Baština Akademije nauka i umjetnosti Bosne i Hercegovine

Cardiovascular diseases and oral health – the impact of pregnant women’s oral health on children’s cardiovascular health

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Preuzeto s Baštine Akademije nauka i umjetnosti Bosne i Hercegovine

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Chapter V
PARENTHOOD, MOTHERHOOD, FATHERHOOD

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Motherhood and fatherhood, and parenthood in the general meaning of that word, is one of the most challenging, most attractive and most interesting social and natural roles of a woman and a man, of a mother and a father.

The natural process that lasted the usual nine months ends with a dramatic event that takes approximately several hours. A woman's physical body undergoes a huge change during that period of time, but in the context of change her psyche must not be neglected. Through this truly dramatic, perfect and significant process in the life of every woman (and indirectly her partner) we can talk about the period of preparation for an unusual event – them becoming a mother and father.

The process of giving birth is an unusual, fateful and a unique situation. When a woman conceives, the time of pregnancy begins in which she faces the inevitable physical and mental changes that are not as harmless as is often thought. Using her natural power of maternal intuition, a woman adapts to these physical and mental transitions, such as changes in her physical and emotional states of her inner and outer world.

The birth of a healthy child is the desire of every parent and the instinct of survival. Regular clinical examinations of a pregnant woman are very important for proper supervision and successful childbirth, where the main goal is to give birth to a healthy child and preserve health of the mother. A woman on average gives birth two to three times and needs to be adequately prepared for these events. How? By leading a healthy lifestyle, performing regular check-ups and getting expert advice from a selected gynecologist. Pregnancy and childbirth should be with a pleasant mood, joy and satisfaction created

by reading popular literature and publications on the internet about the usual and normal pregnancy.

In centers where such a possibility exists, it is recommended that pregnant women attend schools for psychophysical preparation for childbirth.

One of the most fateful moments in the life for most pregnant women is the act of childbirth itself. Countless literary and scientific works have been written about this phenomenal moment, because for almost all women, this is about circumstances that remind us that this is a stressful event accompanied by fear, especially when it comes to firstborns. There is no mother who does not face some sort of anxiety due to the possibility of complications and consequences during and after childbirth. However, it should not be forgotten that today almost every pregnant woman is educated and that the act of childbirth in modern medicine has become almost a routine procedure where the possibility of serious consequences is reduced to the lowest percentage of possible risk, especially if the pregnancy is medically monitored and insured.

Pregnancy is the time of constant development and change for both mother and the child. The purpose of preventive pregnancy examinations is to carefully observe and document data on fetal development and pregnancy events. Medical supervision is intended to eliminate possible dangers to the life and health of the mother or child and for timely detection and treatment of health disorders of high-risk pregnancies and births.

Examinations during pregnancy

A pregnant woman usually comes for a examinations in pregnancy after missing menstruation and getting a positive result of a home-pregnancy test, which is her first knowledge of being pregnant. Every pregnant woman has a legal right to appropriate medical examination, pregnancy supervision and follow up. A doctor should give pregnant women advice on necessary examinations, instructions on appropriate diet, oral health, vaccination against influenza, covid and the risk of HIV infection. A pregnant woman is issued her pregnancy booklet at her first preventive medical examination.

Professional supervision of a pregnant woman includes monthly clinical examinations and obligatory three to five ultrasound screenings. The first examination of a pregnant woman, especially when it comes to the first pregnancy, should be carefully performed and very detailed. In a pleasant atmosphere, her doctor devotes quite some time to perform the examination, have a conversation with the woman and to give her advice about the pregnancy

process. It is very desirable that the woman's partner also attends the examinations and the conversations, especially to attend ultrasound examinations that are done over the abdomen.

After the examination, the pregnant woman receives information about the examination calendar, expert ultrasound examinations, prenatal genetic diagnostics, the importance of a healthy diet and the dangers of gaining too much weight. Partners are educated about sexual intercourse during pregnancy, physical activity and the importance of psychophysical exercise during pregnancy, which is very important for childbirth preparation.

Normal pregnancy is a physiological process that lasts 280 days, 40 weeks or 10 lunar months of 28 days or 9 months according to the Julian calendar. The expected due date is calculated using Negel's rule: the first day of the last menstruation plus 7 days minus 3 months (e.g., the first day of the last menstrual cycle was May 10, 2020, so the expected due date – EDD is Feb. 17, 2021).

