BRIEF REPORT

Body Weight and Health Care Among Women in the General Population

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Objective: To examine the relation between body mass index ([BMI] calculated as weight in kilograms divided by the square of height in meters) and the use of medical care services among a nationally representative sample of women.

Design and Setting: Multistage cluster-area probability sampling survey. Data are from the Cancer Control and Health Insurance supplements of the 1992 National Health Interview Survey conducted by the National Center for Health Statistics. Respondents were 6981 women aged 18 years or older residing in the United States who self-reported sociodemographic information and the use of health care services.

Main Outcome Measures: Interval (≤3 years vs >3 years) since most recent mammography, clinical breast examination, gynecologic examination, and Papanicolaou smear and the number of physician visits in the year before the survey.

Results: When age, race, income, education, smoking, and health insurance status were adjusted for, the BMI was directly related to delaying clinical breast examinations, gynecologic examinations, and Papanicolaou smears. Obese women (BMI of 35) were more likely than nonobese women (BMI of 25) to delay clinical breast examinations (odds ratio, 1.26; 95% confidence interval, 1.00-1.58), gynecologic examinations (odds ratio, 1.39; 95% confidence interval, 1.15-1.69), and Papanicolaou smears (odds ratio, 1.29; 95% confidence interval, 1.04-1.58). The BMI was not significantly related to delays in mammography. It was also related to increased physician visits ($P = .001$).

Conclusion: Among women, an increased BMI is associated with decreased preventive health care services, which may exacerbate or even account for some of the increased health risks of obesity.

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OBESITY IS a major public health problem in the United States, with approximately 35% of American women classified as overweight.[1] These women are at an increased risk for diseases of many organ systems, including some forms of cancer.[2] Indeed, obese women (body mass index [BMI], calculated as weight in kilograms divided by the square of height in meters, of ≥35) have been shown to have significantly higher rates of cervical, endometrial, ovarian, gallbladder, and breast cancers than nonobese women.[3] Although the association between weight and certain forms of cancer among women is strong, other factors (eg, family history, age, smoking status, and body fat distribution) appear to play an important role in determining cancer risk.[4] Nonetheless, the increased cancer risk associated with obesity underscores the importance of preventive health care examinations for obese women.

The examinations that were investigated in this study (eg, mammography, breast clinical examination, gynecologic examination, and Papanicolaou [Pap] smear test) are critical strategies for the early detection and treatment of some forms of cancer among women and form an important element of the national health promotion and disease prevention objectives contained in *Healthy People 2000*.[5] It is estimated that regular Pap smear tests followed by appropriate treatment could prevent nearly all deaths from cervical cancer, and screening mammography followed by timely treatment could reduce the breast cancer mortality by 30% for women aged 50 to 69 years.[6-8] Some evidence exists, however, that obese women delay or avoid medical and preventive care services.[9,10]

For editorial comment see page 385

SUBJECTS AND METHODS

The data sources used were the 1992 National Health Interview Survey (NHIS), Cancer Control and Health Insurance supplements, conducted by the National Center for Health Statistics of the Centers for Disease Control and Prevention, Atlanta, Ga.[11] The NHIS is a continuing annual personal interview survey of approximately 49 000 households in the civilian noninstitutionalized US population aged 18 years or older selected through a multistage cluster-area probability sampling design. Data are collected on personal, sociodemographic, and health-related information of family members and unrelated persons living in these households.[12]

The Cancer Control Supplement to the 1992 NHIS was administered to a randomly selected subsample of 12 035 adult respondents. The response rate was 87%. The survey ascertained information on health-related knowledge and attitudes, as well as the use of health care services. Because our interest was in characteristics associated with delayed preventive health care among women, analyses were restricted to female respondents (N = 6981). To include health insurance status as a covariate in the analyses, subjects' records were linked with their corresponding responses in the Health Insurance Supplement to the 1992 NHIS.

Self-reported weight and height data were used to compute the BMI for each respondent. Self-reported weight is highly correlated with measured weight.[13-16] The BMI is largely independent of height ($r = -0.03$), strongly related to weight ($r = 0.86$), and a reasonable measure of body fatness.[16,17]

The covariates examined in these analyses were those that might influence the use of health care: age, race (nonwhite or white), family income, education (years completed), smoking status (nonsmoker-former smoker or current smoker), and health insurance status (not covered or unknown or covered by private insurance, Medicare, or both).

