

## *Research Progress on “obesity paradox”*

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**Abstract:** “Obes paradox” refers to the conclusion that obesity is contrary to the original obesity. Obesity may not reduce the survival time of patients, and the risk of death in some chronic diseases is inversely proportional to obesity. Obesity can have some adverse effects on an individual's life and society, but obesity is not completely harmful. Compared with people of normal weight, obese people are more likely to actively receive treatment and try various healthy behaviors. The disadvantages of obesity are far greater than the benefits. The most reasonable way is to maintain the health of various body types. Its basic concept is that healthy behaviors, including nutrition and physical activity, are more important than weight. At present, there are some studies on “obesity paradox” and research against the theory. Experts and scholars have their own opinions, but no study can accurately define whether the “obesity paradox” is established.

### 1. Introduction

Obesity can be roughly divided into simple obesity and secondary obesity. Simple obesity is mainly caused by factors such as excessive nutrition and insufficient exercise, accounting for 95% of the total obesity. Secondary obesity may be caused by a disease, accounting for only about 5%. There are many reasons for the obesity epidemic, such as unhealthy diet and lifestyle habits; reduction of physical activity; bad habits of smoking, alcoholism, etc.; genetic factors are also one of the important reasons. With the rapid development of the social economy and the changes in human lifestyles, people's health awareness has not increased. In today's information age, people are too dependent on the products of various informationization, and the time of exercise is gradually decreasing, which leads to the increasing probability of obesity becoming more and more young. Obesity can induce various chronic diseases, which brings a lot of inconvenience to people's lives. For obesity, everyone can't take it lightly. Maintaining normal weight is one of the important conditions for maintaining good health.

### 2. The proposition of “obesity paradox”

In 2013, a study published in The Journal of the American Medical Association stated that During the same period, people with a BMI between 25.0 and 29.9 kg/m<sup>2</sup> were considered overweight according to international standards. The mortality rate of this overweight group was about 6% lower than that of normal weight.

The research team is led by epidemiologist Catherine Flego of the National Center for Health

Statistics. Frego found that people in the overweight and mildly obese categories had lower mortality rates than those in normal weight groups. The odds of suffering from various chronic diseases in these two groups are indeed slightly increased. But there are many factors that cause illness in individuals, not just because of obesity. Many researchers have also adopted the results of Frego's research: overweight does increase the risk of various chronic diseases. But for some specific people, especially the elderly or people who are already sick, their weight is slightly more than normal weight is not completely harmful, but it will have some beneficial aspects. Because of the effects of body size on the disease, they have more dietary intake and control, as well as more exercise than normal body types, and this relatively healthier lifestyle also reduces mortality.

The phenomenon of “obesity paradox” requires more research to prove and interpret. A growing body of research data shows that people with severe illnesses, among those who are overweight, have the lowest mortality rates. Overweight patients have more energy storage to fight these diseases, and their mortality is lower than that of normal body types. Then, for normal non-disease people, there are still many harms caused by obesity. Obesity also brings a great sense of inferiority to a person. Obesity also increases the chance of illness and is also unfavorable to society. influences.

### 3. Research against the “obesity paradox”

On July 13, 2016, the full text of a study co-hosted by Harvard University and the University of Cambridge in the United Kingdom published in The Lancet, which showed that overweight or obesity can cause higher levels than normal weight. The risk of premature death, which is particularly acute in the male population. The study selected data from more than 10.6 million participants from 239 large studies in 32 countries between 1970 and 2015. The average follow-up time was around 14 years. Participants were aged between 20 and 90 years old. BMI's body mass index is between 15 and 60 kg/m<sup>2</sup>. To ensure the accuracy and authority of the study, the researchers excluded people with smoking habits, those with chronic diseases such as cardiovascular disease at the beginning of the study, and during follow-up. Data from the first five years of death. As of the end of the follow-up, approximately 1.6 million people died and the final effective data was more than 4 million.

