

# Obesity puts people at higher risk of diabetes and hypertension than dyslipidemia, especially women

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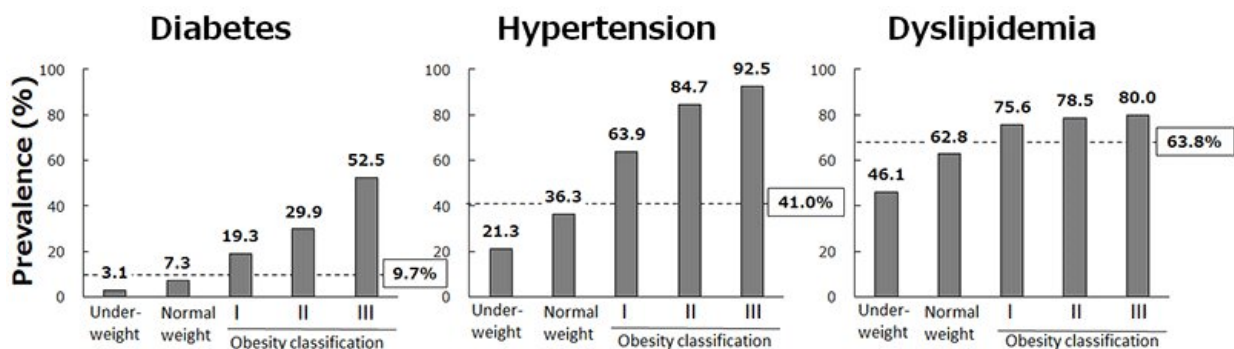


Figure 1. Prevalence of diabetes, hypertension and dyslipidemia according to BMI classification. The prevalence of diabetes and hypertension increases alongside obesity. Dyslipidemia prevalence, however, was high among underweight and normal weight groups and the degree of escalation was lower than that for diabetes and hypertension even at increased levels of obesity. The percentage in the box next to each graph is the prevalence rate for all participants. Credit: *Scientific Reports* (2023). DOI: 10.1038/s41598-023-29276-7

Obesity continues to become more common worldwide, despite the health risks and increased mortality posed by the diseases and conditions that accompany it (comorbidities). Although obesity's comorbidities (such as diabetes) are well known, there is a lack of detailed research

into the relationship between the degree of obesity and the occurrence of these diseases.

In this study, Project Professor Tamori Yoshikazu's research group has revealed how the level of obesity affects the prevalence of the three most common comorbidities (diabetes, [hypertension](#) and [dyslipidemia](#)) in men and women differently.

Analysis of data from approximately 11,000 65-year-old Japanese residents of Kobe City showed that increased obesity elevated the risk of all three diseases in men. However, in women increased obesity significantly elevated the risks of diabetes and hypertension, yet only slightly raised the risk of dyslipidemia.

The results indicated that weight loss is effective in reducing diabetes, hypertension and dyslipidemia in men and diabetes and hypertension in women. However, merely losing weight is not enough to reduce dyslipidemia in women.

This study highlights the importance of understanding exactly how obesity affects the progression of accompanying diseases in different ethnic groups and genders so that more appropriate guidance and treatment can be given to patients.

These results were first published in *Scientific Reports* on February 9, 2023.

## **Main findings:**

- Analysis of 11,000 65 year old residents of Kobe City revealed that 9.7% had diabetes, 41.0% had hypertension and 63.8% had dyslipidemia .
- The incidence of diabetes and hypertension significantly

increased the more obese the patient was. On the other hand, the incidence of dyslipidemia was high even among those of a normal weight and increased gradually alongside the degree of obesity.

- In men, increased obesity led to a similar elevated risk of having each of the three diseases. Even though increased obesity significantly elevated the risk of diabetes and hypertension in women, the risk of having dyslipidemia increased gradually, peaking in slightly obese individuals.

Obesity can cause complications in numerous diseases, shortens healthy life expectancy and reduces quality of life. Diabetes, hypertension and dyslipidemia are common obesity-related conditions that cause the arteries to harden (arteriosclerosis), which is linked to the development of life-threatening conditions such as strokes and heart disease.

