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Obesity and Its Associated Cancer-Related Risk with Gynaecology

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Keywords
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Abstract
Obesity is becoming a life-threatening problem leading to gynaecological malignancies. Emerging data indicate that obesity plays a part in the emergence of gynaecological cancers. The study's goal is to look into the likelihood of gynaecological cancers according to obesity using a cohort study of 400 female patients from a hospital in Chennai, India. Altogether, 200 patients were obese, while the rest 200 were of normal weight. The study indicates that obesity leads to a higher risk of endometrial cancer, intermediate risk of breast and ovarian cancer and relatively negligible risk of ovarian cancer when compared to the normal weight cancer patients.

1. Introduction
The "World Health Organization (WHO)" identified obesity as a latent illness in 2015. Since then, both sexes have seen an increase in the disease's global prevalence trends, mortality and morbidity. In the USA, 37% of women between the ages of 25 and 54 who were fertile were obese by 2012. In fact, high-, middle-and low-income countries saw a rise in the incidence of obesity in women between 1975 and 2016. (Ritchi and Roser 2021).

A person is defined as obese when there is an unhealthily high or uneven distribution of body fat. The phrases "overweight" and "obesity"

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refer to a weight increase that is excessive or abnormal and constitutes a health risk. BMI thresholds 25 and 30 are used to characterise overweight and obesity, respectively. Obesity is an issue that is becoming worse and has substantial effects on many illnesses, including cancer in humans (Garvey et al., 2020). Cancer is a group of diseases that develop when the body's cells begin to multiply and grow out of control. These cells can then invade healthy areas and wreak havoc there. The cells become cancerous or malignant as a result of DNA damage. More than one-third (38%) of any novel cancer cases in women worldwide are caused by breast cancer and the three primary gynaecological malignancies, "endometrial cancer," "ovarian cancer," and "cervical cancer." Western populations have been the focus of the majority of studies looking at the connection between obesity and the danger of gynaecological cancers (Bray et al., 2018). Females are affected by obesity leading to gynaecological malignancies in the pre-menopausal or menopausal age. Endometrial, breast, and ovarian cancer incidence in India has been steadily increasing each year, with the exception of cervical cancer. A cohort study of 400 female cancer patients from a cancer hospital in Chennai, India, was used to examine the impact of obesity on four gynaecological cancers, including cervical, endometrial, breast, and ovarian cancer. BMI, or "body mass index," is a widely used indicator of obesity. However, the BMI is a fundamental assessment of body size that does not take into consideration variations in the amount of body fat. While BMI has a greater correlation with decreased glucose tolerance than waist circumference (WC), the latter assess abdominal obesity. Hence, both body mass index and waist circumference should be taken into account when analysing obesity in order to examine the effect of obesity on the likelihood of developing cancer. Obese people are typically those with BMI > 30 kg/m2 and WC > 80 (Wahrenberg et al. 2005).

2. Literature Review

Increases in body mass index are independently and favourably associated with an increased risk of developing endometrial adenocarcinoma, particularly type 1 tumours, which develop within a "hyperplastic epithelium," and "type 2 tumours," which develop within an atrophic background, with risk factors that are, respectively, three times and twice higher in obese conditions. By activating the PI3K pathway without oestrogen, metabolic syndrome increases the danger in both post- and pre-menopausal women. The incidence of "vulvar" and "vaginal cancer" is also increased. However, in cases of cervical cancer, a greater BMI has been linked to a higher prevalence of cervical adenocarcinoma. In addition, obese women with "vaginal dysbiosis"—characterised by an increase in microbes that results in malignant alteration of the "cervical epithelium"—are more likely to have a chronic cervical infection brought on by high-risk "HPV strains" (Brookheart et al. 2019). Recent meta-analysis studies by Nagel et al. in the year 2011 revealed that the overall relative risk of a 5 kg weight gain and the development of gynaecological cancers in postmenopausal women was 1.11; in postmenopausal women who did not utilise "Hormone Replacement Therapy (HRT)," the incidence rate for endometrial cancer was "1.39 (95% CI, 1.29-1.49);" users of "HRT" had a relative risk of "endometrial cancer" of "1.09 (95% CI, 1.02-1.16);" and only in cases of endometrial cancer and ovarian cancer is obesity linked to earlier diagnostic ages and delayed diagnosis times. Patients with advanced ovarian cancer have a 50% 5-year survival rate (Nagel et al. 2011). Obesity is linked to a worse survival rate for breast cancer specifically. Regardless of menopausal state, a recent meta-analysis found that obese women

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with breast cancer face an up to 11% reduction in overall survival (Lee et al.2019). Pre-menopausal ovarian cancer and cervical cancer incidence may both be somewhat elevated by obesity, either as a consequence of its effect on glandular malignancies or a decline in screening compliance. Obese women with cancer have a worse survival rate; this might be due to the disease itself, coexisting conditions, or a patient's reaction to therapy. Obese women**ii)** are more likely to have surgery and radiation problems, and there is currently no agreement on the proper chemotherapy dosage for this patient population. Obesity is a critical health issue that has a big impact on how often and how to treat gynaecological cancer (Modesitt and Nagel. 2002).