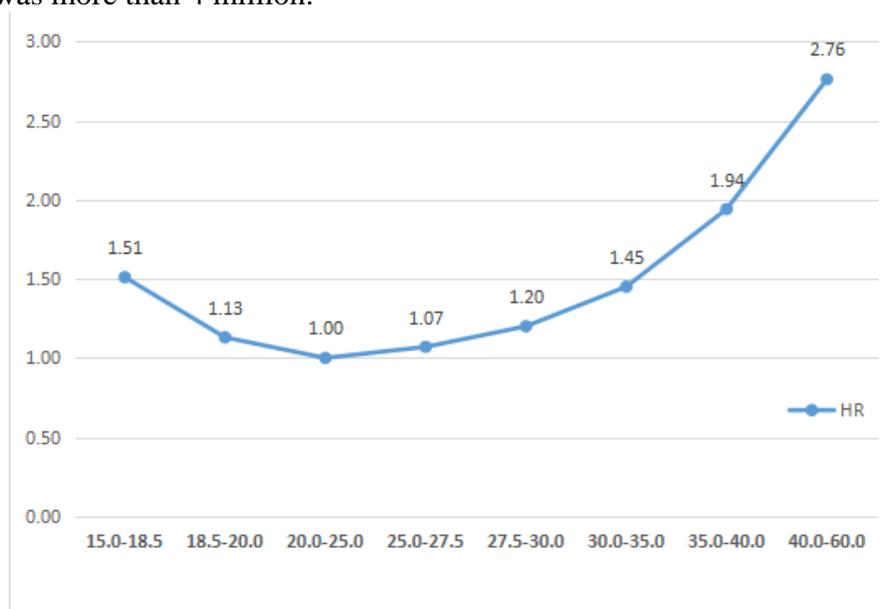


Figure 1 Relationship between BMI body mass index and HR death risk

The study defined the risk of HR death at 0.00-3.00 and the BMI body mass index range of 15.0-60.0 kg/m<sup>2</sup>, as shown in Figure 1. A BMI with a body mass index of 20.0-25.0 kg/m<sup>2</sup> was identified as a healthy weight range with the lowest risk of death during follow-up. Based on HR 1.00 in this range, the risk of death increased by 10% for every 0.1 increase. Participants with a BMI of 30.0-35.0 kg/m<sup>2</sup>, 35.0-40.0 kg/m<sup>2</sup>, and 40.0-60.0 kg/m<sup>2</sup> were defined as primary obesity, secondary obesity, and tertiary obesity, with a mortality age of 35-69. Pregnancy is defined as premature death. There is a “U” curve relationship between BMI body mass index and mortality. When the BMI body mass index is greater than 30, the risk of death from various diseases of the human body will be greatly increased. When the body mass index of BMI is less than 18.5, the human body suffers from various diseases. The risk of death from a disease is also greatly increased [4]. Participants with a BMI between 18.5 and 20.0 kg/m<sup>2</sup> had a high risk of mortality of 13%; participants with a BMI between 15.0-18.5 kg/m<sup>2</sup> had a high risk of 51%; BMI at 25.0- Participants between 27.5 kg/m<sup>2</sup> had a high risk of mortality of 7%; participants with a BMI between 27.5 and 30.0 kg/m<sup>2</sup> had a high risk of mortality of 20%. Level 1 obese participants with a BMI of 30.0-35.0 kg/m<sup>2</sup> have a high risk of 45% mortality; secondary obesity participants with a BMI of 35.0-40.0 kg/m<sup>2</sup> have a high risk of mortality of up to 94%. Third-grade obese participants with a BMI of 40.0-60.0 kg/m<sup>2</sup> can increase the risk of high-risk nearly three-fold. Overweight or obesity is more significant in increasing the risk of premature death. When BMI exceeds 25 kg/m<sup>2</sup>, the increase in mortality is linearly related to BMI. When the BMI body mass index exceeds 25 kg/m<sup>2</sup>, the risk of premature death increases by about 30% for every 5 units of index.

