BMI in early adulthood, BMI change and all-cause mortality. Further findings from the PROCAS study.

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Background

Overweight and obesity increase risk of 13 different cancers in women, including breast cancer1. However, being overweight or obese in early adulthood is protective against later breast cancer2.

Aim

This study aimed to show whether overweight and obesity in early adulthood was associated with increased risk of overall and premature mortality.

The PROCAS Study

We used data from the Predicting Risk of Cancer at Screening (PROCAS) study. Between October 2009 and June 2015, 131,373 women aged 46–73 years across Greater Manchester who were part of the NHS Breast Screening Programme were mailed information, consent form, and a questionnaire. The two-page questionnaire included questions about hormonal and lifestyle risk factors. In total, 57,902 women consented to enter the PROCAS study which is still in follow-up.

Methods

Body mass index (BMI) at PROCAS entry and age 20 were calculated from self-reported height, and self-reported current and recalled weight at age 20. Women were categorised as: underweight (<18 kg/m²), healthy weight (18–24.9 kg/m²), overweight (25.0–29.9 kg/m²), and obese (≥30.0 kg/m²).

Inclusion for the analysis required valid data on BMI at age 20 and study entry, and no previous diagnosis of BC (see consort). Death was confirmed through the National Breast Screening System (last download 15/06/2020). Death under the age of 75 years was classed as premature as per the definition used by Public Health England3. The association between BMI at age 20, change in BMI category and mortality and premature mortality were assessed by Cox regressions adjusted by age and deprivation score, plus BMI at PROCAS entry for BMI at 20 analyses.

Results – Study Population

After median (IQR) 8.8 (7.9-9.7) years follow up there were 1,841 deaths of which 1,546 (84%) were premature deaths.

<table>
<thead>
<tr>
<th>Ageb</th>
<th>PROCAS entry</th>
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<tbody>
<tr>
<td>Ageb</td>
<td>-</td>
</tr>
<tr>
<td>Height</td>
<td>-</td>
</tr>
<tr>
<td>Weightb</td>
<td>57.2 (50.8-62.6)</td>
</tr>
<tr>
<td>BMIm (kg/m²)</td>
<td>21.6 (20.0-62.6)</td>
</tr>
</tbody>
</table>

BMI category:

- Underweight (<18 kg/m²)
- Healthy weight (18–24.9 kg/m²)
- Overweight (25.0–29.9 kg/m²)
- Obese (≥30.0 kg/m²)

<table>
<thead>
<tr>
<th>Underweight (kg/m²)</th>
<th>Healthy (kg/m²)</th>
<th>Overweight (kg/m²)</th>
<th>Obese (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.609 (7.4)</td>
<td>38.738 (79.7)</td>
<td>5.034 (10.4)</td>
<td>1.223 (2.5)</td>
</tr>
<tr>
<td>(IQR)</td>
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<tr>
<td>376 (0.8)</td>
<td>18,523 (38.1)</td>
<td>17,104 (35.2)</td>
<td>12,601 (25.9)</td>
</tr>
</tbody>
</table>

a median (IQR), b mean (SD), c n (%)

The population was 95.6% white, the proportions coming from the different quintiles of English Index of Multiple Deprivation (from most to least deprived) were 23.9, 19.1, 18.9, 19.6 and 18.2%. 67.6% were postmenopausal, 37.2% had ever used HRT, 12.2% exceeded the recommended upper limit of 14 units of alcohol per week, and 38.0% did not meet minimum physical activity recommendations of 150 minutes per week.

Results – Weight Change

Weight change from age 20 to PROCAS entry was median (IQR) 12.7 (6.4–20.0) kg and 21.4 (10.5-35.9) %. 76.6% of women gained 10% or more of their starting weight, and 34.1% had gained 30% or more.

Results – BMI at 20 and Mortality

Overweight and obesity at age 20 increased risk of death compared to women with a healthy BMI (HR 1.25 [95% CI 1.08-1.45] and 2.06 [1.63-2.60] respectively). Results were similar for premature mortality with overweight and obesity at age 20 giving an HR for increased risk of premature death of 1.23 (95% CI 1.05-1.44) and 2.09 (95% CI 1.63-2.67) respectively.

Results – Weight Change and Mortality

Compared to women underweight/healthy weight at both time points, women who moved from underweight/healthy weight at age 20 to obesity at joining PROCAS had an increased mortality risk (HR 1.22 [95% CI 1.07-1.39]).

Women maintaining at overweight or obese had increased mortality risks of 1.39 (95% CI 1.08-1.78) and 2.01 (95% CI 1.54-2.62) respectively. Results were similar for premature mortality however maintaining at overweight did not significantly increase risk.

Summary

- Significant weight gain occurs in women during adulthood.
- Overweight and obesity at age 20, and development of obesity during adulthood, all increase risk of both overall and premature mortality.
- Effort should be made to support women to maintain a healthy weight throughout adulthood.

References


This research was supported by the NIHR Manchester Biomedical Research Centre.