Overweight and obesity were described, by the WHO (World Health Organization) as the epidemic of the 21st century. In Poland, over 54% of adults are overweight or obese. The excessive body weight is not only individual problem but also the problem of society. Obese people get sick more often, than persons with correct body mass, from diseases such as: diabetes, hypertension, cancer, atherosclerosis and costs of their treatment are higher. The incorrect dietary habits, including the consumption of sweets and other foods rich in sucrose and monosaccharides (fructose and glucose) as well as fat, is a major risk factor for obesity. Fructose is found in food as a natural ingredient and is used as a sucrose replacement. Food producers add fructose to products (as fructose-glucose syrup) in large quantities, thus its intake is increasing. Excess of simple sugars disturbs carbohydrates and fat metabolism. It leads to increase lipid accumulation in different organs and tissues of the body, and to increase body weight. Consumption of large quantities of fat products, especially rich in saturated fatty acids, may increase the synthesis of free radicals and induce oxidative stress as well as the lipids accumulation of fat in various organs and tissues of the body, leading to obesity.

In recent years, many studies have focused on issues related to the functioning of adipose tissue and the prevention and effective treatment of overweight and obesity. Scientists have studied the compounds, which naturally occur in plants and which may affect the fat metabolism in the body, for example by hindering its absorption from food or by accelerating the burning of fatty acids. Fruits and leaves of sweet cherry can be a source of this compounds. Among the other fruits and vegetables, sweet cherries are one of the richest sources of anthocyanins, which may affect the fat and carbohydrates metabolism. Fruits of sweet cherry also are rich in a vitamin C, potassium and zinc as well as they have high antioxidant activity. It is supposed, that if the fruits contain significant amounts of bioactive compounds, it is possible that also leaves have the beneficial composition. Recent studies have shown that there was a relationship between the bioactive components of food and the functioning of genes. There is a hypothesis that sweet cherry also, as an excellent source of bioactive components, have such properties. Knowledge of these relationships will allow dieticians and doctors to design individual nutritional recommendations, which could be helped to protect and treat the society with chronic non-communicable diseases.

Therefore the aim of the research is:
• to determine the content of protein, fat, minerals, dietary fiber and polyphenols, anthocyanins, vitamin C as bioactive components in the fruits and leaves selected varieties of sweet cherry
• assessment of the effect of addition the sweet cherry to the experimental diets (high fructose and high fat diet) of rats on selected biochemical parameters and expression of genes involved in fatty acid metabolism. It is also planned to evaluate whether the achieved effects depend on the dose of sweet cherry and used part of the plant (leaves and fruits).

Based on the results of the first stage, it will be selected the best variety, which will be used in animal studies.
During the animal study, two experiments with rats are planned. In the first experiment high fructose diet and in the second experiment high fat diet will be used. Fruits and leaves of sweet cherries will be addition to the diet and in both experiments will be the same (5 and 10% fruit as well as 1 and 3% of the leaves).
The addition of fruits and leaves of sweet cherry to the experimental will allow to verify research hypotheses:
• the fruits of sweet cherry are rich source of bioactive compounds but content of these substances may be different among varieties as well as between leaves and fruits,
• the addition of sweet cherry to a high fructose and high fat diet causes decrease in cholesterol levels in the blood and reduction of inflammation and oxidative stress in rats as well as that there is a relationship between the bioactive components and the expression of mRNA genes involved in fatty acid metabolism.
The study material will be a blood serum of animals and organs: liver, heart, kidneys and adipose tissue.

If beneficial effects of sweet cherry on the fat metabolism will be shown, it may help in the prevention and treatment of overweight and obesity as well as reduce the costs on health care. The results can be used to promote sweet cherries as seasonal fruits, which help in the fight against obesity.