

Epidemiological data indicate that obesity is a one of the main health problems of the 21st century. According to World Health Organization, in 2014 about 13% of the world's adult population were obese and 39% were overweight. That metabolic disorder epidemic continues to spread and lately almost half of Polish adults suffer from it. What is more, there is an increasing tendency of obesity occurrence not only among adult population, but also among children. This chronic disease is also a risk factor for diabetes, hypertension, coronary atherosclerotic heart disease and certain cancers. It is characterized by an increase in the mass of adipose tissue, specifically white adipose tissue. Adipogenesis is the process by which preadipocytes mature into adipocytes through cell differentiation and regulation of that process may be one critical pathway for controlling or reversing obesity. It is regulated by various transcription factors, such as peroxisome proliferator-activated receptor gamma (PPAR γ). Their activation regulates expression of other genes encoding proteins responsible for fat cell development. In recent years, natural plant-derived compounds possessing antiobesity potential have been widely investigated and among the most promising phytochemicals are those, which are able to suppress adipogenesis by regulation of PPAR expression and/or its transcriptional activity. During our preliminary studies we have found that a guelder rose (*Viburnum opulus*) fruit extract possesses such activities. Therefore, the specific aims for the proposed studies are: (1) to isolate and identify guelder rose (*Viburnum opulus*) fruit components showing high activity as adipogenesis inhibitor(s); (2) to explain molecular mechanism with use of four different cell lines (human hepatoma HepG2, mouse 3T3L1 preadipocytes, rat L6 myoblast, mouse insulinoma Min6) and (3) to estimate stability and bioavailability of the most active compounds in cell culture media and during a simulated *in vitro* digestion process, respectively. Implementation of the planned research might yield benefits because results of the studies will allow development of the guelder rose cultivation, promotion of anti-obesity activities of the fruits and production of the fruits-based functional food dedicated to overweight and obese persons.