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No association between body size and frequency of sexual intercourse among oral contraceptive users

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Abstract

Purpose—This study aimed to describe frequency of sexual intercourse and whether body size was associated with weekly sexual intercourse among a diverse group of women using oral contraceptives.

Methods—This longitudinal, prospective cohort study recruited participants (n=185) from several clinics in Charlotte, NC. Body mass index (BMI) and waist-to-hip ratio (WHR) were used as measures of body size and sexual intercourse frequency was determined from self-reported information provided on daily diaries. Mean monthly frequencies of sexual intercourse were calculated and linear mixed models were used to assess if means remained constant over time. Generalized estimating equations were used to calculate odds ratios (ORs) and 95% confidence intervals (CIs).

Results—Mean monthly frequency of sexual intercourse was similar for women classified as normal/underweight or obese by BMI during each month of data collection, but was highest for women classified as overweight. After adjustment, obesity-sexual intercourse associations were attenuated (BMI 30 vs. <25.0: OR=0.78, 95% CI: 0.43, 1.42 and WHR 0.85 vs. <0.85: OR=1.11; 95% CI: 0.62, 2.01).

Conclusions—This study found no association between BMI or WHR and weekly sexual intercourse. However, more research is warranted given the importance of this possible relationship for future studies of fertility, contraceptive effectiveness, and sexual health.

Keywords

coitus; contraceptives; oral; obesity

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INTRODUCTION

Sexual intercourse has garnered the attention of investigators since the 1980s for its primary role in studies of sexually transmitted infections, pregnancy, and contraceptive use [1]. In the context of contraceptive research interpretation, the risk of pregnancy is not influenced by method efficacy alone [2]. In particular, further examination of the possible association between body size and frequency of sexual intercourse may be important since studies of the obesity-oral contraceptive failure have been inconsistent [3–8], and many studies have been unable to adjust for this potentially important confounder [3,4,6–8].

Many women who use oral contraceptives are concerned that the use of this method will cause weight gain; however, a recent review found little evidence to support a strong association between oral contraceptive use and weight gain [9]. Other research has focused on whether the use of oral contraceptives affects a woman's sexual function and desire. According to several comprehensive reviews of this literature, it appears that while oral contraceptives may have both positive and negative impacts on sexuality, most users are unaffected [10–12].

Despite research on how oral contraceptive use may impact weight or sexual function and desire, little has been published on how body size may affect frequency of sexual intercourse among oral contraceptive users. Previous studies on female sexuality have focused primarily on sexual frequency in relation to marital status or health conditions, such as body image, pregnancy, and cancer [13–19]. Available research suggests that there is an association between obesity and lack of enjoyment of sexual activity, sexual desire, difficulties with sexual performance, and avoidance of sexual encounters [20], but that a measure such as waist-to-hip ratio (WHR) has no correlation [21]. Studies that have investigated the body size-sexual frequency association have had inconsistent findings [20,22–26]. Some studies have found that obese and overweight women reported a lower monthly frequency of sexual intercourse compared to their normal weight counterparts [22,25], while others have found that (body mass index) BMI is not significantly associated with frequency of sexual intercourse [23, 24, 26]. A number of these prior studies of sexual function and frequency have had limited generalizability to US populations due to the use of restrictive age ranges (e.g. only 40 to 69 year old women) [25] and international populations [21, 22]. The purpose of this study was two-fold: 1.) to describe the frequency of sexual intercourse and 2.) to determine whether body size, as measured by BMI and WHR, was associated with weekly sexual intercourse among a racially and socioeconomically diverse group of adult women using oral contraceptives.

