

## Physical and mental problem in pregnant and adult women with heart disease based on psychology and nursing education by examining the risk of vascular embolism in these patients: A Systematic Review

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### Abstract

The present study investigates the physical and mental problems in pregnant and adult women with heart disease based on psychology and nursing education by investigating the risk of vascular embolism. In this article, the issue was investigated by reviewing 78 articles and searching for words such as "physical and mental problems in pregnant women", "heart disease" and "risk of vascular embolism". The results showed that the blood volume increases during pregnancy, and in this case, if a person is suffering from heart disease, his heart will not stretch and will be in the phase of heart failure. Also, sometimes valve problems cause blood to clot and move to the lung and cause embolism, which can lead to death. Sometimes mitral stenosis is so severe that it causes heart failure and death, it is better for women who plan to get pregnant to know about their heart condition before that. The most noticeable symptom before a heart attack in women is not severe pain in the chest. Usually, women experience heart attack pain in a different way. Most women who have a heart attack say that before the attack, they experienced double pressure in the heart area with pain. A blood clot can form in a deep vein, usually in the legs. This condition is known as deep vein thrombosis (DVT). If part of a blood clot breaks off, it can travel through the bloodstream to the lungs and block blood vessels there, a condition called a pulmonary embolism, which can be fatal, although this is rare. Together, these conditions are known as venous thromboembolism. The blood clotting system is more active during pregnancy to protect women from excessive bleeding during childbirth. Some women are at higher risk of VTE during pregnancy and around the time of delivery, including women with a prior history of VTE, thrombophilia, and following cesarean delivery.

