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### **The assessment of the influence of manual lymphatic drainage on biochemical parameters in people with improper weight. The description of chosen cases.**

**Keywords:** manual lymphatic drainage, obesity, overweight, metabolic syndrome, carbohydrate metabolism, lipid metabolism.

**Introduction:** Lymphatic drainage is usually used as a manual therapy in people after oncological surgeries, chemotherapy, radiotherapy and as well as in overweight individuals. Lymphatic drainage contributes to the increase of lymph circulation. It can partly cause accelerated removal of damaged metabolites, increased dynamic of body fluids and decreased activity of sympathetic nervous system. It is particularly used in the treatment of lymphedema and lipedema which can be a result of genetic defects, venostasis, excessive physical effort, injuries or oncological diseases. The literature also reports about rare cases which suggests that not only the lymphatic system disorder can cause lymphedema, but may also lead to the increased risk of hypertension, atherosclerosis or insulin resistance.

**Aim:** Evaluation of the impact of manual lymphatic drainage on carbohydrate and lipid metabolism in the group of three chosen women.

**Materials and methods:** The research realization was approved by Independent Bioethics Committee for Scientific Research at Medical University of Gdańsk (approval number: Uchwała nr NKBBN/692/2019-2020).

The patients were recruited from Poradnia Kardiologii i Chorób Wewnętrznych in Gdynia. The therapy of three women, in the age ranging from 30 to 59 years old, was presented. The patients were subjected to the therapy of lymphatic drainage of abdomen ten times (30 minutes, 2-3 times per week).

There was also a blood test conducted- before and after the therapy. The test included: glycated haemoglobin HbA1c, C-peptide, C reactive protein, lipid panel and blood glucose (point 0 and 120). The patients were given a health questionnaire. The obesity level was defined by the BMI (Body Mass Index) and WHR indicator (weight to hip ratio).

### **Results:**

Patient nr 1 (CT): 59 years old, 27,5 kg/m<sup>2</sup>; average pressure 122/85 mm HG; before/ after respectively- HbA1c 5,5% / 5,6%; Glucose<sup>0'</sup> 91/95 mm/dl; Glucose<sup>120'</sup> 103 mm/dl; total cholesterol 253/239 mg/dl; HDL 51/47 mg/dl; LDL 177/169 mg/dl; Triglycerides 125/109 mg/dl; CRP 3,6/3 mg/l; C-peptide 2.95/2.23 ng/ml.

Patient nr 2 (NH): 30 years old, BMI 35.42 kg/m<sup>2</sup>; average pressure 120/77 mm Hg; before/ after respectively HbA1c 5,6% / 5,6%; Glucose<sup>0'</sup> 105/b.z. mg/dl; Glucose<sup>120'</sup> 69 mg/dl; total cholesterol 194/211 mg/dl; HDL 57/55 mg/dl, LDL 111/144 mg/dl, Triglycerides 131/61 mg/dl; CRP 1.3/1.9mg/l; C-peptide 2.4/1.9 ng/ml.

Patient nr 3 (CA): 49 years old, BMI 21,67 kg/m<sup>2</sup>; average pressure 121/74 mm Hg; before/ after respectively HbA1c 5,6% / 5,6%; Glucose<sup>0'</sup> 97/94. mg/dl; Glucose<sup>120''</sup> 81 mg/dl; total cholesterol 213/214 mg/dl, HDL 67/66 mg/dl; LDL 135/134 mg/dl; Triglycerides 51/67 mg/dl, CRP <1/2mg/l, C-peptide 1,16/1.21 ng/ml.

**Conclusion:** The therapy in overweight patient resulted in a decrease of: CRP, few elements of lipid panel, triglycerides, C-peptide. In the case of obese patient, there was an increase of: lipid panel and CRP. However, there was also a decrease in C-peptide and triglycerides. In the case of the patient with proper BMI, the results were the most stable. The continuation of research is necessary to establish if manual lymphatic drainage may be helpful in the treatment of early phases of insulin resistance in obese people.