METHODS

Study Design and Population

The Fertility and Oral Contraceptive Use Study (FOCUS) is a longitudinal, prospective cohort study that recruited participants from several clinics in the Charlotte, NC area that specialized in family medicine, obstetrics/gynecology, and family planning. The study protocol was approved by the local institutional review boards. The primary objective of

FOCUS was to explore methodological issues related to the successful execution of a long-term study to investigate the possible obesity-oral contraceptive failure association, including whether obesity influences sexual intercourse frequency. Eligible participants were women between the ages of 18 and 40 years old who spoke English or Spanish, were currently using oral contraceptives, had never been told by a physician that they would be unable to get pregnant and/or carry a pregnancy to term, and who planned on remaining in the area for the next year. Both active and passive methods of recruitment were employed. Trained research assistants approached women entering the clinics to invite them to participate in the study. In addition, recruitment flyers were placed inside clinics and letters were sent to a subset of women who had recently been seen at the clinics for routine care. These flyers and letters invited women to contact the research staff to learn more about the study and to schedule a baseline interview.

Eligible women who agreed to participate and provided written informed consent completed an in-person interview that took approximately 15–20 minutes to complete. During the interviews, information on demographics, oral contraceptive use, frequency of sexual intercourse, and other reproductive factors were collected. The trained interviewers also obtained anthropometric measurements, including height, weight, waist circumference, and hip circumference, using standardized methods. Specifically, calibrated scales and stadiometers were used to measure height and weight, and tape measures were used to obtain waist and hip circumferences. Women were also provided with three monthly diaries and asked to complete them on a daily basis. These diaries collected daily information on sexual intercourse and oral contraceptive use. Upon completion of the baseline interview and the monthly diaries, women were provided with gift cards to a local grocery store chain to compensate them for their time. Ultimately, a total of 185 women completed baseline interviews.

Measurement of exposure and covariates

Both BMI and WHR were used as measures of obesity. BMI (kg/m^2) was categorized according to the World Health Organization's (WHO) International Classification: <18.5 (underweight), 18.5–24.9 (normal), 25.0–29.9 (overweight), and > 30.0 (obese) [27, 28]. Due to the small number of women ($n=6$) in the underweight category, we further collapsed these categories into underweight/normal (< 25.0), overweight (25.0–29.9) and obese (≥ 30.0). WHR (waist circumference divided by hip circumference) was categorized as <0.85 or ≥ 0.85 [29]. The following self-reported variables were considered as potential confounding factors: age, marital status, education, income, number of individuals residing in household, race/ethnicity, alcohol consumption, smoking, parity, use of oral contraceptives to prevent pregnancy, use of oral contraceptives to lessen cramps, and use of oral contraceptives to regulate menstrual cycles.

Identification of outcome

Sexual intercourse resulting in vaginal penetration was determined from the self-reported information provided on the daily diaries. If a woman indicated that she had sexual intercourse at least once during a week, she was considered to have been sexually active [24].

Analysis

Women were excluded from the analysis if they did not return at least one diary (n=41), if they declined to have their weight measured (n=1), or if they were missing information on smoking (n=1). Ultimately, this analysis considered a total of 394 monthly diaries returned by 142 women. These diaries represented a total of 1,558 weeks of information (n=18 weeks deleted since women did not mark sexual intercourse information). Frequencies and percentages were obtained to describe the overall study population, and to determine monthly frequency of sexual intercourse. Additionally, mean monthly frequencies of sexual intercourse were calculated for each of the BMI and WHR groups and linear mixed models were used to assess if these means remained constant over time. Since the diary data were collected at multiple time points for each participant, a generalized estimating equations (GEE) approach was used to calculate unadjusted odds ratios (ORs) and 95% confidence intervals (CIs) to provide an unadjusted measure of the association between obesity and weekly sexual intercourse. Multivariate models of the obesity-sexual intercourse association were also based on a GEE approach. Backwards elimination was used to retain only those covariates with $p < 0.15$ while the exposures of interest were forced into models independently of their significance. All analyses were performed using the SAS System for Windows Version 9.2 (SAS Institute, Cary, NC).