The outcome measures were the number of physician visits in the 12 months before completing the survey and the interval since the most recent use of the following preventive health care procedures: mammography, clinical breast examination, gynecologic examination, and Pap smear. The interval since the most recent procedure was defined by the NHIS as follows: within the past year, 1 to 3 years ago, more than 3 years ago, unknown specific interval ($\leq$3 years vs $>$3 years), not ascertained or don't know, or unknown or refused. These responses were recoded and treated as dichotomous variables: 0 indicates 3 years or less; and 1, greater than 3 years. Responses coded as unknown or not ascertained were treated as missing variables and excluded from the analysis.

Multiple linear regression analysis was used to examine the relation between the BMI and the number of physician visits in the 12 months before completing the survey, adjusting for the previously mentioned covariates. Logistic regression analyses were used to examine whether the BMI was related to delaying each of the 4 preventive care procedures after controlling for the influence of the covariates. After testing for linear effects (on the logit level), tests for nonlinear effects were conducted by adding the BMI squared to the model. Finally, because of the heterogeneous age range of this sample (**Table 1**), interactions between the BMI and age for each outcome variable were also tested.

Data were also tested by treating the BMI categorically (quintiles). These results did not differ substantially from analyses that treated the BMI as a continuous variable. Therefore, given the advantages of using continuous variables in epidemiological studies,[18] we report analyses that treated the BMI as continuous. Separate odds ratios were computed for BMIs of 35 and 40 relative to a BMI of 25 (the sample mean) to estimate the relative odds of delaying care by obese and severely obese women, respectively. Variability in sampling associated with the estimated odds ratios was assessed by 2-sided 95% confidence intervals, with $P<.05$ (2-tailed) considered statistically significant.

The purpose of this study was to examine the relation between the BMI and both the frequency of physician visits and the use of preventive health care services among a nationally representative sample of women, adjusting for age, sociodemographic characteristics, smoking, and health insurance status.

RESULTS

Selected characteristics of respondents are shown in Table 1. The mean age of the women was 46.2 years (median, 42 years), with a range of 18 to 97 years (3 women were $\geq$99 years, but their actual age was not specified). The mean number of physician visits in the 12 months before completing the survey was 5.35 (median, 2). Nearly 70% of the women reported having some form of health insurance.

Of the 3105 women who answered the question regarding the interval since their last mammography, 2657 indicated that it had been less than 3 years, and 448 reported that it had been more than 3 years. Of the 4926 women who answered the question about clinical breast examination, 4162 reported having had 1 less than and 764 more than 3 years before the survey. For gynecologic examination, of the 5924 women who answered the question, 4416 reported having had 1 less than and 1508 more than 3 years before the survey. Finally, of the 6314 women who answered the question regarding the interval since last Pap smear, 5126 reported having had 1 less than and 1188 more than 3 years before the survey.

In the linear regression analysis adjusted for age, race, education, family income, smoking status, and health insurance status, the BMI was associated with increased physician visits in the 12 months before completing the survey ($\beta = .063$, $P = .002$). That is, for every 1-unit increase in the BMI, there was, on average, a 0.063-unit increase in visits to a physician.

The fully adjusted odds ratios for having delayed mammography, clinical breast examination, gynecologic examination, and Pap smear testing (each for $>$3 years) as a function of the BMI are shown in **Table 2**. The BMI was directly related with a reduced probability of having had a clinical breast examination ($P = .04$), gynecologic examination ($P = .001$), and Pap smear ($P = .02$) in the previous 3 years. The BMI was not significantly related to delays in mammography ($P = .20$). No evidence of a nonlinear effect for the BMI was seen (ie, the

Table 1. Selected Characteristics of Respondents

Characteristic	Respondents, No.	Value*
Age, y	6981	46.2 ± 18.6
White race, %	6981	79.9
Weight, kg	6981	69.8 ± 26.5
Height, cm	6964	163.1 ± 7.1
Body mass index, weight (kg)/[height (m)]^2	6805	25.1 ± 5.4
Physician visits	6947	5.3 ± 14.4
Married, %	6974	50.2
Education level, %		
<12 y	6960	23.5
12 y		37.9
>12 y		38.7
Family income, %		
<$20 000	5745	42.5
$20 000-$40 000		29.3
>$40 000		28.2
Smoking status, %		
Former or nonsmoker	2972	44.4
Current smoker		55.6
Health insurance, %		
Covered	6981	67.8
Not covered or unknown		32.2

**Values are expressed as mean ± SD unless otherwise indicated.*

Table 2. Adjusted Odds Ratio for Delaying Mammography, Clinical Breast Examinations, Gynecologic Examinations, and Papanicolaou Smears According to Body Mass Index (BMI)*

