STEPS OF FORMING THE KNOWLEDGE BASE OF PRE- AND POST-PREGNANCY DISEASES

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https://doi.org/10.5281/zenodo.8428337

Abstract. *The article presents methods of treatment of diseases before and after pregnancy in order to form a knowledge base of medical specialists. A set of rules was formed on the signs, types, and symptoms of these diseases. Issues of developing a database of rule sets and forming a knowledge base were considered.*

Keywords: *knowledge base, rule set, disease symptoms, diagnosis, disease treatment methods, adverse events, disease symptoms, pregnancy process, database, disease risk levels.*

Introduction. Currently, computerization of the knowledge of advanced specialists in medicine, that is, creation of a knowledge base, is one of the global problems. In medical practice, the use of a computer in combination with measuring and control equipment makes it possible to create new effective tools for automated collection of information about the patient's condition and processing it in real time.

In order to form the knowledge base of medical specialists, first of all, qualified specialists` methods of treatment of diseases in specific medical fields are studied, their database and set of rules are formed.

When creating a database, the user tries to sort information by various characters and quickly get a selection with an arbitrary combination of characters. This can only be done if the data is structured. Creating a database for data storage, transmission and processing, and then its widespread use remains crucial today. Healthcare, finance, production, trade and other businesses cannot be imagined without a database.

The decision-making process is based on the selection and use of certain mathematical methods: systematic analysis, operations research, forecasting, optimization and simulation. When solving a problem, the human brain does not use all the knowledge it has, but only the knowledge related to this problem. To solve a specific problem, it is possible to create a program in the traditional way, or it is possible to create a program in the way of artificial intelligence. That means the use of artificial intelligence makes solving the problem much easier and faster. A separate part of the compiled programs performs a specific task. However, it has a special feature that it is built on the basis of artificial intelligence, and at the same time, it is close to human intelligence in terms of character, that is, partial changes do not change the entire structure of the existing information program.

If a disease is detected in the patient during the examination, the system automatically alerts the radiologist.

According to this, artificial intelligence technology is used in the healthcare sector to detect and diagnose diseases based on computer tomography analysis of human diseases.

In the article, a sequence of preliminary steps to solve the above-mentioned problems was developed.

The internal structure of diseases before and after pregnancy is shown in the table below, 14 types of diseases, their symptoms and the frequencies of these symptoms in pregnant women are listed.

It was found that changes in the state of the mother during pregnancy actively affect the development of the fetus. In turn, the condition of the fetus is not indifferent to the mother's body.

At different periods of prenatal development, many signals come from the fetus, which are received by the relevant organs and systems of the mother's body and, under their influence, their activity changes. Therefore, the expression of "functional maternal-fetal system" means two independent sets of organisms united with the common goal of ensuring the correct, physiological development of the fetus. All diseases that systematically return during pregnancy are shown in column 1 of the table. Correctly diagnosing patients with the help of artificial intelligence through the signs and frequencies of their diseases, having information about the general condition of patients will control the pregnant woman in the case of a systematic analysis until she gives birth to a healthy child.

The mother's nervous system plays a leading role in the perception of many impulses from the fetus. During pregnancy, the receptors of the uterus are the first to respond to impulses from the growing fetal egg. The uterus contains a large number of different nerve receptors: sensory, chemo-, baro-, mechano, osmoreceptors, etc. The effect of these receptors leads to a change in the activity of the central and vegetative nervous system of the mother. It affects the proper development of the unborn child.

During pregnancy, the function of the central nervous system (CNS) undergoes significant changes. From the moment of pregnancy, an increased flow of impulses to the mother's central nervous system begins, which leads to an increase in temporary changes in the cerebral cortex - the emergence of pregnancy dominance. According to the physiological laws of induction, a field of inhibition of nervous processes is created around the pregnancy dominant. Clinically, this process is manifested in a slightly inhibited state of the pregnant woman, in the predominance of her interests directly related to the birth and health of the unborn child. At the same time, other interests seem to be in the background. When various stressful situations (fear, strong emotional experiences, etc.) occur, in the central nervous system of a pregnant woman, along with the pregnancy dominant, other permanent changes in nervous system may appear. This significantly weakens the effect of the pregnancy dominant and is often accompanied by a pathological course of pregnancy. It is on this basis that all pregnant women should, if possible, create conditions for mental peace both at work and at home.