**KEYWORDS:** blood clot, pulmonary embolism, venous thromboembolism, heart, childbirth.

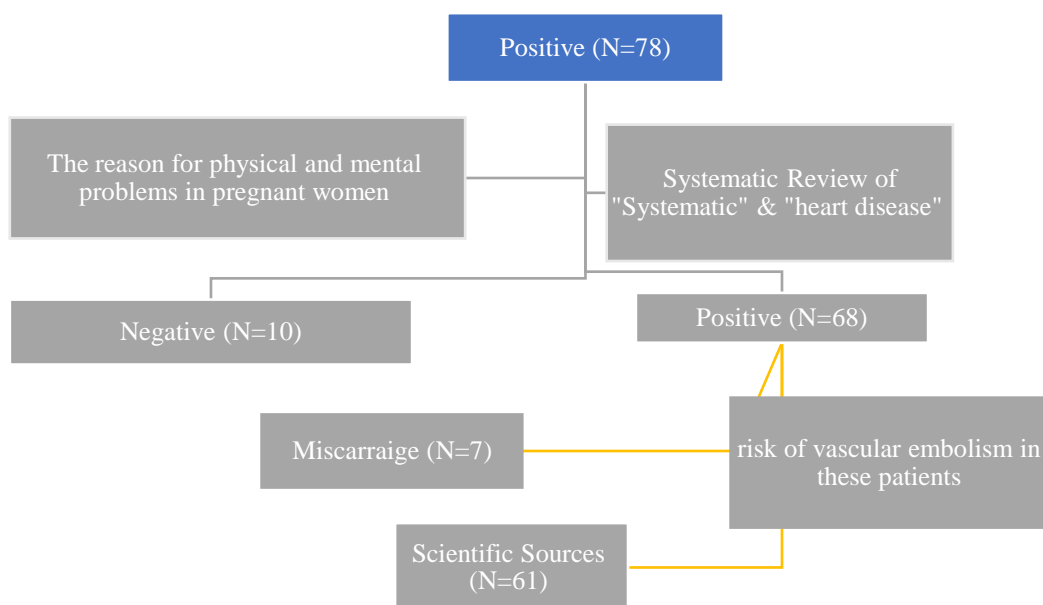
### Introduction

Heart disease is known as a serious complication that includes a wide range of health conditions and symptoms [1-3]. A heart condition affects any part of the heart or all heart tissue. Arrhythmia, coronary artery disease, heart muscle disease and heart infection can be mentioned among the common heart complications. Heart disease often manifests with pain in the chest [4-6], under the chest, difficulty in breathing, or a burning sensation in the back [7-9]. Pregnancy affects the heart and circulatory system of the expectant mother, but most mothers with heart disease give birth to healthy children [10-12]. During pregnancy, the pregnant mother will have a 30-50% increase in blood to feed the growing fetus. For this reason, the heart pumps more blood every minute and the heart rate of the mother increases [13-15]. Also, during childbirth, the pressure on the heart is high and the mother's heart rate increases, and it takes time for the condition and arrhythmia of the mother's heart to normalize [16]. During pregnancy, sometimes diseases that do not have symptoms, including heart diseases, worsen and are diagnosed by specialists for the first time during this period [17]. A pregnant woman with symptoms of heart disease is referred to a cardiologist for diagnosis. If there is a history of congenital heart disease or sudden death in close relatives, the possibility of heart disease in women should be considered [18-20]. Women who have been diagnosed with heart disease by a doctor before becoming pregnant must consult their cardiologist and have the current condition of the heart evaluated with echocardiography and other diagnostic procedures. Physiological changes during normal pregnancy may cause symptoms and clinical findings that are similar to heart disease and are evaluated by a gynecologist and cardiologist [21]. Also, maternal heart disease affects the fetus and newborn. The most noticeable symptom before a heart attack in women is not severe pain in the chest. Usually, women experience heart attack pain in a different way [22]. Most women who have a heart attack say that before the attack, they experienced double pressure in the heart with pain. Many women have a heart attack without feeling any pain [23].

Pregnancy is one of the most sensitive periods of human life. Injuries to the fetus during pregnancy can cause many physical and mental disorders in the following years of a person's life. So that the background of many psychiatric disorders in adulthood should be sought in the fetal period. Mental health during pregnancy is one of the issues that is of great concern today [24-26]. Pregnancy is one of the most sensitive periods of human life. Injuries to the fetus during pregnancy can cause many physical and mental disorders in the following years of a person's life. So that the background of many psychiatric disorders in adulthood should be sought in the fetal period. Mental health during pregnancy is one of the issues that is of great concern today. It has been proven that from the beginning of pregnancy [27-29], the anxiety and emotions of a pregnant woman will have a direct effect on the fetus. Lack of information or incorrect and incomplete information about pregnancy and its changes can cause emotions and mental disturbances [30-32].

Change of mood (morality), change of appetite, occasional vomiting, change of interests and tastes, and finally dozens of other such types [33-35], each of them alone can cause many problems. Complications of stress in pregnancy the first months of pregnancy (first trimester) are more vulnerable to stress [36]. Pregnant women who experience an earthquake in early pregnancy show more complications than women who are in the last months of pregnancy and are in the same conditions [37].

Pregnancy is one of the most sensitive periods of human life. Injuries to the fetus during pregnancy can be the cause of many physical and mental disorders in the following years of a person's life. Mental health during pregnancy is one of the issues that is of great concern today [38-40]. It has been proven that from the beginning of pregnancy, the anxiety and emotions of a pregnant woman will have a direct effect on the fetus [41-43]. Lack of information or incorrect and incomplete information about pregnancy and its changes can cause emotions and mental disturbances. Change of mood (morality), change of appetite, occasional vomiting [44-46], change of interests and tastes, and finally dozens of other such types, each of them alone can cause many problems [47].



**Figure 1. Flow chart of included subjects**

### Risks of heart disease during pregnancy

Risks during pregnancy depend on the nature and severity of heart diseases of the pregnant mother.

- ✓ In some cases, the pregnant mother has irregular arrhythmias during pregnancy, which is common during this period, and there is no need to worry if they are under the care of a gynecologist [48].
- ✓ An artificial heart valve or other abnormalities will put the pregnant mother at serious risk during this period. In this situation, the mother should be under the supervision of Karaj gynecologist and cardiologist [49].

- ✓ Congenital defect of the pregnant mother that threatens the fetus and it is possible for the fetus to be born with a heart defect [50].
- ✓ Congestive heart failure that can have irreparable risks for the fetus [51].
- ✓ Narrowing of the mitral or aortic valve can cause problems for the mother and the fetus.

