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Does Hysterectomy Lead to Weight Gain or Does Overweight Lead to Hysterectomy?

Abstract

Objective
To investigate whether overweight women are more likely to have a hysterectomy and whether hysterectomy leads to increased weight gain.

Methods
Survey data of middle-aged women participating in the Australian Longitudinal Study on Women’s health in 1996 (n=13125), 1998 (n=10612), 2001 (n=10293) and 2004 (n=9309) included self-reported height, weight and hysterectomy. First, a cohort analysis was used to compare the body mass index (BMI) of women categorised according to hysterectomy status. Second, a nested case-control analysis was used to compare weight gain after hysterectomy to weight gain in women who did not have a hysterectomy, matched for height, pre-hysterectomy weight and educational level.

Results
At Survey 1, mean BMI of women who subsequently had a hysterectomy was greater than that of women who did not have a hysterectomy by Survey 2, with a difference of 1.1 kg.m\(^{-2}\) [95% CI 0.4 - 1.8]). We found similar results for Surveys 2 to 3, with a BMI difference of 0.8 kg.m\(^{-2}\) [95% CI 0.1 - 1.5]). For surveys 3 to 4 the difference in mean BMI between new cases and women without hysterectomy was not statistically significant (0.8 kg.m\(^{-2}\) [95% CI -0.1 - 1.6]). Weight gain over the 3 or 6 years following hysterectomy (OR 1.0 [95% CI 1.0 - 1.0]) was not associated with having a hysterectomy.

Conclusions
Hysterectomy did not lead to greater weight gain, but was more likely to be performed in women who were heavier and at risk for a higher rate of weight gain.

Introduction
Hysterectomy is the most common non-obstetric surgical procedure performed on women in the United States (1). In Australia the prevalence of hysterectomy was 22% in women aged 45-50 years, in 1996 (2). The procedure is most commonly performed for benign diagnoses such as leiomyomas and menstrual disorders. In cross-sectional studies hysterectomy is found to be associated with relatively higher body mass index (BMI) (3, 4), overweight (5) and an adverse risk profile for cardiovascular disease (6). High body weight at age 25 has been found to be associated with hysterectomy later in life (7)(6). We hypothesised that hysterectomy does not independently lead to weight gain but that hysterectomy is performed in women who are heavier and who are at risk for a higher rate of weight gain later in life. Using data from the Australian Longitudinal Study on Women’s Health (ALSWH) (8), the first objective of the present study was to identify women who had recently had a hysterectomy and to compare their BMI to that of other women in the same age group. The second objective was to conduct a nested case-control study matching cases (women
reporting a recent hysterectomy) with controls (women matched for height, weight and educational level, who have not had a hysterectomy), to assess whether subsequent weight change was associated with having a hysterectomy.

Method

Study population
The ALSWH is a broad-ranging prospective study of factors affecting health and wellbeing in three cohorts of Australian women. At the start of the study in 1996 the younger cohort was aged 18-23 years; the mid-aged cohort was 45-50 years and the older cohort 70-75 years. The study sample was selected randomly from the Medicare Australia database, which covers all citizens and permanent residents of Australia, including refugees and immigrants. Informed consent was obtained from all participants in 1996. The study was approved by both University of Queensland and University of Newcastle Ethics Committees. Further details of recruitment and response rates have been published elsewhere (8, 9). The present study focuses on the middle-aged cohort, which was surveyed in 1996 (Survey 1, n=14099), 1998 (Survey 2, n=12338), 2001 (Survey 3, n=11200) and 2004 (Survey 4, n=10905). There were 13125 women who provided information on hysterectomy, weight and height at Survey 1; 10220 women who provided these data for the first two surveys; 8764 for the first three surveys and 7246 for all four surveys.

Hysterectomy status
In 1996 women were asked whether they had ever had a hysterectomy. In subsequent surveys women were asked whether they had had a hysterectomy in the last 2 years (Survey 2) or the last 3 years (Surveys 3 and 4). Based on their answers to these questions women were categorised as ‘existing cases’ (having had a hysterectomy before Survey 1); ‘new cases’ (having had a hysterectomy between Surveys 1 and 4) or ‘never hysterectomy’ (not having had a hysterectomy by Survey 4).

Statistical Methods
Cohort analysis
For each pair of successive surveys, data were compared between women who had a hysterectomy between the surveys (new cases), those who had not (yet) had a hysterectomy (never hysterectomy) and those who had already had a hysterectomy before the first survey (existing cases). Analysis of variance, followed by multiple-comparison Bonferroni t-tests, was used to compare the means of the three hysterectomy groups. This analysis was repeated for each time period separately (Survey 1 and 2, 2 and 3, 3 and 4, respectively).