During pregnancy, the state of the central nervous system changes. Up to 3-4 months of pregnancy, the changes of the cerebral cortex usually decreases, and then it gradually increases. The changes of the main parts of the central nervous system and the reflex apparatus of the uterus decreases, which ensures the relaxation of the uterus and the normal course of pregnancy. Before childbirth, the changes of the nerve elements of the spine and uterus increases, which creates favorable conditions for the beginning of childbirth. During physiological ongoing pregnancy, the tone of the autonomic nervous system changes, so pregnant women often experience drowsiness, tears, increased irritability, sometimes dizziness and other individual disorders. Such disorders usually occur in early pregnancy, and then gradually disappear.

During pregnancy, there are significant changes in the activity of the mother's cardiovascular system. These changes provide the necessary intensity for the delivery of oxygen and various nutrients to the fetus and the removal of metabolic products. During pregnancy, the cardiovascular system works with increased stress. This increase in load is associated with increased metabolism, increased circulating blood mass, development of utero-placental blood circulation, progressive increase in body weight of a pregnant woman, and a number of other factors. As the uterus grows, the mobility of the diaphragm is limited, the pressure in the abdominal cavity increases, the position of the heart in the chest changes.

Digestive system. In the early stages of pregnancy, many women experience morning sickness, vomiting, changes in taste, and intolerance to certain foods. As the gestational age

increases, these phenomena gradually disappear. Pregnancy has an inhibitory effect on the secretion of gastric juice and its acidity. All sections of the gastrointestinal tract are in a state of hypotension due to changes in topographic and anatomical relationships in the abdomen due to the increase of the pregnant uterus, as well as neurohormonal changes characteristic of pregnancy. Here, the effect of placental progesterone on the smooth muscles of the stomach and intestines is of particular importance. This means why pregnant women often complain of constipation. Liver function undergoes significant changes. In this organ, there is a significant decrease in glycogen reserves, which is due to the intensive transfer of glucose from the mother's body to the fetus. The increase in glycolysis processes is not accompanied by hyperglycemia, so the nature of the glycemic curve in healthy pregnant women does not change significantly. The intensity of lipid metabolism changes. This is explained by the development of lipemia, which is a high level of cholesterol in the blood. The content of cholesterol esters in the blood also increases significantly, which indicates an increase in the synthetic function of the liver. During the physiological process of pregnancy, the protein-forming function of the liver also changes, which is primarily aimed at providing for the growing. At the beginning of pregnancy, the frequencies of total protein in the blood of pregnant women is within the normal range for non-pregnant women. However, from the second half of pregnancy, the total protein concentration in the blood plasma begins to decrease slightly. Significant changes are also observed in the protein fractions of the blood (a decrease in the concentration of albumin and an increase in the level of globulins). This is apparently due to the proliferation of finely dispersed albumins through the capillary walls into the tissues of the mother, as well as their consumption by the growing body of the fetus. An important indicator of liver function in pregnant women is the enzyme spectrum of blood serum. During physiological pregnancy, the activity of aspartate aminotransferase (ACT), alkaline phosphatase (AP), especially its thermostable fraction increased. Other liver enzymes undergo slightly smaller changes. During pregnancy, the processes of inactivation of estrogens and other steroid hormones produced by the placenta in the liver increase. During pregnancy, the detoxification function of the liver is slightly reduced. Pigment exchange does not change significantly during pregnancy. Only at the end of pregnancy, the frequencies of bilirubin in the blood serum increases slightly, which indicates an increase in the process of hemolysis in the body of pregnant women.

Significant changes of a clearly adaptive nature occur during pregnancy and in the respiratory system. Along with the circulatory system, the respiratory organs constantly supply the fetus with oxygen, which increases by more than 30-40% during pregnancy. With the increase in the size of the uterus, organs, the abdominal cavity is gradually mixed, the vertical size of the chest decreases, but this is compensated by an increase in its circumference and an increase in the excursion of the diaphragm. However, restriction of diaphragmatic excursion during pregnancy makes lung ventilation somewhat more difficult. This is expressed by a certain increase in breathing (by 10 %) and in the gradual increase in the respiratory volume of the lungs by the end of pregnancy (by 30-40%). As a result, the minute volume of breathing increases from 8 l/min at the beginning of pregnancy to 11 l/min at the end.