The most noticeable symptom before a heart attack in women is not severe pain in the chest. Usually, women experience heart attack pain in a different way. Most women who have a heart attack say that before the attack, they experienced double pressure in the heart area with pain. Therefore, we cannot always be aware of the pains and consider the chest pressure and tightness due to other medical conditions. Many women have a heart attack without feeling any pain [52].

### **Diabetes and its effect on pregnancy**

High blood sugar levels in early pregnancy and before the 13th week can lead to birth defects in the fetus. Also, this issue can increase the possibility of miscarriage and other problems related to diabetes. Considering that in most cases, women may be unaware of their pregnancy until the fourth week, blood sugar control before pregnancy becomes very important. It is very important to control the blood sugar level during pregnancy and it is better to keep it within the ideal range. This range includes the following:

- ❖ Before meals: 70 to 100 mg/dL
- ❖ Two hours after eating: less than 120 mg/dL
- ❖ Before bedtime snack: 100 to 140 mg/dL

The best way to reduce the risk and keep the mother and baby healthy is to fully control diabetes before pregnancy [53]. If you use insulin to control your diabetes, your doctor will tell you how to adjust the dose. Your body's needs are likely to increase during pregnancy, especially during the last trimester. If you take pills, you may need to use insulin [54-56]. Some medications may not be safe to use, and insulin may control your blood sugar better. You can also avoid problems caused by blood sugar levels by having a proper diet and paying more attention to what you eat and how you eat it [57].

One of the diseases during pregnancy that usually appears after the 20th week is preeclampsia or pregnancy poisoning. This condition causes an excessive increase in blood pressure. Preeclampsia is dangerous and sometimes it can be life threatening. Symptoms of preeclampsia include severe headache, vision changes, and pain under the ribs. But many of these patients do not have any symptoms and when they go to the doctor for prenatal examinations, they find out that they have high blood pressure. In this situation, the doctor should prescribe tests to check kidney and liver function. Usually, obese people, high blood pressure or mothers over 40 are more prone to this disease. This complication disappears after delivery [58].

### **Urinary tract infection during pregnancy**

Urinary tract infection and urinary tract infection in general are common during pregnancy. During this period, due to the enlargement of the uterus and the production of pregnancy hormones, the flow of urine slows down in the urinary tract. In this situation, there is a possibility of accumulation of bacteria and the risk of urinary infection increases. Urinary tract infection may cause premature labor or premature rupture of the membranes around the fetus. This disease may cause symptoms. Symptoms include heartburn, fever, fatigue, abdominal pressure, and foul-smelling urine. But many pregnant women have no symptoms. For this reason, a urine sample should be taken to check the presence of bacteria [59].

The cause of dilatation of the heart valve in pregnancy

Since the mother's body, in addition to blood circulation to its organs, must also provide blood supply to the fetus in order to reach oxygen and nutrients and eliminate waste materials, the symptoms of dilatation of the heart valve show themselves faster and better. Generally, in mitral valve insufficiency [60], the valve between the upper chamber of the left heart (left atrium) and the lower chamber of the left heart (left ventricle) does not close tightly, causing blood to leak backwards, in the left atrium. In aortic valve failure, the valve between the lower chamber of the left heart (left ventricle) and the main artery that leads to the body (aorta) does not close properly, and this issue causes some blood to leak backwards, in the left ventricle. Both of these cause the left ventricle to have to hold more blood [61], possibly causing it to enlarge and thicken. At first, the enlargement of the left ventricle does not cause complications, but as this process continues, the heart begins to weaken [62].

**Among the causes of aortic or mitral heart valve dilatation in pregnancy, the following can be mentioned:**

- ✓ Mother suffering from congenital heart valve disease.
- ✓ Aortic or mitral valve endocarditis [63].

- ✓ Mother's rheumatic fever during or before pregnancy.
- ✓ Having had a heart attack in the past [64].
- ✓ Cardiomyopathy or heart muscle disease.
- ✓ Injury to the chest or tear in the aorta or mitral valve.
- ✓ Autoimmune conditions such as lupus [65].
- ✓ Mother suffering from atrial fibrillation.
- ✓ Taking special drugs or radiotherapy [66].