RESULTS

Most study participants were between the ages of 25 and 35 years old, non-Hispanic black, single, and well educated (Table 1). Nearly 36% of the diary weeks represented weeks when women did not have vaginal intercourse. During the first month of diary collection, similar percentages of women reported having sexual intercourse 0, 1–3, 4–6, and 7–9 days per month (0 days/month: 20.4%, 1–3 days/month: 17.6%, 4–6 days/month: 23.2%, and 7–9 days/month: 19.7%). Nearly 9% of women reported having sexual intercourse 10–12 days per month and 9.9% indicated they had sexual intercourse more than 12 days per month (data not shown in table). Findings were similar for the second and third months of diary collection. Mean monthly frequency of sexual intercourse was similar for women classified as normal/underweight or obese by BMI during each month of data collection (Table 2). For all months, the mean monthly frequency of sexual intercourse was highest for women classified as overweight. Changes in mean monthly frequency of sexual intercourse were only statistically significant for women in the overweight category ($p=0.005$). WHR results were similar with mean monthly frequencies of sexual intercourse being highest for women with a WHR > 0.85 . Changes in mean monthly frequency of sexual intercourse according to WHR categories were not statistically significant.

Women who were married or living with a partner had increased odds of having sexual intercourse during a week as compared to women who were single (OR= 4.55; 95% CI: 2.55, 8.10 and OR=6.59; 95% CI: 2.57, 16.91, respectively; Table 3). There was a dose-response relationship between education and sexual intercourse. Specifically, as education level increased, the odds of sexual intercourse during a week decreased (high school or less vs. college graduate or more: OR= 2.64; 95% CI: 1.40, 5.01 and some college vs. college graduate or more: OR=1.33; 95% CI: 0.72, 2.47). Hispanic women had over four times the

odds of having sexual intercourse during a week as compared to non-Hispanic white women (OR=4.42; 95% CI: 1.44, 13.56). While women who used oral contraceptives to prevent pregnancy had increased odds of having sexual intercourse during a week, women who used oral contraceptives to lessen cramps had decreased odds of having sexual intercourse during a week (OR=5.00; 95% CI: 2.27, 11.11 and OR=0.47; 95% CI: 0.28, 0.80, respectively).

In unadjusted models, women with overweight and obese BMIs had increased odds of sexual intercourse as compared to women with underweight or normal BMIs, however, these results were not statistically significant (OR= 1.99; 95% CI: 0.95, 4.14 and OR=1.16; 95% CI: 0.66, 2.04, respectively). Similarly, women with a WHR ≥ 0.85 had increased odds of sexual intercourse during a week as compared to women with a WHR < 0.85 (OR=1.66, 95% CI: 0.93, 2.95, Table 3). When adjusted for marital status, education, use of oral contraceptives to prevent pregnancy, and use of oral contraceptives to lessen cramps, there was no association between BMI and sexual intercourse. Specifically, overweight women had 1.35 times the odds of sexual intercourse during a week (95% CI: 0.65, 2.77; Table 4) and obese women had 0.78 times the odds of sexual intercourse during a week (95% CI: 0.43, 1.42) as compared to normal and underweight women. There was also no association between WHR and sexual intercourse after adjustment for marital status, education, and use of oral contraceptives to prevent pregnancy (OR=1.11; 95% CI: 0.61, 2.01).

DISCUSSION

In this study of oral contraceptive users, we found that mean monthly frequency of sexual intercourse was highest for women classified as overweight by BMI. Additionally, heavier women, as determined by both BMI and WHR, had increased but nonsignificant odds of having weekly sexual intercourse as compared to normal weight women in unadjusted models. After adjustment, there was no association between either BMI or WHR and sexual intercourse.

