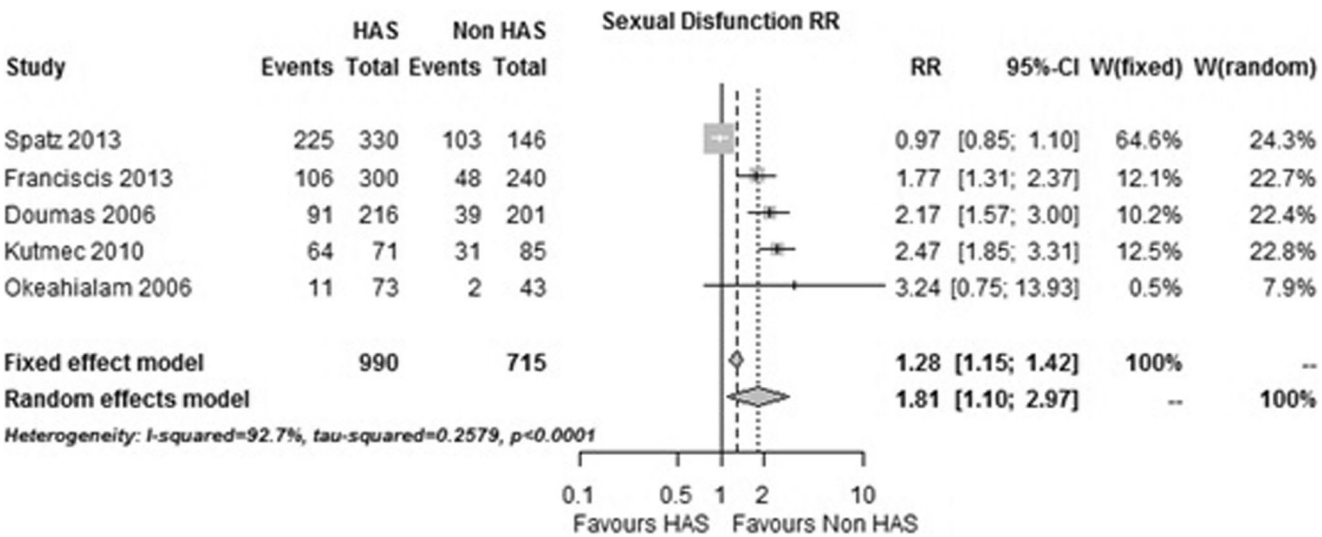

Fig. 2 Forest plot of relative risk of sexual dysfunction. Hypertensive × normotensive

In regard to the meta-analysis comparing the risk of sexual dysfunction in hypertensive women versus non-hypertensive, we found heterogeneity between the five included studies ($I^2 = 92\%$), with a significant risk ratio of 1.81 (95% CI 1.10–2.97, $p < 0.05$). When examining the covariates that could explain the heterogeneity, the meta-regression calculated only explored the age of the groups included in the studies. The risk of sexual dysfunction could be higher in hypertensive women than in normotensive women regardless of age; however, the risk could also be the same in both groups. A limitation in the meta-analysis is the fact that only age was explored as a covariate to explain heterogeneity; additionally, there were a limited number of studies. The relevance of age as a covariate for the sexual dysfunction risk differences between hypertensive and normotensive thus emerges as hypothesis; further studies are necessary to confirm it. Additionally, emotional dissatisfaction and frustration, gynecological disabilities, and psychological disorders should be included in the pathophysiology of this disorder [7, 8].

Hypertension affects the pelvic region by reducing pelvic blood flow and nitric oxide thus leading to fibrosis of the smooth muscle of the clitoris and the vaginal wall. This makes the ability of achieving a response from sexual stimulation extremely difficult [28, 29].

Doumas evaluated 216 women with hypertension (136 medically treated, 80 untreated) and 201 normotensive women [1••]. Sexual dysfunction was found in 42.1% of hypertensive women compared with 19.4% of normotensive women. The study concluded that sexual dysfunction was a significant risk factor for hypertensive women. Similarly [1••], the Okeahialam study found that hypertensive women have higher sexual dysfunction than normotensive women and newly diagnosed with hypertension [12].

Argun et al. [30] showed that sexual dysfunction differed between women who received treatment for hypertension (17.2%) and those who did not.

In a study of hypertensive patients treated in outpatient clinics, it was found that drugs used for hypertension can improve the degree of sexual dysfunction [1••]. However sexual dysfunction was more evident in hypertensive women who expressed symptoms of decreased vaginal lubrication, reduced orgasms, and increased pain during sexual intercourse [18•]. The question of whether antihypertensive agents can induce sexual dysfunction in hypertensive patients with normal sexual function also arises.