Pregnancy of 10 lunar months is divided into the first trimester, which lasts until the 12th week of pregnancy; the second trimester from the 13th to the 24th week and the third from the 25th week until delivery. The blastogenesis stage lasts from conception and the first two weeks of pregnancy. During this period, the embryo responds according to the "all or nothing" rule, which means that if the pregnant woman has been exposed to a harmful agent/drug, X-rays, infection, severe physical or mental stress, the pregnancy will either not survive, or not thrive, or the agent will not have any harmful effect on the fetus. The embryonic phase lasts until the 8th week of pregnancy and is divided into embryogenesis, morphogenesis and organogenesis. This phase is very sensitive, because numerous anomalies can appear during this time because this is when most tissues and organs differentiate and form. The fetal growth phase begins at 9 weeks and lasts until delivery. During the first 5 months, the fetus grows intensively and develops anatomically with most morphological characteristics, gaining weight proportionally. Ultrasound-monitored fetal size is biometrically up to week 24 of pregnancy approximate in all pregnant women, but from week 24 onwards, the differences are visible and genetic predispositions play a significant role. Fetal development ends by the week 35 of pregnancy and during this period fetus may be exposed to various harmful factors, but the possibility of developing an anomaly is extremely small.

During pregnancy, the cardiac output of a pregnant woman increases by 30% to 50%. The reason for this is the greater need for nutrition and oxygenation of the pregnant uterus, which increases 16 to 18 times the size of the

egg; then there's the skin's need for thermoregulation and increased maternal diuresis of the kidneys of fetal radioactive substances.

The heart rate increases from 70 to 90 beats per minute, which is normal during pregnancy. The serum volume and fluid in the blood also increase, but the number of red blood cells, erythrocytes, remains the same, which we call apparent anemia.

The size and shape of the uterus varies depending on the duration of the pregnancy. After the absence of the menstrual cycle, the uterus is the size of a goose egg; at 8 weeks gestation it is the size of a woman's fist, at 12 weeks the size of a man's fist, and at 16 weeks the size of a newborn's head.

Calendar of pregnancy examinations

Preventive examinations of a healthy pregnant woman with an orderly pregnancy, which is more common than not, are performed every month until the week 32 of pregnancy, followed by exams every 14 days until week 36. During the last month of pregnancy, examinations are performed weekly, until the expected date of delivery, usually at the maternity hospital. Term delivery can fall anywhere between 21 days before and 15 days after the expected due date – EDD. If the baby is not born until the expected due date, then examinations are performed more often: every other day until the 8th day, then every day until the 10^{th} or 12^{th} day after the EDD. If natural childbirth does not take place by then, the woman is hospitalized, and the birth is induced by one of then accepted methods. It is considered that a healthy pregnant woman with an orderly pregnancy and adequate supervision can carry-over up to 10 days after the expected date of delivery, without danger to the child. Of course, the pregnancy length has to be correctly calculated.

The first pregnancy exam and ultrasound screening is recommended between week 6 and 8 of pregnancy, when ultrasound can visualize the gestational sac, determine its size and location, visualize internal structures – yolk sac and number of embryos. An echo of the embryo is displayed in which the length is measured, and cardiac action is displayed. The pregnancy length in irregular menstruation is determined based on the ultrasound measurement of CRL (crown-rump length) and the embryo size, and thus the expected due date is calculated. When fetus size is 3 mm or more, a high-quality ultrasound and color Doppler transvaginally visualize the child's heartbeat. When vaginal examination in specula shows pregnancy with uterine bleeding, and transvaginal ultrasound diagnoses retrochorial hematoma, both of which are signs

of a threatened abortion, this requires rest with adequate therapy, intensive monitoring, and active follow-ups.

During this period, it is possible to diagnose an atypical location of the gestational sac, ectopic pregnancy as a pathological condition, which requires monitoring, medication therapy, Methotrexate amp and, if necessary, surgical treatment, primarily laparoscopic as minimally invasive one.

At the first exam, a detailed anamnesis is taken, the pregnancy length and the expected due date – EDD – are determined. Speculum examination is used to monitor vaginal discharge, changes in the vaginal wall and the cervix. An orderly discharge is sparse and whitish in color. The purity of the vaginal smear is determined by bacteriological analysis of vaginal swabs under a microscope, and the PAP-test is taken in pregnant women who have not had a cytological changes in the last year. A proven infection should be treated as soon as possible in order to prevent its spread to the fertile linings and the fetus. In high-risk pregnancies and based on local findings, it is necessary to take cervical swabs for chlamydia trachomatis, urea and mycoplasma, and for aerobic and anaerobic bacteria. If necessary, a bimanual palpation examination is performed.

Blood pressure must be measured each time, and after measurement, BMI – body mass index – is calculated.

Laboratory processing is usually done after two months, which represents the "pregnancy package" and includes CBC – complete blood count, BSL – blood sugar level, in the morning, before food and drink, blood iron levels and urine analysis. Inflammatory parameters and proteins in urine are monitored, and urine culture is performed if necessary.