Is it possible to prevent dilatation of the heart valve during pregnancy?

Yes. If you do not prepare the ground for it before pregnancy, it will not threaten you during pregnancy [67].

**Among the ways to prevent dilatation of the heart valve in pregnancy, the following can be mentioned:**

- ✓ Before and after pregnancy, be under the supervision of a cardiologist.
- ✓ Get plenty of rest and avoid vigorous physical activity.
- ✓ Watch your weight gain. Because excessive obesity has a negative effect on heart health.
- ✓ Control your anxiety and daily stress [68].
- ✓ Avoid alcohol and smoking not only during pregnancy, but also before it.

Is it better for mothers who have dilatation of the heart valve to give birth naturally or by caesarean section?

Regarding dilatation of the heart valve and natural delivery, you should know that if the mother's symptoms are not too severe, the gynecologist can provide you with the conditions for natural delivery with the help of forceps or a vacuum suction device to help the baby come out more easily. Although, in most cases [69], doctors recommend cesarean delivery. Because there is less pressure on the mother and during work, the condition of the mother's heart is constantly controlled with the help of monitoring equipment [70].

Ways to treat dilatation of the heart in pregnancy

The treatment of heart dilatation during pregnancy is mostly in the form of drug and control treatments, and the doctor does not have the possibility to maneuver as much as before pregnancy. Of course, in emergency situations and increased severity of heart valve dilatation complications during pregnancy, there is a possibility of surgery to repair or replace the valves. Usually, the doctor postpones this surgery until after delivery [71-73].

Herbal treatment of aortic and mitral valve dilatation

Herbal medicines, such as the following, can somehow prevent the occurrence of dilated heart valve symptoms by reducing anxiety and sedation, and even cure them:

- ✓ Chamomile;
- ✓ Lavender;
- ✓ Valerian [74];
- ✓ Borage flower;
- ✓ Pussy willow.

What is the cause of pulmonary embolism in pregnancy?

Venous thrombosis and pregnancy occur when a blood clot or a fragment of the blood clot breaks off and travels to the lung and blocks the pulmonary artery. Venous thromboembolism (VTE) is a condition that includes both DVT and PE.

**The cause of pulmonary embolism in pregnancy is:**

- ✓ Decreased blood flow and pooling of blood in deep veins due to immobility or travel.
- ✓ Damage to blood vessels caused by surgery or injury.
- ✓ Family history of blood clots [75].
- ✓ Taking medications that increase the risk of blood clots, such as birth control pills and hormone replacement therapy (HRT).
- ✓ In vitro fertilization (IVF) and preeclampsia.
- ✓ Cesarean delivery and stillbirth, immobility due to bed rest [76].
- ✓ Damage to blood vessels during childbirth and bleeding after childbirth.

Symptoms of pulmonary embolism in pregnancy

The most common symptoms of pregnancy and pulmonary embolism are shortness of breath and cough, which may include bloody sputum. Especially during the flu season and the covid-19 pandemic, even minor coughs

should be checked because if the blood clot travels to the lungs, it can cause a pulmonary embolism and require emergency treatment.

### Some patients may experience these symptoms during pregnancy or weeks after delivery:

- ✓ Dizziness, fainting or lightheadedness.
- ✓ increase of heart rate [77].
- ✓ Pain or swelling that is more noticeable in one leg.
- ✓ Inexplicable anxiety.

Large blood clots can significantly reduce oxygen delivery to the lungs and lead to organ damage. In severe cases, large clots can block both lungs and cause total cardiovascular collapse. There are other factors that put pregnant women at risk of developing leg embolism, including the following:

- ✓ Having a family history of this disease.
- ✓ Age over 35 years old, obesity and overweight, history of severe infection or serious and new injuries such as broken leg.
- ✓ Absolute rest during pregnancy or immobility after childbirth.
- ✓ Twin or multiple pregnancy, performing fertility treatments [78].
- ✓ Cesarean delivery.
- ✓ smoking, having varicose veins during pregnancy that are painful or accompanied by swelling.
- ✓ Dehydration and suffering from heart diseases or inflammatory bowel diseases.