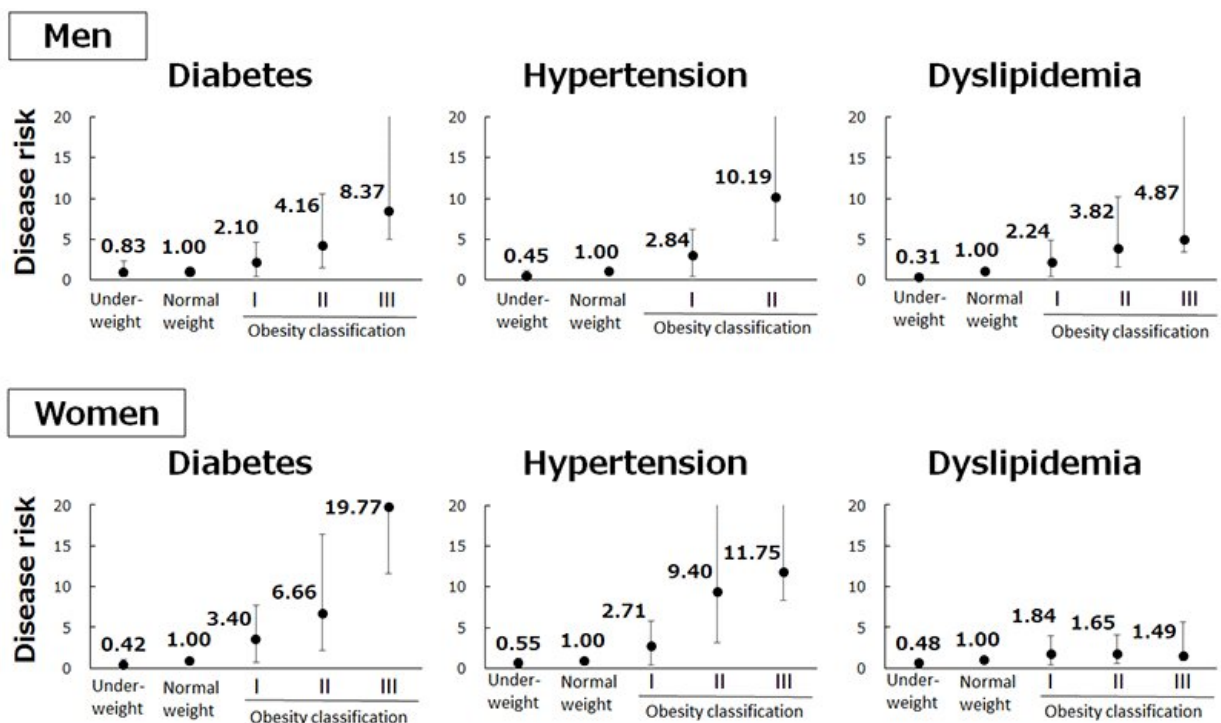


Figure 2. Risk of diabetes, hypertension and dyslipidemia by gender. In women,

the risk of diabetes and hypertension rises significantly as BMI increases. However, the risk of dyslipidemia was lower and peaked at the grade 1 classification of obesity (slightly obese). The graph shows the odds ratio with people of normal weight given a reference value of 1.00 for disease risk. The straight lines with the odds ratios have 95% confidence intervals. Credit: *Scientific Reports* (2023). DOI: 10.1038/s41598-023-29276-7

In particular, people of East Asian ethnicity (including Japanese people) are prone to [metabolic disorders](#) even if they are only slightly obese. However, detailed research has yet to be conducted into the exact relationship between the degree of obesity and the extent to which comorbidities occur.

Sixty-five is often considered the start of old age in developed countries like Japan. Although it is important to avoid becoming overweight in old age, it is also vital to avoid becoming underweight or too thin as this can lead to sarcopenia and frailty.