It is necessary to determine the blood group and the Rh factor, perform testing for hepatitis B, HIV and hepatitis C, TORCH tests for rubella, which should be performed for every pregnancy as soon as possible by taking a blood sample.

If the pregnant woman is Rh-negative and her partner's blood type is Rh-positive, this is referred to as Rh-inconceivability and a Coombs sensitization test should be performed every two months, usually at the beginning of pregnancy, and at weeks 24 and 32.

Pregnant women who have a history of recurrent miscarriages or ectopic pregnancies, after undergoing adequate treatment before planning the next pregnancy, are advised to visit a gynecologist for an checkup as soon as missing the menstrual cycle. The same procedure is recommended if the

pregnancy was achieved by any of MAR methods, medically assisted reproduction – IVF/ICSI.

1st trimester screening – 12 to 14 hbd
(screening for Down syndrome and other chromosomal abnormalities)

Gestation screening of the first trimester from week 12 to 14, but optimally in week 13, which is the most important screening in pregnancies, can be performed quite successfully when in experienced hands and using high-tech 3D/4D ultrasound technology. This involves a detailed ultrasound examination of the fetus, where, under high magnification, nuchal translucency (thickness of the fold at the back of baby's neck) is measured in combination with transabdominal and transvaginal ultrasound examination while visualizing vitality, counting fetal movements, measuring the amount of amniotic fluid, measuring the location and structure of placenta, insertion and number of umbilical cord blood vessels, thus assessing pregnancy length, appearance of uterus and uterine and ovarian structure, cervicometry, fetal biometrics, head anatomy (symmetry, brain structures, ventricles, magna cistern, face and lip profile), spine and extremities (all bones of arms and legs, both hands and both feet), anatomy of the heart showing two ventricles and two atria, position, size, rhythm and heart rate), abdomen showing front abdominal wall, diaphragm, stomach, kidneys, bladder.

Ultrasound markers for chromosomal aberrations are certain changes that can be visualized by ultrasound scan. In a smaller or a larger percentage, they can indicate a genetic anomaly, but they can also be found in a completely healthy fetus. Because of their association with certain chromosomal aberrations, they are divided into **major** and **minor markers**. Major markers have a greater association with the possibility of genetic error and their visualization requires further diagnosis, while this is not the case with minor markers. Of course, with this ultrasound examination it is not possible to prove a genetic anomaly.

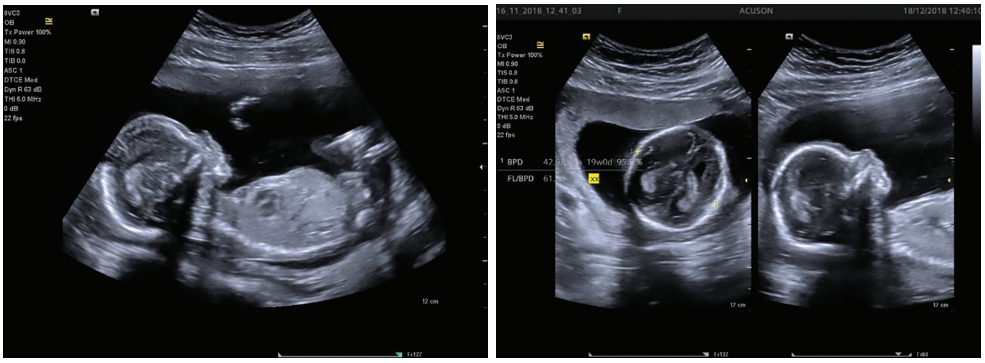


Fig 1. Transvaginal ultrasound, 2D sonography is a screening of the first trimester of pregnancy /fetal anatomy, section of the head with the structure of the brain, nuchal transparency, facial bones and nasal axis/

Major markers are: measurement of nuchal translucency, viewing nasal bones and their angle, measurement of facial angle, viewing the flow through the ductus venosus, viewing the flow through the tricuspid valve.

Minor ultrasound markers are: cyst of the choroid plexus (greater than 1.5 mm), hyperechoic focus in the heart, slow or fast heart rate, hyperechoic bowel, pyelon enlargement (greater than 1.5 mm), enlargement of the bladder, lack of one umbilical artery, shortening of long bones, lack of posterior joint on the little finger, omphalocoela (diaphragmatic hernia). 3D ultrasound screening allows correct, reliable and accurate measurement of all these markers, and thus are used in determining the possible risk of the most common genetic diseases (Down, Turner and Edwardson Syndrome).