### Symptoms of leg embolism in pregnancy

- ✓ A feeling of pain in the leg when standing or walking.
- ✓ Pain in the leg when bending it to the side, warmth of the skin in the area where the clot has formed.
- ✓ Discoloration of the skin around the area where the blood has clotted.
- ✓ Pain and swelling of the leg, the veins are enlarged more than normal [79].

### Complications of embolism in pregnancy and after delivery

Blood clotting in pregnancy can be affected by various methods during pregnancy and after delivery, which include:

**1- Heart attack:** If the blood clot blocks the blood flow and prevents oxygen from reaching the heart, it causes malfunction of the heart and causes an attack and heart attack.

**2- Stroke:** If a blood clot forms in the cerebral veins, it is associated with symptoms such as headache, vision problems, and seizures, which increases the possibility of a stroke.

**3- Preeclampsia:** Preeclampsia usually occurs after the 20th week of pregnancy or after delivery, and its symptoms include increased blood pressure, protein excretion, visual disturbances, and severe headaches [80].

### Treatment of blood clots and leg embolism in pregnancy

During pregnancy, especially in the first trimester and 4 to 6 weeks after giving birth, women are susceptible to leg embolism or blood clots in the legs. Usually, the treatment of this condition should continue for six weeks after delivery. Venous embolism or thrombosis during pregnancy is easily treated.

### It is very useful to use the following methods to treat an embolism:

**1- Use of medicines:** blood thinners are the first solution for quick treatment of blood clots. Taking blood thinners causes:

- ✓ The blood clot that is formed should not get bigger.
- ✓ The blood clot formed in the body will break up and disappear.
- ✓ Reduce the risk of more clots.

Not all blood thinners are suitable for pregnancy. Among these drugs, heparin is a safe drug that cannot cross the placental barrier. Therefore, there is no risk to the fetus. Of course, heparin injection should be stopped 24 hours before delivery. During breastfeeding, the mother should not use heparin and warfarin tablets are prescribed instead [3]. This pill is not transferred through breast milk and does not have a diluting effect on the baby's blood. In addition, regular blood tests should be done to ensure that blood clots are removed and new clots are not formed, and blood concentration should be controlled [5-]. Because excessive dilution of blood is also harmful and may cause bleeding. For this reason, the doctor uses these drugs only to treat very severe cases of blood clots [7].

**2- Use of filter:** If the pregnant mother cannot use blood thinners, the doctor will place a filter in the large vein of her abdomen. This filter prevents the blood clot from moving to the lung [11].

Prevention of blood clots during pregnancy and after delivery

The best thing to do to prevent the complications of blood clots and their possible damage, such as pulmonary embolism, is to prevent their occurrence. To prevent the formation of blood clots during pregnancy and postpartum, be sure to take the following measures seriously:

The pressure that the anti-embolism socks apply to your leg makes the blood flow better in the leg veins and muscles. Using these socks is a safe, simple and cheap way to prevent blood clots during pregnancy, after natural birth or cesarean surgery [22].

**There are ways to help prevent PE during and after pregnancy.**

*This includes:*

**1- Staying hydrated:** drinking a lot of water helps prevent blood thickening and clot formation.

**2- Regular exercise:** If the doctor does not recommend bed rest, the person should try to stay active and exercise regularly. Doing so helps maintain healthy blood flow and prevent blood clots from forming [24].

**3- Wearing compression socks:** These socks improve blood circulation and prevent blood from accumulating and clotting in the leg.

A person who is pregnant and has an increased risk of blood clots should be seen by a doctor regularly. A doctor can determine whether a person should use anticoagulants or not.