3. Methods And Materials

i) Collection of Data Study Population

A total of 200 female obese cancer patients (BMI ≥ 25aHRkg/m2 and WC ≥ 80 cm) with 50 individuals in each category (cervical, breast, endometrium and ovarian) were considered for the study, whereas 200 female cancer patients with normal BMI and WC had 50 individuals in each category were considered as control. Using Cox proportional hazard regression models, two-variate analyses (normal and obese are the variables) were performed to analyse the effect of BMI and WC levels for normal and obese on the occurrence of malignancies unique to women. For these results, "Adjusted Hazard Ratios (AHRs)" & "95% Confidence Intervals (CIs)" were evaluated. The collection of data was carried out from a population of cancer candidates from a cancer hospital in Chennai, India.

Classification of the Population

The population was chosen such that out of 100 individuals for each category of cancer, 50 patients were normal, while the rest 50 were obese. Obesity included both general obesity, determined from the BMI and obesity in the abdominal region, determined from the circumference of the waist (WC). The average BMI was (18.5-22.9% kg/m2), and general obesity was considered for individuals with BMI ≥ (25 kg/m2). In addition, we split the women into two groups according to their waist circumference (WC), categorising those who measured 75 cm as normal and those who measured 80 cm as obese. The classification of general and abdominal obesity was considered according to the cut-offs declared by WHO guidelines for the Asian population (Lancet 2004). The classification of the sample population of gynaecological patients is shown in Figure 1.

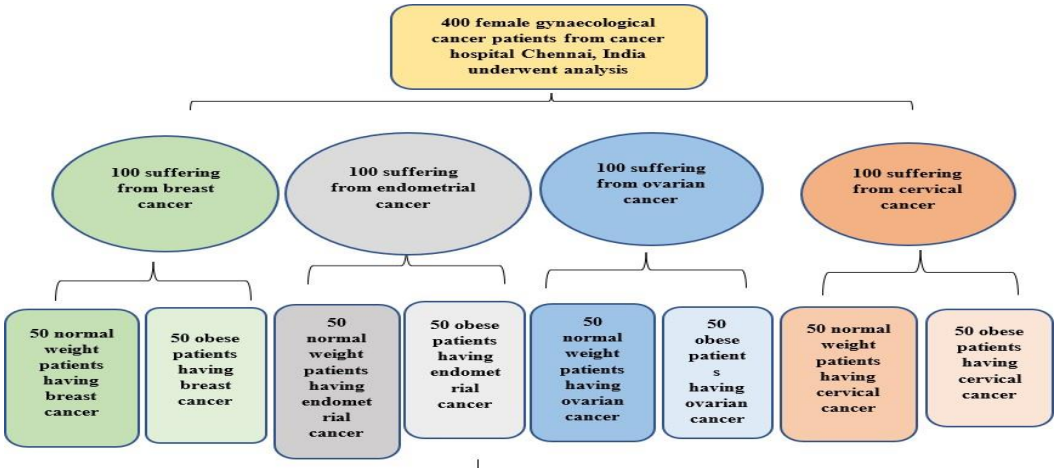

Figure 1. Classification of the Sample Population of Gynaecological Cancer Patients

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iii) Statistical Analysis

The use of two-variate Analysis was done using "Cox Proportional Hazard Regression Models" & produced "Adjusted Hazard Ratios (AHRs)" and "95% CI" to examine the relationship between "BMI" and "WC" values and the onset of female-specific cancers (CIs). The normal and the obese were the two variables considered here.

4. Results

i) BMI and Risks of Gynaecological Cancer

Overall, a greater body mass index was related to a greater risk of breast cancer. In every instance, the probability value p for trend 0.00001 was observed. Two-variate Analysis showed that when the BMI categorisation went from healthy persons to obese, the threat of cancer of breast steadily increased. In women with a normal BMI, which was used as the reference point (22.9 kg/m2), a lower risk was seen. The "AHR" of normal was "(aHR, 0.90; 95% CI, 0.80-0.96)," but the "aHR" of obesity was 1.17 "(95% CI, 1.10-1.24)."

Likewise, endometrial cancer risk was considerably higher for women with obesity (aHR, 2.94; 95% CI, 2.53-3.45) than it was for women with normal BMI "(aHR, 0.70; 95% CI, 0.52-0.93)."

The chance of developing ovarian cancer was also reduced in women with normal BMI than in obese women with aHR (0.88; 95% CI, (0.83–0.94), and aHR1.14 95% CIs, 1.14 (1.04-1.25) and respectively.