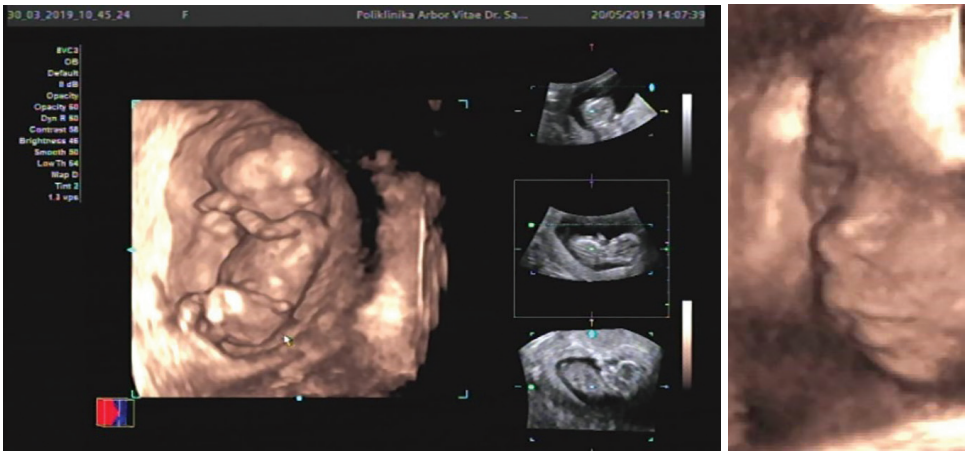


Fig 2. 3D imaging of fetus at 13hbd /human beta defined/ fetal face at 24 hbd

Genetic processing and counseling are planned if necessary, especially if indicated. They are recommended in following cases:

- one child with a genetic anomaly is already born,
- partner has a burdened family anamnesis, or
- one of the ultrasound markers for anomalies is shown on the ultrasound screening of the first trimester.

In case all of the above is in order, but woman's biological reproductive clock is running out and if she is 35 and older, genetic processing is definitely recommended.

Non-invasive prenatal tests are necessary in completing prenatal genetic diagnosis of a fetus. The results are very safe, simple, reliable and painless, they are obtained relatively quickly by simply drawing mother's vein blood already at week 10 of the pregnancy. There is no risk of miscarriage, and the results provide a reliable insight into the genetic health of the fetus.

Amniocentesis is an invasive method of taking a small amount of amniotic fluid by puncturing the abdomen while using transabdominal ultrasound between week 16 and 20 of pregnancy. In less than 2% of cases, this intervention can lead to spontaneous abortion.

Prenatal screening of fetal chromosomopathies in the first and second trimesters of pregnancy, or combined in both trimesters, shows that each is characterized by specific characteristics and success. Measured concentrations of biochemical markers, free 3 Human chorionic gonadotrophin (HCG) and pregnancy-associated plasma protein A (PAPP) are not expressed in absolute values, but are used to calculate the probability ratio even if they are within normal limits, with parameter being the woman's age and measured nuchal fold thickness (NT) which is always expressed in relation to the value of crown to rump before week 14, which can with high probability determine whether the embryo has any chromosomal disease.

2nd trimester screening – 20 to 24 hbd

(fetal growth, morphology, placental quality, umbilical cord flow, amniotic fluid)

Ultrasound examination is also performed in weeks 18-19 of gestation, when, in addition to routine fetal measurements, the so-called "soft-markers" are measured for chromosomopathy such as dilated renal fetal pyelon, developmental cysts in the choroid plexus, hyperechoic echoes of the heart, shortened thigh, etc.

The examination from week 20 to 24 of gestation is conducted as an expert 4D/3D ultrasound examination when the anatomy and morphology of the fetus with fetal echocardiography are examined in detail. Although the fetus is examined in detail from the very beginning and especially from week 12 of pregnancy, this is the best period for analyzing the morphology of all organ systems and the external appearance of the fetus. According to the protocol of conducting a normal pregnancy, this examination is one of the two most important ultrasound examinations during pregnancy.

Morphological analysis consists of four segments and is performed with 2D and 3D/4D ultrasound. The size of the fetus allows the analysis of the smallest anatomical details and thus eliminates the possibility of anomalies that can be detected by ultrasound. The external appearance of the fetus is analyzed (presence of cleft lip, facial symmetry, hand or foot deformities), spinal column, analysis of brain structures (cerebellum, brain chambers, corpus callosum, blood vessels of the base of the skull/lens cristalinum – eye lenses, color Doppler of the blood vessels of the base of the skull), analysis of abdominal organs (visualization of the stomach and the integrity of the diaphragm, observation of the urinary bladder, tripartite umbilical cord with two arteries, presence and appearance of both kidneys, analysis of the integrity of the anterior abdominal wall wall).

