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PHYSIOLOGICAL AND PATHOLOGICAL CHANGES OBSERVED IN THE CARDIOVASCULAR SYSTEM DURING PREGNANCY, PHYSICAL EXERCISES AND STRESS THAT CAN BE PRESCRIBED TO PREGNANT WOMEN

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Abstract
The article discusses the changes that occur in the cardiovascular system during pregnancy, as well as physical exercises that are prescribed during pregnancy to prepare the cardiovascular system for childbirth.

Introduction

During pregnancy, a woman's body undergoes very high psychological, physiological and hormonal changes, and the same pressure is observed on the cardiovascular system. Depending on the level of fitness and health of the body, each woman faces changes during pregnancy individually.

Research Objective

Acquaintance with ways to gradually prepare the body for the high load on the cardiovascular system in pregnant women and prevent complications of cardiovascular diseases during pregnancy.

Materials and Methods

If we consider the hormonal changes that occur during pregnancy, then due to this hormonal shift, gradual changes occur in organs and tissues, as well as in the cardiovascular system. In particular, the amount of the hormone estrogen during pregnancy increases up to 60 times compared to the period before pregnancy.

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	Bone changes	Togai tissue changes	Changes in joint tissue	Myotendinous unit	MNS
Estrogen	Bone resorption decreases	Development and production will increase	It's relaxing, rigidity decreases, load resistance increases	It's relaxing	Excitability increases, synaptic transmission and power output increase.
Progesterone	Bone cell renewal accelerates	Increases development and defense	Collagen production increases		Excitability decreases neuroprotective
Testosterone	Stimulates bone formation	Rot protection	Increases pelvic strength. Causes relaxation during the menstrual cycle (together with estrogen and progesterone).	Increases the hypertrophic and hyperplastic response to resistance exercise.	neuroprotective
Relaxin	Bone resorption increases	Stiffness is reduced	Mobility increases Engagement is declining	Engagement is declining	Attention increases

Under the influence of such high hormonal pressure during pregnancy, remission or improvement in the course of the disease is observed in women with diseases accompanied by joint damage, for example, rheumatoid arthritis, arthrosis, and in women with cardiovascular diseases, there is a large flow of blood to the cardiovascular system. As a result of pressure, exacerbations or complications of the disease may occur.

Blood in the heart during normal pregnancy					changes in the vascular system.		
	1st trime-ster	2nd trime-ster	3rd trime-ster	1st stage of labor	2nd stage of labor	Early postpartum period	Last period 3-6 months after birth
Cardiac output	↑5-10%	↑↑35-45%		↑30%	↑↑50%	↑↑↑sharply 60-80%, then rapidly decreases within 1 hour	Returns to pre-pregnancy levels
Heart rate	↑3-5%	↑10-15%	↑15-20%	During uterine contractions: ↑ 40-50%	During uterine contractions: ↑ 40-50%	It lasts until it increases, as it did in the 3rd trimester.	Returns to prepregnancy levels
Blood pressure	↓10%	↓5%	↑5%	During uterine contractions: ↑SKB 15-25% ↑DKB 10-15%	During uterine contractions: ↑SKB 15-25% ↑DKB 10-15%	↓SBP 5-10% over 48 hours, may increase again after 3-6 days due to fluid retention;	Returns to prepregnancy levels
Plasma volume	↑	↑↑40-50%		↑	↑↑	↑↑↑ per 500 ml due to autotransfusion	Returns to prepregnancy levels

SBP – systolic blood pressure; DBP-diastolic blood pressure

As can be seen from the table above, due to a sharp increase in the number of heartbeats during pregnancy and childbirth, women with heart disease may develop chronic or acute heart failure or worsen the level of chronic heart failure. An increase in blood pressure causes increased tachycardia and impaired perfusion in organs and tissues.