Overall, compared to "breast," "endometrial," and "ovarian cancers," the connection between BMI and the occurrences of cervical cancer revealed a distinct pattern. The cervical cancer risk was observed to be considerably more or less similar in both healthy and obese women (aHR, 0.95; 95% CI, 0.91-0.98) than it was for women with average body mass index "(aHR, 0.97; 95% CI, 0.91-0.99)."

The relationship between BMI and female gynaecological malignancies like the breast, endometrium, ovarian and cervical cancers confidence intervals were adjusted. The combined data were plotted in the form of a graph represented in Figure 2.

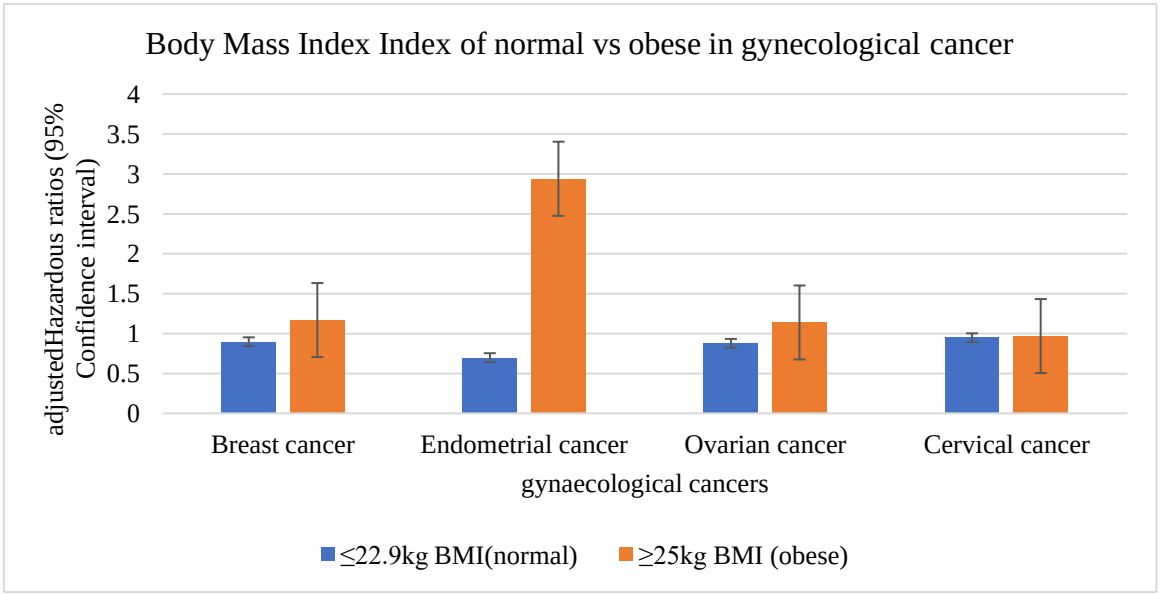

Figure 2 aHR at 95%CI of Body Mass Index of Normal Versus Obese in Gynaecological Cancers.

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iii) WC and Risks of Gynaecological Cancers

Breast cancer risk was correlated with "WC 75 cm (aHR, 0.95; 95% CI, 0.90-0.97)," "WC 80 cm," however, was connected to the highest risk "(aHR, 1.19; 95% CI, 1.10-1.29)," according to Two-variate analyses using a WC of 79.9 cm as the reference.

Women who were obese had a substantially higher Endometrial cancer risk "(aHR, 2.85; 95% confidence interval, 2.54-3.23)" compared to those who were under 75 cm tall "(aHR, 0.69; 95% CI, 0.51-0.92)."

Similarly, obesity was attributed to an aHR of 1.43 (95% CI, 1.26-1.57) in ovarian cancers and an aHR of 0.89 (95% CI, 0.81-0.92) for patients with typical cancer.

In contrast to breast, endometrial, and ovarian cancers, there was a clear trend for "cervical cancer" overall in the association between body mass index and the prevalence of the disease. The outcomes of cervical cancer in individuals with WC < 75 cm "(aHR, 1.23; 95% CI, 1.09-1.40)" were comparable to those of obese patients' cancer "(aHR, 1.26; 95% CI, 1.01-1.56)."

WC-related HR CI is 95% to the obesity-related gynaecological cancers adjusted and represented in Figure 3.