It is important to note that after week 20 of pregnancy, the ultrasound signs for Down syndrome on the fetus and in mother's blood are lost, as well as mongoloids who do not have a major anomaly, because they can practically no longer be detected. Larger amounts of adipose tissue in the abdomen make it difficult for ultrasound waves to pass, so it is sometimes not possible to perform a detailed ultrasound examination of the fetus in obese pregnant women.

3rd trimester screening – 30 to 34 hbd

(fetal growth, placental quality, umbilical cord flow, amniotic fluid and baby position)

Ultrasound examination in the period from week 30 to 34 of gestation is very important. In addition to routine measurements, color Doppler ultrasound examination are preformed of blood flow through the umbilical cord, and if necessary in high-risk pregnancies, the flow through the fetal aorta and blood vessels based on the fetal brain, aa.cerebri media. This examination determines the condition of the fetus and reveals early signs of baby's suffering, if

any. Examinations after this are then performed by cardiotocography – CTG every 15 days, and a month before EDD cardiotocography is performed every 7 days. Before the birth, an ultrasound and vaginal examination are routinely performed, baby's position is determined – which way is baby turned, the size is estimated and the weight of the fetus are measured, and the manner of delivery is assessed. Based on the recording of the fetal heart rate and the activity of the uterus, an assessment is made of the condition of the fetus and its possible endangerment. Prior to delivery cervical swabs are routinely performed, and coproculture if necessary.

If the birth does not follow the expected date, examinations are performed every other day until day 8 after the expected due date, and then every day until day 10 or 12, and if birth still does not follow, the woman is sent to the maternity hospital for induction of labor. Therefore, if a woman does not give birth naturally by the end of week 41 of gestation, examinations should be performed every day until delivery. A pregnant woman with a normal pregnancy can be overdue up to 10 days after the expected due date without any danger to the baby. If we are sure that the pregnancy length is correctly calculated, childbirth should be induced without any major difficulties using one of then accepted methods.

During the last trimester of pregnancy, special attention is paid to the signs of premature birth by cervicometry, fetal growth retardation, or accelerated growth. Blood pressure values are regularly monitored and hypertension is treated in a timely manner. Gestational diabetes detection by means of oral glucose tolerance test (OGTT) is done between week 24 and 28 of pregnancy. Chronic diseases with which the pregnant woman entered the pregnancy are monitored in order to avoid worsening or complications. In the period immediately before the birth, if necessary, a bimanual examination is performed, possibly also speculum examination.

Spouses should be encouraged to attend pregnancy school together with psychophysical exercises for pregnant women in order to adequately prepare her for childbirth, and their partners can attend the birth without major trauma. This is a great way to strengthen the bond between partners and represents the axis of one of the basic principles of the "Baby friendly Hospitals".

First signs of the onset of labor:

- rapture of fetal or amniochorionic membranes, RVP (premature rapture of membrane) is a sudden leaking of clear liquid,

- losing bloody mucous plug from the vagina or a more severe uterine bleeding,
- labor that occurs in a rhythm of ten minutes or more often, lasting half an hour or longer; after which they become more frequent and intense. These are rhythmic uterine contractions that are a sign of the beginning of the birth and the time when the woman should go to the maternity hospital.

Childbirth is divided into 4 childbirth stages, about which partners are educated in order to psychologically better prepare themselves for the actual act of childbirth, especially during the theoretical classes.

- First stage of childbirth – cervix dilation, which lasts 12 to 16 hours.
- Second stage of childbirth – the stage of squeezing out the fetus (baby delivery); in the firstborn it lasts 2 hours.
- Third stage of childbirth – pushing out the placenta and membranes, lasts 2 hours.
- Fourth stage of childbirth – early recovery and supervision in the delivery room, lasts 2 hours.

Most preventive examinations can be performed by midwives under the supervision of a gynecologist. Exceptions are ultrasound examinations performed exclusively by a gynecologist. Special attention must be paid to high-risk pregnancies! If the pregnant woman does not take adequate steps and decides otherwise, then she does so at her own risk, contrary to given advice and recommendations. The doctor should record everything with the patient's signature in order for her to be aware of the risk of overweight as well as the risk of certain diseases and conditions during pregnancy.

Hygiene and physical activity in pregnancy

Pregnancy comes with a variety of physiological, anatomical, and hormonal changes, all of which can affect the woman's oral health. During pregnancy, certain changes in the condition of the teeth and tissues of the oral cavity occur, but they can be prevented or controlled mainly by proper nutrition and the oral hygiene. Inflammation of the oral cavity and emergency painful conditions should be properly remedied as soon as possible, regardless of the stage of pregnancy. Radiological recordings should be avoided, especially in the first trimester.