Form of Preventive Health Care	Obese (BMI of 35) (n = 203)	Severely Obese (BMI of 40) (n = 135)
Mammography	0.81 (0.59-1.12)	0.73 (0.45-1.19)
Clinical breast examination	1.26 (1.00-1.58)†	1.42 (1.00-1.99)†
Gynecologic examination	1.39 (1.15-1.69)†	1.63 (1.23-2.19)†
Papanicolaou smear	1.29 (1.04-1.58)†	1.46 (1.07-1.98)†

**Data are given as odds ratio (95% confidence interval). Odds ratios are relative to the average BMI, calculated as weight (kg)/[height (m)]^2, of the sample (25.1). Odds ratios have been adjusted for age, race, education, income, smoking status, and health insurance status.*

†Significantly different from 1.00 (P<.05).

BMI-squared term was not significant when it was added to the models), and no significant interactions occurred between the BMI and age for any of the outcome measures. Furthermore, there was no independent association or trend between race and health care use.

COMMENT

These data support a direct relationship between the BMI and an increased number of physician visits after age, race, income, education, smoking status, and health insurance status were taken into account. Thus, as the BMI increased, the frequency of physician visits also increased. Compared with women of average relative body weight (BMI of 25), however, obese and severely obese women were significantly more likely to delay clinical breast examinations, gynecologic examinations, and Pap smear testing, suggesting that body weight may play a role in delaying these forms of preventive health care. Thus, although obese women visit physicians more frequently and, presumably, are prompted to undergo preventive services, they also appear to be the least likely to use these services. Given their increased health risks, the absolute decrease in preventive services is clearly inappropriate for this population.

Obesity may make women less likely to seek preventive health care, especially for procedures (eg, pelvic examination) that involve disrobing and manual manipulation of their bodies.[9,19] This may explain why obesity did not associate with delays in mammography, as this procedure is less personally invasive and involves less direct physical contact with a health care practitioner. Delays in preventive health care might also occur because obesity may dissuade physicians from suggesting or performing certain procedures, particularly pelvic examinations.[9,19] Physicians may be dissuaded by the technical difficulties associated with performing gynecologic examinations of obese women.[19] Apart from the difficulties physicians encounter when performing gynecologic procedures on obese women, they are also less likely to perform such procedures on reluctant patients.[9] Thus, the association between body weight and reluctance to undergo preventive health care examinations may be mediated by attitudes toward one's appearance, discomfort with the procedures themselves, or the nature of the interaction with the clinician.[9,10] Finally, because obese women are more likely than nonobese women to make physician visits, preventive services may be of a lower priority for them.

Given the correlational nature of this study, it cannot be presumed that the "causal" source of the observed association lies with the women. The delay may be initiated by the women, health care providers, or some unmeasured covariate of obesity. For example, perhaps associated disorders such as arthritis prohibit preventive health care screening. Further investigations using alternative designs will be fundamental in determining possible causal pathways.

This study has some limitations. First, weights and heights were not measured but were self-reported. Second, respondents were asked to recall the number of physician visits in the previous 12 months and the intervals since their most recent use of health care services. The accuracy of recall cannot be verified and provides another possible source of bias. Furthermore, the reasons for the physician visits are not known. Finally, because these data were obtained from an observational study, the associations observed could be due to residual confounding or confounding from unmeasured variables.

The effect of obesity on cervical, ovarian, endometrial, and breast cancer mortality among women is well documented.[3,4] If detected early, however, many of these cancers might be successfully treated.[6-8] Therefore, screening tests for this high-risk population are of particular importance. As this study illustrates, although obese women visit physicians more often than nonobese women, they appear less likely to use preventive health care services. Delays in the use of these services may account for some of the increased risk of mortality from these cancers.

An interesting finding was the discrepant results for mammography vs breast examinations because these tests are usually conducted in parallel. No clear answer exists why obesity was unrelated to delays in mammography. Practice or referral services may underlie this dissociation. Mammographies have traditionally only been done when ordered by a physician. Perhaps once patients reach this stage of physician referral, their obesity status no longer acts as a barrier to screening. Moreover, the incidence of patient self-referral for mammography may be increasing in certain states. Perhaps removing the physician from the referral process plays a role in this nonsignificant finding. Further studies will be needed to address such issues.

Given the association between the BMI and the number of physician visits, physicians may have a unique opportunity to present this information, alleviate fears about the procedures, and encourage the use of preventive care services. The already remarkably high prevalence of obesity in the United States seems likely to continue or even increase in the years to come.[5] Greater emphasis on preventive services has the potential to reduce the risk of a similar magnitude of increase in associated health problems.

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