Case-control analysis
To determine whether hysterectomy leads to greater weight gain, a matched case-control study was carried out comparing new hysterectomy cases with women who did not have a hysterectomy. Women reporting a new hysterectomy between Surveys 1 and 2 (n=212), or between Surveys 2 and 3 (n=233) were identified as cases. Potential controls were identified from the survey preceding the hysterectomy (n=5260 and 5035, respectively). Existing cases of hysterectomy at Survey 1 were excluded. Women who later became cases were not also included as controls. The data allowed for more than one case and more than one control in most matched sets. Firstly, 83% of cases could be matched for education level, heights within one cm and weights within one kg. Allowing a difference in height of 2 cm or a difference in weight of 2 kg between controls and remaining cases resulted in matching in 98% of cases. Of the remaining 11 cases, 10 could be matched for exact BMI (integer); the remaining case was matched with a BMI difference of 1. Age matching was not used since the age range of the cohort is 5 years. Conditional logistic regression was used to compare cases and controls with matched set stratification. Subsequent weight change was measured as a percentage of the weight at the first of the surveys being compared. Other explanatory variables were age, rurality, parity (including age at first and last birth), energy intake,

**Results**

**Hysterectomy and demographics**

Of the 10284 middle-aged women who provided sufficient data to be included in the cohort analysis, 2961 women had undergone a hysterectomy before Survey 1 and 818 women had a hysterectomy during the eight year study period up to Survey 4.

**Hysterectomy and body mass index**

For the three groups of women: existing cases, new cases, and women not having a hysterectomy (‘never’), mean ages and heights were similar for the three groups. For Surveys 1 to 2, the mean BMI before hysterectomy of women who subsequently had a hysterectomy was greater than that of women who did not have a hysterectomy (difference 1.1 kg.m\(^{-2}\) [95% CI 0.4 to 1.8]) and was not statistically significantly different from mean BMI of women who had a hysterectomy before the beginning of the study. The results for Surveys 2 to 3 were similar with a difference in mean BMI between new cases and women who did not have a hysterectomy of 0.8 kg.m\(^{-2}\) [95% CI 0.1 to 1.5]). For surveys 3 to 4 the difference in mean BMI between new cases and women who did not have a hysterectomy was not statistically significant (0.8 kg.m\(^{-2}\) [95% CI 0.1 to 1.6]).

**Case-control study**

Results of the conditional logistic regression models (adjusted for age, rurality, parity, energy intake, smoking and physical activity) with cases having a hysterectomy between Surveys 1 and 2 or between Surveys 2 and 3 and controls matched for height, weight and level of education, did not indicate a statistically significant association between hysterectomy and subsequent weight change. Weight gain between surveys 2 and 3 was not associated with (prior) hysterectomy between surveys 1 and 2 (odds ratio 1.0, 95% CI 0.98 to 1.02); similarly, weight gain between surveys 3 and 4 was not associated with (prior) hysterectomy between surveys 2 and 3.

Women living in rural areas and younger women (within a 5 year age range) were more likely to undergo hysterectomy.

**Discussion**

In a representative sample of middle-aged Australian women, those who had a hysterectomy had a higher BMI than those who did not, prior to the operation.

Matching new cases of hysterectomy with controls with a similar level of education, height and weight prior to hysterectomy showed that having a hysterectomy was not associated with weight change over the following three to six years; after hysterectomy, women gained weight at a rate similar to controls without hysterectomy. Hysterectomy does not lead to accelerated weight gain.

Hysterectomy is clearly associated with higher BMI \((3, 5, 6)\). From cross-sectional studies it is not possible to determine whether relatively overweight women are more likely to undergo hysterectomy or if hysterectomy leads to greater weight gain. Women with hysterectomy retrospectively reporting a higher body weight at age 25 \((4, 7)\) supports the suggestion that heavier women were more likely to undergo hysterectomy. The present results confirm that women subsequently undergoing hysterectomy had higher BMI compared to women of similar age not having hysterectomy.

Annual weight gain has been reported to be higher in Australian women who have had a hysterectomy \((10)\). However women who are initially overweight or obese are more likely to experience major weight gain \((11, 12)\). As heavier women are more likely to have hysterectomy these
women are at risk for further weight gain. The results of our weight-matched case-control analysis show that women who have a hysterectomy are in fact at no greater risk of weight gain than other women of the same BMI who do not have a hysterectomy.

Changes in hormonal status after hysterectomy have been postulated to relate to weight gain. Hysterectomy alone does not alter hormonal status; only in conjunction with bilateral oophorectomy in premenopausal women does hysterectomy induce menopause. Menopause tends to be associated with an increased risk of obesity and with a shift to an abdominal fat distribution (13). Reported concomitant bilateral oophorectomy rates range from 4% (Sweden, early 1990’s) (7) to 23.7% (Australia, early 1990’s) of women with hysterectomy (14). If still premenopausal, however, women who have oophorectomy may take hormone replacement therapy following surgery. Overall, hormonal changes in this subgroup are not likely to make a major contribution to weight gain after hysterectomy.

Study design and limitations
This study relies entirely on self-reported data. Self-reported hysterectomy status of a representative sample of women in the US was found to be in good agreement with hospital records; furthermore, associations obtained with self-reported hysterectomy status and demographics were not unduly biased (15). In Australia women have been found to report hysterectomy status accurately with only few inconsistencies between women’s and physicians’ reports (14).

Conclusions
In a representative sample of middle-aged Australian women, overweight women were more likely to have a hysterectomy than women in the normal weight range.

Women who had a hysterectomy had lower levels education; they had given birth for the first time at a younger age and also completed their family at a younger age. After hysterectomy, women gained weight at the same rate as matched controls without hysterectomy but with similar height, weight and educational level; hysterectomy does not lead to greater weight gain.

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