During pregnancy, it is recommended to perform exercises in a prescribed manner to prepare the female body for stress on the cardiovascular system. Exercise during pregnancy prevents excess weight gain during pregnancy, lower back pain caused by the weight of the spine, reduces the risk of preeclampsia and gestational diabetes, and reduces the risk of cesarean section.

Moderate intensity exercise and moderate stress are not the direct cause of any negative effects of pregnancy.

Physical activity/exercise: does not cause preterm labor.

As a result of physical exercise, the number of fetal heartbeats increases to 10-30 per minute, and this does not pose any danger to the fetus.

Transit hypoxia in the mother causes transit tachycardia of the fetus and a short-term increase in fetal blood pressure. As a result, protective mechanisms are activated (gas exchange and blood circulation through the placenta are accelerated).

Prenatal exercise reduces the risk of high birth weight by up to 31%, but does not cause low birth weight or preterm birth.

Pregnant women are advised to engage in 30 minutes of moderate exercise per day.

Absolute contraindications to aerobic exercise during pregnancy are:

- Heart diseases with pronounced hemodynamic changes
- Restrictive lung diseases
- Neck weakness
- Multiple pregnancy with risk of premature birth
- Anterior placenta placement at 26 weeks.
- Membrane rupture
- Preeclampsia/Gestational Hypertension

Partial contraindications to aerobic exercise during pregnancy are:

- Severe anemia
- Chronic bronchitis
- Poorly controlled type 1 diabetes
- High obesity rates
- Heavy weight (TIM<12)
- Be in a state of weakness for a long time
- Fetal growth restriction
- Poorly controlled hypertension.
- Orthopedic limitation of mobility
- Poorly controlled hyperthyroidism
- High quality of life

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Signs that make you stop exercising during pregnancy:

- Bleeding from the uterus
- Shortness of breath during exertion
- Dizziness
- Headache
- Chest pain
- Muscle relaxation
- Pain or swelling in the calf area (check for thrombophlebitis)
- Early birth
- Decreased fetal mobility.
- Arrival of amniotic fluid

During pregnancy, moderate exercise is prescribed up to 150 hours a week with a 10-minute break between exercises, exercises are prescribed twice a week.

Previously sedentary women should start with 15 minutes of exercise 3 times a week. Later, these women will be able to increase the duration of classes to 30 minutes and up to 4-7 times a week.

Types of exercises prescribed during pregnancy:

Safe

Aerobic exercise
Exercises that gradually build up
Stretching exercises
Yoga
Cycling
Run
Walk
Go up and down stairs
Exercises on the treadmill
Water exercises
Swimming

Avoid:

Lying face up on one arm
Standing still for a long time
Ice hockey
Baseball
Horse riding exercises
Scuba diving exercises

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Light intensity exercise: < 3 MET

Sleep	0.9 MET
Watching TV	1.0 MET
Writing, typing	1.8 MET
Walking at a speed of 1.7 m/h, 2.7 km/h is very slow.	2.3 MET
Walking 2.5 m/h (4 km/h)	2.9 MET

Moderate intensity activity: 3-6 MET

Exercise bike slow 50 W.	3.0 MET
Walking 3.0 m/h (4.8 km/h)	3.3 MET
Light and moderately intense rhythmic gymnastics, home exercises.	3.5 MET
Walking 3.4 m/h (5.5 km/h)	3.6 MET
Exercise bike<10 m/h(16 km/h)	4.0 MET
Exercise bike 100 W	5.5 MET

High intensity movement: > 6 MET

Run	7.0 MET
Performing complex rhythmic gymnastics exercises.	8.0 MET
Run fast	8.0 MET
Jumping rope	10.0 MET

MET - metabolic equivalent

Results and Discussion

During pregnancy, a woman's volume of physical exercise can be gradually increased to 6-7 METs, if there are no risks for the child. Exercises are scheduled for 30 minutes a day, 5-7 days a week.

Physical exercises of this order prepare pregnant women for the heavy load on the cardiovascular system during childbirth and provide an easier labor period.

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