Consultations to the pregnant woman by a gynecologist and dentist in certain cases are very desirable, and sometimes necessary, because optimal oral health is very important for the pregnant woman and the newborn. It is necessary to pay attention to the prevention and proper hygiene of the oral cavity, eating habits and the use medications that are proven to be safe for both mother and child.

Women who are planning to become pregnant or are already pregnant should be encouraged to seek oral health advice and have a check-up with a dentist.

Spouses are given information about the examination calendar, expert ultrasound examinations, prenatal genetic diagnostics, breast and perineal care during pregnancy, the importance of a healthy diet and the dangers of being overweight.

Sexual intercourse in a stable pregnancy is permitted with the use of a condom, protected intercourse or interrupted intercourse. Why? This is because sperm carries prostaglandin hormones that can cause uterine bleeding, contractions, miscarriages or, can later even cause premature birth. Prostaglandins were first discovered in sperm, while in a woman's body they exist in larger quantities. They are responsible for painful menstrual cramps, dysmenorrhoea, and prostaglandins are also "responsible" for labor and pushes, strong uterine contractions in childbirth.

Folic acid is recommended from conception and during the first three months of pregnancy and is very important for the preparation of mucous membranes and egg implantation and has a positive effect on the proper development of the fetal neurocerebral tube, which means the brain and spinal cord. From the third month of pregnancy, dietary supplements are added, since multi-vitamins are very important for the proper development of the newborn and for mother's health during pregnancy. For a healthy pregnancy, the diet should be balanced and rich in appropriate quantities of protein, carbohydrates and fats, as well as fruits and vegetables that contain the necessary vitamins and minerals. It is very important that a pregnant woman gains about a kilogram a month during pregnancy, leading to a total of 10 to 12 kilograms, but never over 15 kilograms. Every woman's weight gain varies, depending on the weight she had before pregnancy, diet during pregnancy and other factors. A big mistake pregnant women make is when they think that they need to "eat for two". The fact is that the caloric intake of a pregnant woman should increase during pregnancy, but it is not necessary to double the calorie intake; instead the intake should increase by several hundred calories by the end of

pregnancy. It is necessary to follow some simple rules in terms of the diet during pregnancy. Avoid eating "strong food", salty, as well as seeds, barbecue and dried meat that later, with increased weight, can cause hypertension in pregnancy with preeclampsia and eclampsia, which is extremely difficult and serious condition that can endanger the life of the child and the mother. It is very important to eat fresh fruits and vegetables, make fresh juices that contain unchanged levels of vitamins and nutrients.

Pregnancy and the cardiovascular system

A pregnant woman's heart beats for two – for the mother and the child. That is why it has to "work" a lot more than when the woman is not pregnant. Through the umbilical cord, the fetus receives blood from mother's body, and during its development, the pregnant woman's heart gradually increases its work. With the help of hormones the mother's body gets ready for a gradual increase in blood flow and the needs of the child.

The volume that the heart pumps every minute (minute volume of the heart) in pregnant women increases by approx. 30% – 50%. Heart rate and stroke volume also increase significantly. Pregnant women have about 40% more blood volume than non-pregnant women, which means that their heart needs much more power. During childbirth, pain and anxiety can lead to the secretion of stress hormones which further increase the heart rate. The cardiac output increases shortly before delivery by approx. 50%, and uterine contractions during childbirth further increase the volume of blood in mother's bloodstream by approx. 500 ml.

All this leads to numerous changes in the body of pregnant women that can cause certain pathological conditions. In pregnancy, varicose veins of the lower extremities often dilate due to an increase in the circulating volume of varicose veins and mechanical pressure of the fetus on the large veins within the mother's pelvis. Due to the increase in thrombotic activity, the risk of thrombosis and embolism in pregnant women is increased, but with adequate compression therapy this risk can be significantly reduced.

A common occurrence in pregnancy is arterial hypertension, which can lead to a very serious danger for mother and child. This condition appears in approx. 10% – 15% of pregnant women and requires timely and effective drug therapy.

The development of operative and minimally invasive methods in cardiology and cardiac surgery of children and adults has led to an increase in the

chances of survival of these patients, so that today we are more often faced with pregnant women who have previously known complex cardiac diagnoses. The older age of the pregnant woman, which is common, leads to a higher number of comorbidities even before pregnancy. Therefore, every pregnant woman is recommended to perform regular monitoring of vital parameters such as blood pressure and pulse, regular laboratory testing in consultation with a competent gynecologist, and in case of pathology, a cardiologist is certainly engaged for further diagnosis and treatment.

Women with known cardiovascular diseases and current therapy should definitely consult a cardiologist when planning a pregnancy. Numerous heart medications can adversely affect pregnancy and the fetus, so therapy is being switched to medications that have been shown not to have a detrimental effect on fetal development. A pregnant woman with cardiovascular disease performs regular cardiac check-ups, which is especially important during pregnancy.