While some studies have investigated whether body size is associated with sexual function and/or sexual quality of life [20–22,25], there has been limited research on the association between body size and frequency of sexual intercourse. For example, Bajos et al. examined the association between BMI and sexual activity, sexual satisfaction, unintended pregnancies, and abortion in a national, population-based telephone survey of 12,364 men and women aged 18 to 69 years who were residing in France [22]. Among women who indicated that they had had sexual intercourse in the past 12 months, the mean monthly frequency of sexual intercourse was lowest for overweight and obese women (underweight: 9.04 times/month, normal: 8.78 times/month, overweight: 8.20 times/month, and obese: 7.74 times/month). Findings in the current study were contradictory with overweight women having the highest mean monthly frequency of sexual intercourse and underweight/normal and obese women having lower and similar monthly means. The difference in age ranges between the Bajos et al. study and the current study, as well as cultural differences between the US and France, may explain the discrepant findings. Additionally, the Bajos et al. study included both contraceptors and non-contraceptors while the current study only included women using oral contraceptives.

Satinsky investigated the association between BMI and a range of sexual behaviors in a cross-sectional study of 238 women between the ages of 18 and 56 years [26]. Women self-reported their height, weight, and sexual behaviors during the previous four weeks using an on-line survey. Findings were comparable to the current study in that BMI was not associated with a number of sexual behaviors, including vaginal intercourse ($p=0.268$).

To our knowledge, only one study has specifically examined the association between obesity and sexual intercourse among oral contraceptive users. Huber et al. recruited oral contraceptive users from a family medicine clinic and invited them to fill out a short baseline questionnaire and five one-week diaries where they recorded information on sexual intercourse ($n=98$) [24]. Similar to the current study, there was no clear association between BMI and weekly sexual intercourse after adjustment for race/ethnicity, marital status, income, parity, use of oral contraceptives to alleviate cramps, and use of oral contraceptives to regulate menstrual cycles (overweight vs. normal: OR=1.84; 95% CI: 0.64, 5.32 and obese vs. normal: OR=1.22; 95% CI: 0.53, 2.81).

There are several limitations to the current study. Since women self-reported sexual intercourse data, it is possible that there is some misclassification of the outcome. However, the use of diaries likely provided more accurate data than asking women to retrospectively self-report information on sexual intercourse. While the response rates for the diaries were respectable (range: 77.8% to 63.4%), it is possible that selection bias occurred due to nonresponse. We compared women who completed at least one diary to women who completed only the baseline interview. While these two groups of women did not differ with respect to a number of characteristics including age, marital status, income, race/ethnicity, alcohol consumption, smoking, parity, BMI, or WHR, they did differ with respect to educational level. Specifically, women who did not complete a diary were more likely to have a high school education or less.

It should be noted that we chose to focus our data collection on a very specific set of items in order to reduce participant burden associated with completing daily diaries, and thus maximize our response rates. Consequently, the diaries did not measure some items that may have been related to either the outcome or the exposures of primary interest. For example, we did not ask women to indicate days they may have had breakthrough bleeding or bleeding due to their menstrual cycles. Some evidence suggests that women may be less likely to engage in sexual intercourse on days they experience bleeding [10]. Also, the diaries only asked about vaginal sexual intercourse and did not consider other sexual behaviors, nor did they ask about sexual orientation. Since nearly 90% of women indicated they were using oral contraceptives to prevent pregnancy, most women were likely in heterosexual relationships. However, if women were particularly concerned about pregnancy they may have been more likely to engage in forms of sexual behavior other than vaginal intercourse that confer less risk of unintended pregnancy. Lastly, this study had a relatively small sample size to detect lower risk associations.

This study also had several strengths. Few studies have examined the association between body size and frequency of sexual intercourse although this potential relationship may be important to studies on pregnancy and oral contraceptive failure. Rather than relying on self-

report of height and weight to calculate BMI, trained interviewers collected anthropometric measurements using standardized procedures. While the overall prevalence of overweight and obesity for our sample was similar to national estimates for women of reproductive age [30, 31], there were some differences when racial/ethnic specific estimates were considered. Prevalence of overweight and obesity for non-Hispanic white and Hispanic women in our sample was similar to national estimates; however, the prevalence of overweight and obesity for non-Hispanic black women in our sample was slightly lower than what is reported for non-Hispanic black women in national surveys [30, 31]. Moreover, we considered WHR in addition to BMI in order to provide a more comprehensive examination of obesity. Also, the use of diaries provided more accurate weekly information on sexual frequency than relying on women to retrospectively recall how many times they had sexual intercourse in a week. Finally, the racial/ethnic diversity of the study population is advantageous in generalizing the findings more widely to other oral contraceptive users.