**Table 1. Forest plot showed the Physical and mental problem in pregnant and adult women with heart disease based on psychology and nursing education by examining the risk of vascular embolism in these patients**

Raw	Study	Year		Proportion	Wight 98%	Weight %
1	Motamedi et al.	2023		0.92	[0.39 – 1.06]	5.03
2	Nabiuni et al.	2023		0.87	[0.54 – 1.02]	6.02
3	Nabiuni 2023et al.	2020		0.88	[0.63 – 1.01]	5.57
4	Naghdipour et al.	2021		0.60	[0.25 – 1.08]	6.13
Heterogeneity $t^2=0.02$ , $I^2= 0.00$ , $H^2=1.02$				0.95	[0.22 – 1.07]	
Test of $\Theta= \Theta$ , $Q (4) =5.55$ , $P= 0.74$						
1	Naghdipour et al.	2021		0.92	[0.39 – 1.06]	3.03
2	Namanloo et al.	2022		0.87	[0.54 – 1.02]	8.33
3	Otaghvar et al.	2023		0.99	[0.63 – 1.01]	7.50
Heterogeneity $t^2=0.14$ , $I^2= 0.00$ , $H^2=1.02$				0.87	[0.22 – 1.07]	
Test of $\Theta= \Theta$ , $Q (4) =3.55$ , $P= 0.12$						
1	Pakmehr et al.	2022		0.84	[0.27 – 1.08]	6.08
2	Pourhanifeh et al.	2020		0.76	[0.52 – 0.22]	5.82
3	Rostami et al.	2020		0.11	[0.54 – 0.89]	5.85
Heterogeneity $t^2=0.19$ , $I^2= 0.09$ , $H^2=0.16$				0.77	[0.19 – 1.00]	
Test of $\Theta= \Theta$ , $Q (4) =3.11$ , $P= 0.04$						

Conclusion

Blood clotting (DVT) in pregnancy is one of the most important risks that threatens pregnant women with the growth of the fetus and can cause problems for the mother and the fetus. A deep vein embolism is a blood clot in the leg, thigh, or pelvis. In general, blood clotting occurs when the body sends cells called platelets to the damaged part to prevent further bleeding and damage to the tissues, to stop the blood flow, but sometimes during pregnancy, due to several reasons, a disorder in this process happens and blood clots inside the vessels cause the blood flow to be blocked or limited and cause very serious problems for the pregnant mother. Embolism is not very common during pregnancy, but pregnant women are 5 to 10 times more likely to develop this condition than non-pregnant women. The reason for this is the increase in blood clotting proteins and the decrease in anticoagulant proteins during pregnancy. In addition, the enlargement of the uterus puts a lot of pressure on the veins of the lower body, which causes pregnant women to suffer from varicose veins during pregnancy or embolism. Fortunately, a blood clot in the leg does not have a negative effect on the fetus, unless it is ignored and subsequent complications occur. In 80% of cases, a blood clot occurs in the left leg during pregnancy, and if left untreated, it enters the lungs through the bloodstream and causes pulmonary embolism, which can lead to miscarriage or even the death of the mother. Although blood clots in the leg and pulmonary embolism are more common in women, they can be treated and, most importantly, preventable. Embolism can occur in pregnancy for various reasons. Reduction of blood flow, cut or damage to the vessels and abnormal blood coagulation are the main causes of embolism. However, the following factors cause embolism in pregnancy:

- ✓ Blood concentration increases during pregnancy and this change is for more blood supply to the placenta during pregnancy.
- ✓ As the period of childbirth approaches, the body prepares itself to reduce the amount of bleeding in childbirth, and it does this by increasing the amount of blood clotting proteins and reducing anticoagulant proteins.
- ✓ Due to the enlargement of the uterus during this period, the blood flow from the leg veins to the heart is very slow. In general, the pressure of the uterus during pregnancy prevents the rapid flow of blood.
- ✓ During childbirth, due to the pressure of the fetus on the pelvic vessels, the vessels may be damaged and cause the mother to have leg embolism after delivery.
- ✓ During pregnancy, due to the increase of estrogen hormone, the possibility of blood clot formation increases 10 times. In spite of all the mentioned reasons, in general, the probability of blood clots in pregnancy is very low. Only 1 or 2 women in 1000 women have this problem during pregnancy or after giving birth.

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