Since sexual dysfunction is considered secondary to the therapeutic efficacy of antihypertensive medications, the mechanisms as well as strategies to treat sexual dysfunction need to be better studied.

This systematic review and meta-analysis demonstrates the lack of available information on sexual dysfunction and draws attention to the high prevalence of female sexual dysfunction, including women without comorbidities. Thus, this study reinforces the importance of further studies on female sexual dysfunction and the relationship of the hypertension that use adequate calculated sample sizes and validated instruments for assessing sexual dysfunction.

The included studies presented significant limitations in relation to methodology and a small sample size. Consequently, the meta-analysis was highly heterogeneous.

More blinded randomized clinical trials, with larger sample sizes, and a clear description of the selection and allocation of hypertensive and normotensive patients, should be conducted in order to answer these research questions.

Conclusion

In this systematic review with meta-analysis, we searched evaluate the prevalence of sexual dysfunction in hypertensive women and compare sexual dysfunction between hypertensive and non-hypertensive women.

This disorder is a common medical disorder associated with the pathology, psychological state, and social behaviors of the general population. The studies analyzed presented significant limitations in relation to methodology and a small sample size. Consequently, the meta-analysis was highly heterogeneous.

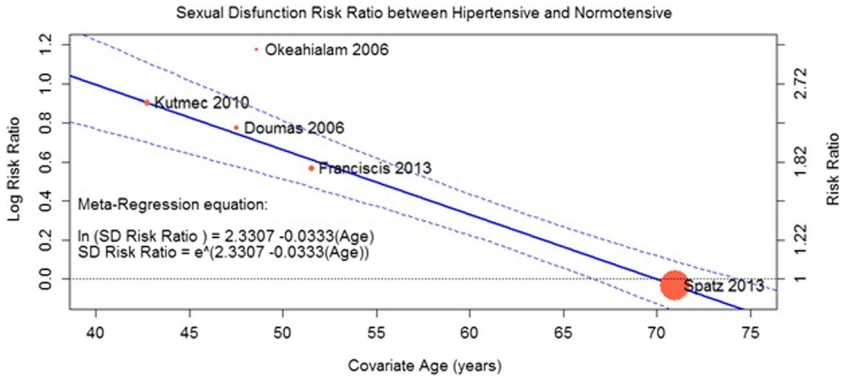

Fig. 3 Bubble plot of sexual dysfunction risk ratio, between hypertensive and normotensive women, age

More blinded randomized clinical trials, with larger sample sizes, and a clear description of the selection and allocation of hypertensive and normotensive patients, should be conducted in order to answer these research questions.

Acknowledgements We would like to thank the Instituto de Cardiologia do RS—Fundação Universitária de Cardiologia (IC-FUC) for assistance in developing the study.

Availability of Data and Material It registered in the Prospero (International Prospective Register of Systematic Reviews) database under the number CRD42014008704.

Authors' Contributions S.M.L and P.L conceived the study, participated in the study design, and helped to draft the manuscript; I.S.F.J, L.R, R.G.C, and G.S participated in the study design and coordination, undertook data analysis, and helped to draft the manuscript; E.B and G.S participated in the study design and coordination. All authors read and approved the final manuscript.

Funding This study was financially supported by Fundação de Amparo à Pesquisa do Estado do Rio Grande do Sul (FAPERGS).

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

Ethics Approval and Consent to Participate No. 4512/10.

Consent for Publication Ethical approval was obtained from the Ethical Committee, Foundation University of Cardiology for conducting the research study.

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- • Of importance
- •• Of major importance

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Appendix

Appendix 1 Search strategy used for PubMed

Search	Query	Items found
#62	Search ("Hypertension"[Mesh] OR "Blood Pressure, High"[All Terms] OR "Blood Pressures, High"[All Terms] OR "High Blood Pressure"[All Terms] OR "High Blood Pressures"[All Terms])	210073
#61	Search ("Sexual Dysfunction, Physiological"[Mesh] OR "Physiological Sexual Dysfunction"[All Terms] OR "Physiological Sexual Dysfunctions"[All Terms] OR "Sexual Dysfunctions, Physiological"[All Terms] OR "Sex Disorders"[All Terms] OR "Sexual Disorders, Physiological"[All Terms] OR "Physiological Sexual Disorder"[All Terms] OR "Physiological Sexual Disorders"[All Terms] OR "Sexual Disorder, Physiological"[All Terms])	23066
#63	Search (#62 AND #61)	478

Used the same method and the same instrument to evaluate sexual dysfunction.

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