In this study, the researchers discovered the prevalence of diabetes, hypertension and dyslipidemia in relation to BMI in around 11,000 65-year-old residents of Kobe City. They also investigated the risks of having these diseases at different levels of obesity through comparisons with data from participants in a normal weight range.

The prevalence of three obesity-related comorbidities (diabetes, hypertension and dyslipidemia) at different BMI levels was analyzed using data from 65-year-old Kobe City residents enrolled in Japan's National Health Insurance. In addition, the researchers also evaluated the risk of disease occurring at higher BMI levels when compared to those of a normal weight (disease risk).

Disease prevalence was as follows: diabetes 9.7%, hypertension 41.0% and dyslipidemia 63.8% (Figure 1). The prevalence of all these diseases rose alongside the degree of obesity but diabetes and hypertension in particular increased significantly as obesity progressed. On the other hand, a high prevalence of dyslipidemia (60%) was found even in the [normal weight](#) group, and the prevalence of dyslipidemia increased gradually alongside obesity progression. These trends were more pronounced in women.

With regard to disease risk, higher BMI correlated with increased risk for all three diseases in men. In contrast, for women the risk of both diabetes and hypertension significantly increased with BMI but dyslipidemia risk only increased slightly, peaking in the low level obesity group (Figure 2).

## **Significance of the results and further research**

Very few previous research studies have examined the relationship between the occurrence of obesity-related comorbidities and the level of obesity, with only vague confirmations of the risk for obesity comorbidities increasing as a person becomes more overweight. Therefore, it is difficult to provide clear guidance on how much a certain degree of weight loss would decrease disease risk when treating lifestyle diseases and obesity.

However, this study has shown that weight loss in men is effective in reducing the risks of diabetes, hypertension and dyslipidemia. In women, the study has shown that while weight loss is effective in reducing diabetes and hypertension prevalence, merely losing weight is insufficient for reducing dyslipidemia, and that lifestyle improvement guidance and treatment (e.g., diet and exercise) is also required.

Beyond the three disorders examined in this study, there are many other

serious comorbidities related to obesity, including cerebral infarctions (strokes), coronary artery [disease](#), non-alcoholic steatohepatitis, sleep apnea syndrome and osteoarthritis. Understanding exactly how prevalent these obesity-related health disorders are at different levels of obesity is important to enable physicians to give better guidance and treatment according to the patient's age and gender. Such estimations of weight loss effectiveness would also provide important reference for health care system economics.

Professor Tamori Yoshikazu says, "The health impairments that accompany obesity can be ameliorated through [weight loss](#). However, up until now there has been no detailed examination of different degrees of obesity, therefore the generic advice that 'It is important to lose weight' has been given to patients regardless of comorbidity.

"While this research revealed that obesity has a strong impact on diabetes and hypertension, the effect on dyslipidemia wasn't as apparent in women. However, LDL-cholesterol and TG levels in the blood tend to increase in postmenopausal women. Therefore, it is necessary to take into account that this research looked at 65-year-old women.

"Dyslipidemia is caused by various other factors apart from obesity (including genetic factors, age, hormones, diet and exercise). Therefore, it is important for patients with dyslipidemia, especially women, not only to lose [weight](#) but to maintain a healthy lifestyle by avoiding too much fat and sugar, avoiding alcohol and taking care to get enough exercise.

"It is known that people of East Asian ethnicity (including Japanese people) accumulate visceral fat easily, and even slight obesity can lead to the development of [diabetes](#), hypertension and dyslipidemia. Obesity is also associated with a wide range of other diseases including cancer, [bronchial asthma](#) and psychological disorders such as depression. Considering that so many diseases are connected to obesity, it is vital for

future research studies to gather data on Japanese people in order to understand the specific risks for each health impairment at each level of [obesity](#) for people of this ethnicity and extend their [healthy life expectancy](#)."

**More information:** Tomoko Yamada et al, Obesity and risk for its comorbidities diabetes, hypertension, and dyslipidemia in Japanese individuals aged 65 years, *Scientific Reports* (2023). [DOI: 10.1038/s41598-023-29276-7](#)

Provided by Kobe University

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