#### 4. The “obesity paradox” was overthrown?

In 2018, a new study by Northwestern University reported that obese people have a shorter life expectancy and a higher chance of suffering from various chronic diseases than normal people. The new study shows that life expectancy is similar for normal and overweight people, but those who are overweight have a higher risk of cardiovascular disease during their lifetime and longer with cardiovascular disease.

Dr. Sadiya Khan, an assistant professor of medicine at Northwestern University Feinberg School of medicine and a Northwestern medical cardiologist, said: “The obesity paradox has caused a lot of confusion and potential damage, because we know that obesity is related to cardiovascular and non-cardiovascular diseases.” Then many patients will ask: “If the study shows that I want to live longer, why am I? Want to lose weight?” Of course, losing weight not only reduces the risk of heart disease, but also reduces the risk of other diseases such as cancer. The data from the study show that under normal weight, you will be healthier and the survival time will be longer, so we can't just see the little benefits of obesity, forget that obesity brings us good health. Serious harm.

The study investigated 190,000 individual-level data from 10 large prospective groups and followed up for many years. All participants did not have cardiovascular disease at the beginning, and objectively measured height and weight to assess BMI body mass index. In a follow-up study, the researchers evaluated the overall and type of cardiovascular disease, including coronary heart disease, stroke, heart failure, and cardiovascular death, as well as non-cardiovascular deaths.

Table 1 prevalence and life span of middle-aged men with different obesity

	Morbidly obese	Obese person	Overweight people	Normal body weight
Possibility of disease	/	X +67%	X +21%	X%
Lifetime	X -6year	X -1.9year	Xyear	Xyear

Table 2 prevalence and life expectancy of middle-aged women

	Morbidly obese	Obese person	Overweight people	Normal body weight
Possibility of disease	/	X +85%	X +32%	X%
Lifetime	X -6year	X -3.4year	X -1.4year	Xyear

Table 1 and Table 2 show that middle-aged men aged 40-59 are 21% more likely to have stroke, heart disease, heart failure or cardiovascular disease than men of normal weight. Overweight women are 32% more likely than women of normal weight. Obese middle-aged men between the ages of 40 and 59 are 67% more likely to have stroke, heart disease, heart failure or cardiovascular disease than men of normal weight. Obese women are about 85% more likely to have a disease than women of normal weight. The life expectancy of middle-aged men of normal weight is 1.9 years longer than that of obese men and 6 years longer than those with morbid obesity. Men of normal weight are similar to those of overweight men. The life expectancy of middle-aged women of normal weight is 1.4 years longer than that of overweight women, 3.4 years longer than obese women and 6 years longer than morbidly obese women.

Studies at Northwestern University show that obesity increases people's chances of illness and has a corresponding impact on longevity. In recent years, many scholars and researchers have done a lot of research in order to refute the “obesity paradox”, but it is not satisfactory. The presentation of this research report is an important basis for overthrowing the “obesity paradox”. We need to make a rational judgment on the “obesity paradox” and correctly distinguish the relationship between obesity and health.

## 5. Summary

For the “obesity paradox”, no organization can effectively define it, and more data and research are needed to judge whether it is established. Many countries have long been concerned about the importance of health issues. They have a lot of research on the “obesity paradox”, But at present, China’s research on “obesity paradox” is relatively rare, the research system is still not perfect, and it needs to be strengthened. Aspects of data collation and theoretical research. However, the foreign research on “obesity paradox” is not very accurate. There is a certain error in defining the BMI body mass index of obesity. BMI body mass index is only one of many measures to assess future risks. The single BMI body mass index is an ideal and not comprehensive enough for the health research to launch the “obesity paradox”. More research and theory are needed to analyze the “obesity paradox”.

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