In summary, this study found no association between BMI or WHR and weekly sexual intercourse among a diverse group of oral contraceptive users after adjustment for confounders. Although few studies have examined this association, the current study's findings are consistent with the only other study that has studied this possible association among women using oral contraceptives [24] suggesting that if there is an association between obesity and oral contraceptive failure, it is likely unrelated to more sexual intercourse among obese women. Furthermore, this study's findings underscore that overweight and obese women do not engage in *less* sexual intercourse because of their body size. All women, regardless of body size, may benefit from receiving sexual health advice from public health and healthcare professionals. Women who are using or are considering using oral contraceptives may be an important subpopulation to consider given the concerns they may have regarding weight gain and/or lack of sexual desire as potential side effects of oral contraceptive use. Additional studies to evaluate the association between body size and sexual intercourse frequency are warranted given its potential importance in future studies of fertility, contraceptive effectiveness, and sexual health.

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List of Abbreviations and Acronyms

BMI	Body Mass Index
CI	Confidence Interval
FOCUS	Fertility and Oral Contraceptive Use Study
GEE	Generalized Estimating Equations
OR	Odds Ratio
WHR	Waist-to-Hip Ratio
WHO	World Health Organization

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Table 1

Demographic and lifestyle characteristics of women who participated in the Fertility and Oral Contraceptive Use Study (FOCUS)

Characteristic	Sample Size	Percent ^a
Age		
< 25	50	35.2%
25–34	68	47.9%
35	24	16.9%
Marital status		
Married	28	19.7%
Living with partner	26	18.3%
Separated, divorced, or widowed	8	5.6%
Single	80	56.3%
Educational level		
High school or less	52	36.6%
Some college	41	28.9%
College graduate or more	49	34.5%
Income		
\$30,000	80	56.3%
\$30,001–\$45,000	26	18.3%
> \$45,000	36	25.4%
Number in household		
1 person	15	10.6%
2 people	46	32.4%
3 people	81	57.0%
Race/ethnicity		
Hispanic	19	13.4%
Non-Hispanic white	46	32.4%
Non-Hispanic black	68	47.9%
Other	9	6.3%
Alcohol consumption		
Yes	68	47.9%
No	74	52.1%
Smoking		
Yes	21	14.8%
No	121	85.2%
Parity		
0	59	41.6%
1	40	28.2%
2	43	30.3%
Using OCs to prevent pregnancy		
Yes	127	89.4%

Characteristic	Sample Size	Percent ^a
No	15	10.6%
Using OCs to lessen cramps		
Yes	51	35.9%
No	91	64.1%
Using OCs to regulate cycles		
Yes	56	39.4%
No	86	60.6%
BMI^b		
< 25.0	52	36.6%
25.0–29.9	32	22.5%
30.0	58	40.9%
WHR^c		
< 0.85	95	66.9%
0.85	47	33.1%

^a Percents may not total 100 due to rounding.

^b BMI = Body mass index. BMI calculated as kg/m².

^c WHR=Waist-to-hip ratio. WHR calculated as waist circumference divided by hip circumference.

Table 2
Mean monthly frequency of sexual intercourse by body mass index and waist-to-hip ratio categories

	Month 1 (N=142)		Month 2 (N=136)		Month 3 (N=116)	
	Mean	St dev	Mean	St dev	Mean	St dev
BMI^a						
< 25.0	5.4	5.2	5.7	5.7	5.0	4.7
25.0–29.9	6.9	4.5	8.1	5.3	7.9	5.1
30.0	5.1	4.7	5.8	4.8	5.9	5.4
WHR^b						
< 0.85	5.2	4.6	5.6	5.0	5.5	4.7
0.85	6.4	5.3	7.6	5.8	7.2	5.9

^aBMI = Body mass index. BMI calculated as kg/m².