An increase in the breathing volume of the lungs occurs due to a decrease in the reserve volume, the vital capacity of the lungs remains unchanged and even slightly increases. Respiratory work increases during pregnancy, but breathing difficulty decreases toward the end of pregnancy. All these changes in the respiratory function ensure the creation of optimal conditions for gas exchange between the mother and the fetus..

The skin undergoes certain changes. In many pregnant women, brown pigment accumulates on the face, chest, and areola due to changes in the function of the adrenal glands. As the gestational age increases, gradual stretching of the front wall of the abdomen occurs. Pregnancy

scars appear as a result of the release of connective tissue and elastic fibers of the skin. Pregnancy scars look like belt-shaped pink or blue-purple lines. Most often, they are located on the skin of the abdomen, less often - on the skin of the mammary glands and thighs. After birth, these scars lose their pink color and take on the appearance of white lines. In subsequent pregnancies, on the background of old pregnancy scars, new ones with a characteristic pink color may appear. In the second half of pregnancy, the navel flattens and then goes out. In some cases, during pregnancy, hair growth on the skin of the face, abdomen and thighs is noted, which is associated with an increase in the production of androgens by the adrenal glands and partly by the placenta. Hypertrichosis is temporary and gradually disappears after childbirth.

Table 1. Types of diseases and their symptoms

№	Types of diseases	Symptoms of diseases	Frequency
	Diseases of the nervous system	Sleep disturbance	2-3
		Memory loss in everyday situations	3-4
		Fatigue quickly	2-3
		Losing temper	3-4
		Frequent heart palpitations	2-3
		Sweating	2
		Trembling of arms and legs	1-2
	Diseases of blood circulatory system	Dizziness and ringing in the ears	1-2
		Panting	1-2
		A feeling of lack of air	2
		Heart palpitations	2
		Seeing black spots visually	2-3
	Diseases of the digestive system	Abdominal drip	3-4
		Burping with bitter liquid, boils in urine	2-3
		Loss of appetite, unpleasant taste in the mouth	3-4
		Stomach ache	2-3
		Nausea and vomiting	2-3
	Diseases of the skin and subcutaneous tissues	Redness of the skin	During a week
		Wound	During a month
		Lines on skin	During a month
		Erosion	During a month
	Infectious and parasitic diseases	Abdominal pain	1-2
		Nausea	1-2
		Diarrhea	2-3
		Vomitting	1-2
	Diseases of the endocrine system	Fatigue	2-3
		Stress	1-2
		Active hair loss or rapid growth	During a month
		Sudden changes in body weight	During a month
		Getting nervous	2-3
	Mental and behavioral disorders	Sleep and insomnia	3-4
		Change in appetite	2-3
		Being alone	2-3
		Engaging in self-harm	1-2
	Respiratory diseases	Shortage of breath	2-3
		Dry cough	1-2
		A feeling of heaviness in the chest	1-2
	Chronic hepatitis	Dull pain under the right rib	1-2
		Powerlessness	2-3
		Loss of appetite	1-2
		Nausea	2-3
		Bile vomiting	1-2
		Dry mouth	2-3
	Diseases of the gall bladder and bile ducts	Pain in the upper right side of the abdomen	1-2
		Nausea	1-2

		Vomitting	1-2
		Jaundice	During a day
	Diseases of the pancreas	Pain in the upper abdomen	1-2
		Abdominal pain that radiates to your back	1-2
		The speed of the pulse in the veins	2-3
		Nausea	2
		Abdominal tenderness when touched	3
		Nausea	2
		Vomitting	2
	Liver cirrhosis	Feeling very tired and weak	3
		Nausea	3
		Loss of appetite	2
		Loss of weight and muscle mass	During a month
		Yellowing of the skin and whites of the eyes	During a week
	Diabetes	Frequent urination	5-6
		Fatigue	3-4
		Constant hunger	4-5
		Constant fatigue	3-4
		Numbness and pain in extremities	2-3
	Neurosis	Sudden mood swings	3-4
		Hypersensitivity;	2
		Crying	1-2
		Anxiety increased;	4-5
		Sensitivity loud sounds,	Mostly in the evening
		Fatigue quickly;	6-7
		Decreased attention and memory;	2-3
		Sleep disturbance.	2
		Overall weakness	During a day
		Increased sweating;	6
		Decreased blood pressure;	1-2
		Nausea;	During a day
		Increased urination.	10

As a result of disease symptoms and frequencies, disease types were determined. In order to form the knowledge base of medical professionals, according to 14 types of diseases that occur before and after pregnancy and their symptoms, the frequencies of disease symptoms were determined. Taking this into account, 14 diseases were classified in the table as a result of the classification of the symptoms and frequencies of these diseases to create a knowledge base.

