How is heart disease different for women and men?

Abstract

Did you know that your sex can change the way your body responds to disease? We wanted to know how the female body responds to serious heart problems. To do this, we looked through previous studies on heart disease. We tracked how many people died in the 30 days after we knew their heart wasn’t working well. Did female patients die more than male patients? Unfortunately, we found that they did. We think this could be because a higher percentage of female patients had the most serious condition, heart failure, after a heart attack. Heart failure means your heart isn’t pumping enough blood. However, we don’t understand exactly why there’s a difference between the sexes. If we can work this out, then doctors may be able to provide better treatment for their patients.

Introduction

Do you have family members with heart problems? Are they men or women? We know that heart problems can be different for men and women, but we don’t know why exactly.

One possibility is that it is due to other hidden reasons. For example, older people have more heart problems. Women live longer than men. So a key difference could be age, not sex! In our study, we used statistics to make sure the only thing that was different between our groups was their sex. This prevented any of the other possible reasons getting in the way of our research.

We also wanted to learn more about how heart disease works in female bodies. For example:

1. Some patients come to the hospital with a heart attack. But others come with different types of heart problems. Do women and men always respond differently to heart problems, or only when they’ve had a heart attack?
2. Do more women than men get heart failure after a heart attack?
3. Do patients who have heart failure die in the hospital more often than patients who don’t?

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Methods

To answer our questions, we looked at previous studies on heart disease. We collected data from over 87,000 patients! Each of the patients in the studies came to the hospital with some blockage in their heart arteries. We divided the patients into two groups:

A. Patients with completely blocked heart arteries. They were having a more severe heart attack, leading to serious heart damage.

B. Patients with partially blocked heart arteries. Some were having a smaller, but still serious, heart attack. Others were not currently having a heart attack, but were at risk.

Results

In both groups, the patients’ heart muscles were suffering from insufficient oxygen.

We measured two things:

1. To learn more about differences between the sexes: how many of the patients – male and female – died in the 30 days after checking in?
2. To learn more about heart failure: who had heart failure when they checked in?

We also used our statistics to rule out reasons that aren’t related to sex, like age, other health conditions, and family history.

More women than men died in the 30 days after they checked into the hospital (Fig.1).

We saw a big difference in people with completely blocked arteries. Of these patients, 5.4% more women died than men. We also saw a difference in people with partially blocked arteries, but it was smaller. Only 0.5% more women died than men.

We learned two things about heart failure:

1. People with heart failure were more likely to die, whether they were men or women.
2. Just under 3% more women than men had heart failure when they checked in (Fig.2).

We also noticed two other curious trends. Women went to hospital later than men after they started having heart problems. Also, they did not receive the same levels of a heart attack treatment called reperfusion therapy.

Figure 1: Rates of death in men and women 30 days after checking into the hospital with blocked heart arteries.

Figure 2: Rates of heart failure in men and women after checking into the hospital with blocked heart arteries.
Discussion

Our study is important because it was the first to look only at sex differences and rule out other hidden reasons. We can now be more certain that men and women’s bodies respond differently to heart disease. But we don’t know exactly how it works yet.

We saw a much bigger difference in deaths for women with fully blocked heart arteries compared to partially blocked. Because of this, we think the amount of blockage – and whether or not the patient had a heart attack – might have something to do with heart problems in women.

Heart failure could also be an important factor. Patients with heart failure – men or women – were more likely to die. But women were more likely to have heart failure. We think heart failure could be one of the reasons we see more deaths in women.

We’re not sure why women waited longer to seek treatment at hospital, or why they were less likely to receive the very helpful reperfusion therapy. This could have more to do with gender, or our ways of moving through society based on our sex. However, according to our statistics, these reasons did not cause the different death rates.

Conclusion

Until recently, we didn’t know much about the health differences between men and women. But we do know that our sex affects the way our bodies develop. Think about your own health and development. Can you list the ways your body changes as you go through your teenage years?

As more women become scientists, we can expect more research on women’s health! Look into different types of science research areas that interest you. Why not look up important female researchers in those areas and learn more about their work?

Glossary of Key Terms

Artery - a blood vessel that (usually) carries blood high in oxygen to the rest of the body. Heart (also known as coronary) arteries deliver oxygen-rich blood to the heart itself. If they become blocked, the heart muscle begins to die. We call this a heart attack.

Heart Attack (or Myocardial Infarction, MI) - when something is blocking oxygen-rich blood from getting to your heart’s muscles. Untreated, a heart attack can be deadly.

Heart failure - a very serious heart condition. Heart failure happens when your heart stops pumping enough blood to keep the rest of your body working well. Heart failure often happens after a heart attack.

Reperfusion therapy - a medical treatment that helps bring blood flow back to an artery that has been blocked. The treatment generally includes drugs that prevent further blockage and surgery to help reopen the artery.

Sex - whether you are born male, female, or intersex. This is different from identifying as a woman or man – we call that gender.

Statistics - a set of calculations we use to check that our hunches are correct. For example, you could flip a coin 10 times. Let’s say you get 7 heads and 3 tails. At first, you might think that means that a coin is more likely to land on heads than tails since you got more heads in your trial. However, statistics will tell you that the 7-3 breakdown is because of random chance. A coin actually has an equal chance of landing on heads and tails. Statistics help us avoid coming to the wrong conclusion.

Acknowledgement: This article’s adaptation was supported by the GM Foundation.
Check your understanding

1. Age is one hidden reason for heart disease differences in men and women discussed in our research – it can trick us into making incorrect conclusions. Can you think of another hidden reason that might have affected previous studies?

2. In order to learn how heart disease affected the body, we measured how many patients died in the 30 days after checking into the hospital. Can you think of something else we could have measured to learn more about how heart disease affects the body?

3. Identify some reasons why studying the female body is important.

4. In a pair or in small groups, research symptoms of a possible heart attack in women. Use your research to create a poster, highlighting the warning signs and the need for medical advice.

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