Pregnancy-independent arterial hypertension is defined as high blood pressure that exists before pregnancy or blood pressure greater than 140/90 mmHg diagnosed in the first half of pregnancy and lasting at least 3 months after delivery. This is often a mild to moderate hypertension. In 1–5% of all pregnancies, arterial hypertension occurs as a result of primary (multifactorial causes) or secondary (other diseases) hypertension, which is often predisposed to older and obese women. The prognosis for mother and child depends significantly on maternal kidney function. Women who have high blood pressure before pregnancy are 5 times more likely to give birth to a premature baby of low birth weight. Data from the literature show that 4% of maternal mortality is caused by placental abruption due to hypertension.

Hypertension without the presence of protein in the urine is called gestational hypertension; conversely, if more than 300 mg of protein is found in the urine in 24 hours, this is preeclampsia (or gestosis) which is a life-threatening condition. Regardless of drug therapy, and depending on the level of blood pressure, the age of the pregnancy and additional maternal and fetal risk factors, strict monitoring will be required with limited activity until bed rest. Blood pressure above 170/110 mm Hg in pregnant women is considered an emergency and requires immediate hospitalization. Differential diagnostic consideration should be given to the occurrence of high blood pressure after week 20 of pregnancy, which disappears within 6 weeks of delivery. Due to the increasing prevalence of maternity in old age and the increased risk of

giving birth to children small for their gestational age, further studies of arterial hypertension independent of pregnancy are needed.

If a form of tachycardia is present, it is necessary to reduce the dose of adrenaline in the local anesthetic or apply a pure anesthetic. An increase in heart rate is accompanied by an increase in stroke volume and higher O2 consumption, which often results in pronounced heart tones and possible functional heart murmurs in the form of premature arterial and ventricular beats. It is important that such findings are not misdiagnosed because they disappear soon after birth, and do not require antibiotic prophylaxis, which is indicated in the event that such heart murmurs were present before pregnancy.

School for pregnant women

Pregnancy is a normal physiological process in which exercising and physical activity can be started or continued. Exercise during pregnancy is recommended but adapted to the condition of the pregnant woman's body. The goal is to improve woman's physical shape during pregnancy, at birth and puerperium postpartum in order to ease childbirth and accelerate recovery and the return of a good psychosomatic state after childbirth. This combined program of preparation for childbirth dates back to 1995 and is known as "Lamaze", named after a French doctor.

Before a pregnant woman decides to exercise, she should first request a written permission from her gynecologist that her pregnancy is in order and that there are no contraindications to exercising during pregnancy. If the pregnancy is in order, exercise will be approved and supported. Otherwise, until the pregnancy stabilizes, the woman can attend school, listen to lectures and watch other pregnant women exercise, all which can be very helpful during childbirth. It is very important for a pregnant woman to attend school and start her preparations in a group.

Pregnant women go through prenatal, birth and postpartum preparation, which consist of:

1. Theoretical part – lectures on the physiology and anatomy of a normal pregnancy, childbirth, postpartum recovery, breastfeeding and newborn care.
2. Practical part – breathing exercises and techniques, getting to know the place and staff of the maternity hospital where the birth is planned and thus try to avoid the fear of the unknown.

Lectures should be thematic, prepared by gynecologists, midwives, physiotherapists, pediatricians and psychologists with selected chapters on the anatomy and physiology of pregnancy, childbirth and postpartum periods. The school can be attended by pregnant women accompanied by their partners, but also by a person who has a positive impact on the pregnant woman and who will eventually attend the act of childbirth. Preparations usually last one month, two to three times a week, each 45-60 minutes and are carried out in small groups in adequate clothes and footwear for exercise.

Exercise can be started from the very beginning when the pregnancy is stable. If a pregnant woman has nausea, vomiting, dizziness or feels generally weak, she should consult a gynecologist and delay the start of exercise until her general condition improves. With a good general condition and a normal pregnancy, you can start exercising with the written approval of the attending gynecologist, and under the professional supervision of an educated midwife or physiotherapist.

There is also a small number of pregnant women who decide to exercise independently at home with literature and videos.

Basic rules of exercise in pregnancy:

1. Always exercise before meals or two to three hours after meals.
2. Empty your bladder before exercising.
3. Exercise clothes must be comfortable, cozy and made of natural fabrics, with short socks up to the ankle, so as not to compromise the circulation of the lower extremities.
4. Practice on mats and hard surfaces in an airy room with an open window.
5. A pregnant woman can self-monitor her heart rate (preferably in the lower third of her forearm) and, if necessary, her blood pressure.
6. At the beginning, it is recommended to exercise two to three times a week for 45 to 60 minutes, in series of 3 to 5 times.
   According to the program developed by a physiotherapist or an educated midwife, the number of repetitions of certain exercises is set according to the anamnesis and current assessment of the woman's functional status during pregnancy.
7. Mobile phones must be turned off and all other irritating factors that can prevent continuity of exercise must be eliminated.