To form the structure of the knowledge base about diseases before and after pregnancy, the following sequences were performed:

- patient information sheet (questionnaire);
- types of diseases;
- disease symptoms;
- diagnostics;

The structure of the knowledge base about the diseases compiled by the above table, the diagnoses given to pregnant women are aimed at pre-analysis of the symptoms of the disease in pregnant women and their prevention, as well as giving specific advice to the patient at the next stages of diagnosis and prevention of the disease.

Summary

When creating a database, the user tries to sort information by various characters and quickly get a selection with an arbitrary combination of characters. This can only be done if the data is structured. Creating a database for data storage, transmission and processing, and then its widespread use, remains essential today.

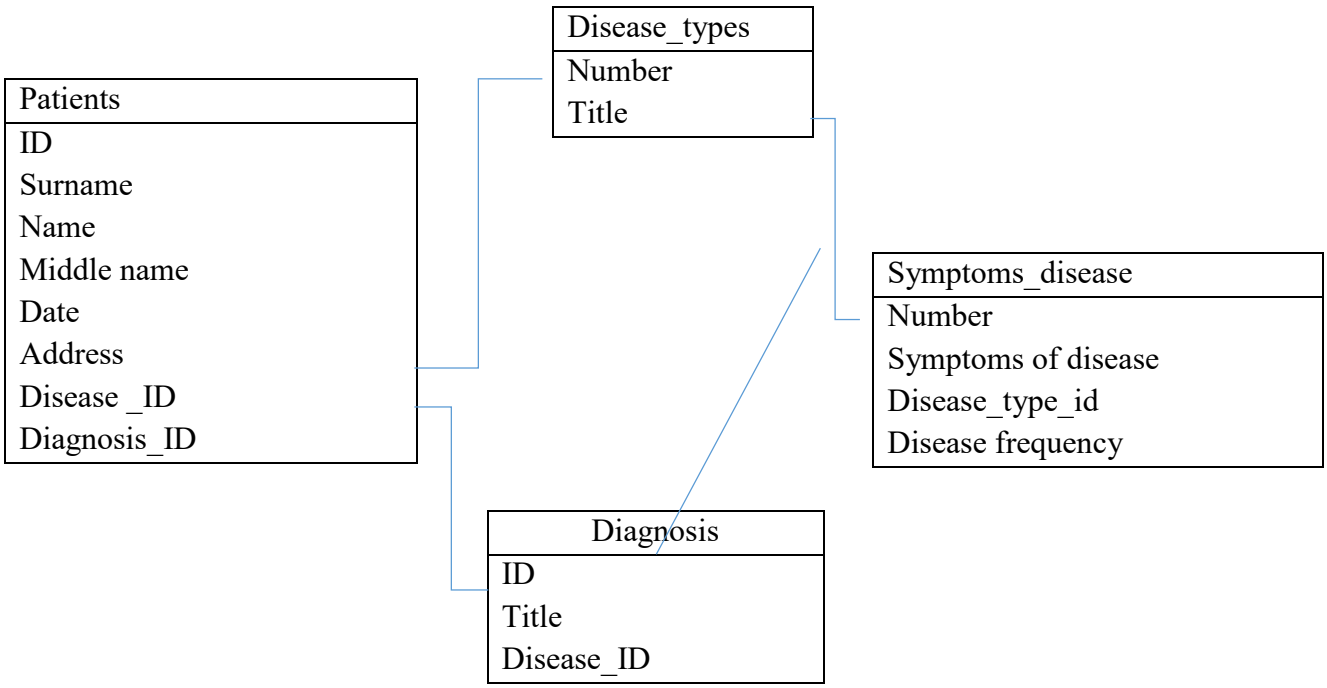

Figure 1. The structure of the disease knowledge base.

In conclusion, a sequence of initial steps has been developed to avoid the abovementioned problems. That is, 14 types of diseases and their symptom frequencies were classified. The structure of the knowledge base about diseases before and after pregnancy was created.

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