^bWHR=Waist-to-hip ratio. WHR calculated as waist circumference divided by hip circumference.

Table 3

Odds ratios and 95% confidence intervals of the association between select demographic and lifestyle characteristics and weekly sexual intercourse

Characteristic	OR	95% CI
Age		
< 25	1.00	Referent
25–34	1.39	0.78, 2.46
35	0.93	0.46, 1.87
Marital status		
Married	4.55	2.55, 8.10
Living with partner	6.59	2.57, 16.91
Separated, divorced, or widowed	0.52	0.15, 1.81
Single	1.00	Referent
Educational level		
High school or less	2.64	1.40, 5.01
Some college	1.33	0.72, 2.47
College graduate or more	1.00	Referent
Income		
\$30,000	1.21	0.65, 2.24
\$30,001–\$45,000	0.98	0.45, 2.13
> \$45,000	1.00	Referent
Number in household		
1 person	0.26	0.10, 0.64
2 people	0.68	0.39, 1.20
3 people	1.00	Referent
Race/ethnicity		
Hispanic	4.42	1.44, 13.56
Non-Hispanic white	1.00	Referent
Non-Hispanic black	0.84	0.47, 1.51
Other	0.51	0.18, 1.45
Alcohol consumption		
Yes	0.80	0.48, 1.33
No	1.00	Referent
Smoking		
Yes	2.14	0.93, 4.91
No	1.00	Referent
Parity		
0	1.00	Referent
1	1.26	0.68, 2.32
2	3.53	1.89, 6.60
Using OCs to prevent pregnancy		
Yes	5.00	2.27, 11.11

Characteristic	OR	95% CI
No	1.00	Referent
Using OCs to lessen cramps		
Yes	0.47	0.28, 0.80
No	1.00	Referent
Using OCs to regulate cycles		
Yes	0.88	0.53, 1.47
No	1.00	Referent
BMI^a		
< 25.0	1.00	Referent
25.0–29.9	1.99	0.95, 4.14
30.0	1.16	0.66, 2.04
WHR^b		
< 0.85	1.00	Referent
0.85	1.66	0.93, 2.95

^aBMI = Body mass index. BMI calculated as kg/m².

^bWHR=Waist-to-hip ratio. WHR calculated as waist circumference divided by hip circumference.

Table 4

Adjusted odds ratios and 95% confidence intervals for the association between body size and weekly sexual intercourse

Characteristic	Adjusted OR ^a	95% CI
Model 1		
BMI^b		
< 25.0	1.00	Referent
25.0–29.9	1.35	0.65, 2.77
30.0	0.78	0.43, 1.42
Marital status		
Married	4.00	2.18, 7.33
Living with partner	4.76	1.82, 12.43
Separated, divorced, or widowed	0.65	0.19, 2.20
Single	1.00	Referent
Educational level		
High school or less	2.23	1.18, 4.19
Some college	1.57	0.84, 2.94
College graduate or more	1.00	Referent
Using OCs to prevent pregnancy		
Yes	2.22	1.05, 4.76
No	1.00	Referent
Using OCs to lessen cramps		
Yes	0.64	0.36, 1.14
No	1.00	Referent
Model 2		
WHR^c		
< 0.85	1.00	Referent
0.85	1.11	0.61, 2.01
Marital status		
Married	4.20	2.31, 7.66
Living with partner	4.92	1.88, 12.85
Separated, divorced, or widowed	0.74	0.20, 2.80
Single	1.00	Referent
Educational level		
High school or less	2.15	1.13, 4.07
Some college	1.58	0.86, 2.90
College graduate or more	1.00	Referent
Using OCs to prevent pregnancy		
Yes	2.56	1.19, 5.56
No	1.00	Referent

^a Adjusted for all other variables in the model.

^b BMI = Body mass index. BMI calculated as kg/m^2 .

^c WHR=Waist-to-hip ratio. WHR calculated as waist circumference divided circumference.