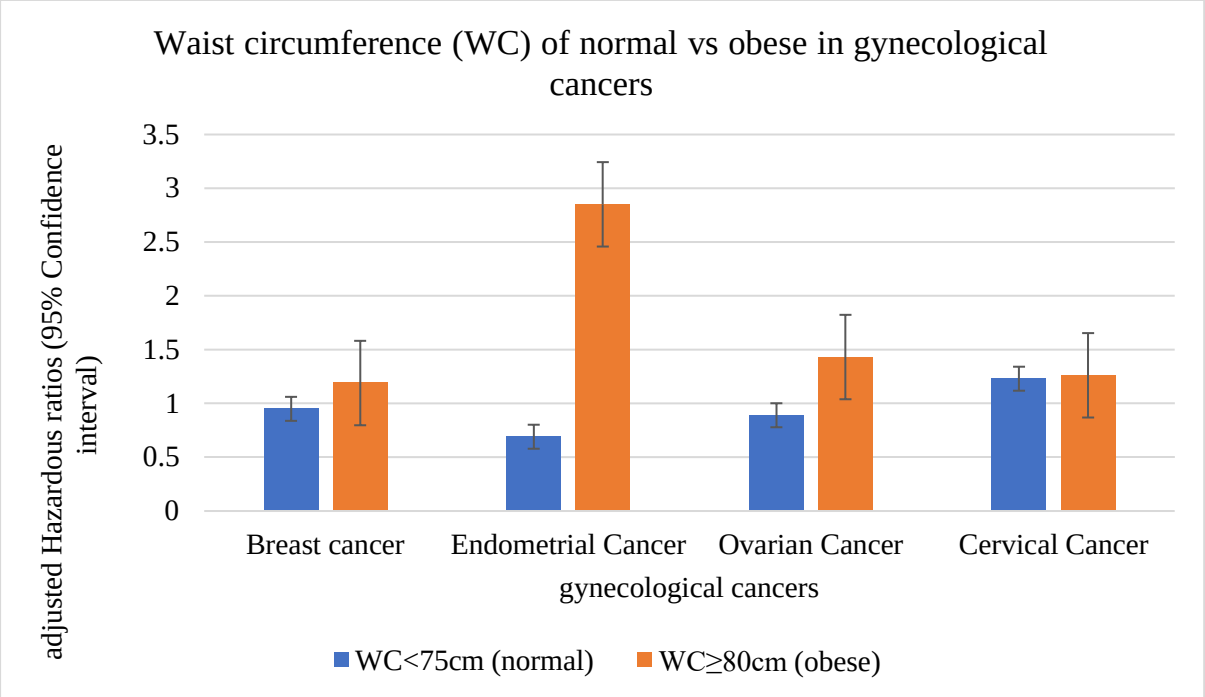

Figure 3 aHR at 95%CI of Waist Circumference of Ordinary Versus Obese in Gynaecological Cancers.

4. Discussion

The incidence of ovarian cancer was considerably increased by both overall and abdominal obesity. Ovarian cancer may develop as a result of persistent inflammation and high oestrogen levels, according to studies (Leitzmann et al. 2009).

Obesity's impact on the emergence of cancers particular to women ("endometrial," "breast," "cervical," and "ovarian cancers") was thoroughly studied in this population-based cohort research with 400 Indian women. BMI and WC, which stand for general and abdominal obesity, respectively, were used to measure obesity specifically. Depending on the exact form of cancer, obesity has a variety of consequences on cancer incidence. "Cancer of Breast," "ovarian cancer," "endometrial

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cancer," and "cervical cancer" were the most frequent female-specific cancers discovered during the observation, in that order of incidence rates. In this particular research group, age-standardised occurrences were not estimated.

The incidence of endometrial cancer significantly increased in the current study from (aHR, 2.94; 95% CI, 2.54-3.43) to (aHR 0.70; 95% CI, 0.52-0.93) as the body mass index classification changed from non-obese to obese. In fact, in healthy women with lower BMI, endometrial cancer was shown to be prevented. As the body mass index categorisation went from non-obese to obese, an elevated risk of cancer of the breast was noticed.

In contrast to other female-specific malignancies, cervical cancer seems to be less impacted by obesity or high oestrogen in Indian women. This was observed both in the BMI as well as the WC study of cervical cancer patients.

The study showed that, depending on the particular kind of malignancy, there was variation in the malignancy level in the affected women who were obese.

5. Conclusion

According to the particular kind of malignancy in Indian women, obesity has varying effects on the emergence of cancers that only affect women. A population-based cohort study with 200 cancer patients, 200 of whom were average weight and 200 of whom were obese, demonstrated this. A comparative analysis of the adjusted hazardous risk at 95% CI was documented between the normal weight and the obese cancer patients by two-variate analyses to get an insight into whether obesity risk is associated with gynaecological cancers. It was observed that except for cervical cancer, which was more or less similar in both the normal and obese patients, ovarian, endometrial and breast cancers pose a greater risk with obesity. Endometrial cancer showed the highest hazardous risk in obese patients when compared to ovarian or breast cancer. It can be concluded that there is a high risk of female gynaecological cancers, which increases the risk in obese patients.

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