After childbirth, the muscles and the pelvic floor are relaxed and the ligaments that secure the uterus are stretched, so there is a possibility that the

uterus drops through, prolapses, or tilts towards the back. A preventive measure is to rest and avoid strenuous physical exertion. While still in the hospital, we recommend that the mother does exercises to strengthen the pelvic floor muscles! These exercises can be done in bed simply by briefly squeezing the vagina and colon several times and then relax (contraction-relax), as well as Koegel exercises. Exercises are performed in the morning and evening, 3 to 5 series with 8-12 repetitions, with a break of one minute. You should try to increase the amount of exercise, so that the training lasts 10-15 minutes two to three times a day.

Relaxation exercises are done in a calm and warm atmosphere and in a suitable room, usually after exercising. The pregnant woman takes a comfortable position and relaxes her entire body – until complete relaxation, or a certain part of the body – partial relaxation. After a couple of deep inhales and exhales, the eyes close and part by part of the body relaxes, starting from the toes and feet to the top of the head. This relaxes the whole body. If we want to partially relax any part of the body, we then first contract a certain muscle group, and then relax them. These exercises are most pronounced during the first and second stage of childbirth, when the mother relaxes between labor or stress, relaxing the whole body and the pelvic floor. This provides a sufficient amount of oxygen that is necessary to achieve an easier and faster birth. Exercises can be performed daily until delivery.

Breathing exercises

Every person breathes in a different way. Most men use the abdominal muscles more, unlike women who use the pectoral muscles.

Chest breathing is performed by placing a hand on the chest and lightly exhale through the mouth, then begin to deeply inhale through the nose and exhale through the mouth pronouncing the letter “Sh” or “S”.

Exhaling must last longer than inhaling. This type of breathing is used by pregnant women only in the initial exercises to notice the difference between chest and abdominal breathing. When a pregnant woman inhales air through her nose, the diaphragm lowers to allow as much space as possible for the lungs to expand, and on exhalation it frees up space for the abdominal cavity and retreats to the starting position.

Abdominal breathing is for the first stage of childbirth and can be done throughout this stage if it is comfortable for the woman. The air is exhaled slowly through the mouth and the abdomen relaxes, air then is inhaled through the nose and continuously exhaled through the mouth pronouncing the letter

"Sh" or "S", with the abdomen retracted. The described breathing is applied during labor in order to achieve the best possible concentration of the mother and reduce the feeling of labor pains.

Short and shallow breathing or so-called panting, is used during the first stage of childbirth when abdominal breathing is no longer comfortable for the woman giving birth. This is usually when labor is more intense and when deep breathing causes a "collision" of the diaphragm and uterus, which causes severe pain. This type of breathing is fast and "superficial" as if the air does not go below the chest. In the breaks between labor, the mother should relax as much as possible. Breathing applied at the end of the first stage of labor is a combination of short and shallow breathing interrupted by a single exhale and inhale, which makes it easier for the woman to control the urge to push when this time has not yet come. In the second stage of childbirth, the woman in labor should follow the instructions of the midwife and the physician. In the act of giving birth, all the forces that direct the child towards the exit through the birth canal should be used. During childbirth, the mother lies on her back, kneels or squats and completely relaxed begins to push. At the beginning of the push, she exhales deeply, then inhales and holds her breath as much as possible, at the same time bending her head and her chin toward her chest and upper body with strong tension, as if wanting to quickly urinate or defecate. The bottom of the pelvis should be relaxed so as not to create resistance to the passage of the baby. All pushing forces are directed in the same direction. In the lower part, the support is the pelvic part of the spine, and in the upper part, the diaphragm, which lowers when you inhale deeply and pushes the uterus down, and the contraction of the abdominal muscles acts as a force from the front. The thighs are bent at the knee and hip all the way to the abdomen, as this takes up the proper axis of the child's passage through the small pelvis. When the mother can no longer hold her breath, she exhales through her mouth and if the push still lasts, she inhales again quickly and presses while the push lasts, and when it stops, complete relaxation follows. This saves the strength needed for the next stage of stress and completion of labor. It is important to point out that during the birth, the woman should not push before going into labor in the narrow sense of the word, and before the conditions for pushing are met and the external cervix is completely dilated and opened, all under the supervision and instructions of a doctor or midwife. Proper breathing in the first stage of birthgiving and pushing the baby in the second stage significantly shorten and alleviate labor.

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