

## Introduction

Visceral obesity is associated with the development of metabolic disorders. The brown adipose tissue (BAT) is responsible for thermogenesis and its activation has become a new object both as a determinant of metabolic health and as a target for therapy. **The aim of our study** is to assess the presence of relationships between the presence of BAT, metabolic parameters and dynamic of body mass index (BMI) during weight-reducing therapy.

## Materials and methods

The study included patients (men and women) with obesity (BMI > 30 kg/m<sup>2</sup>). They were needed to be ready to comply with dietary and lifestyle recommendations, take drugs for 6 months according to the treatment group and also they should not have contraindications to the therapy prescribed in the study. Patient characteristics are presented in the table:

Indicator	Patients with obesity (n = 38)
Age, years	31,6±7,5
% male/female	21/79
BMI, kg/m <sup>2</sup>	34,05±2,66
Patients with brown adipose tissue, %	19,6
Uric acid, mmol/L	0,34±0,05
Glucose, mmol/L	5,28±0,78
Insulin, pmol/L	137,9±87,7
HOMA-IR	4,57±2,78
HOMA-B	312,8±373,4
TC, mmol/L	4,34±0,91
HDL-C, mmol/L	1,22±0,24
LDL-C, mmol/L	2,53±0,65
TG, mmol/L	1,29±0,35
CRP, mg/L	4,68±2,99
SBP, mm Hg	127,0±13,9
DBP, mm Hg	78,8±7,9

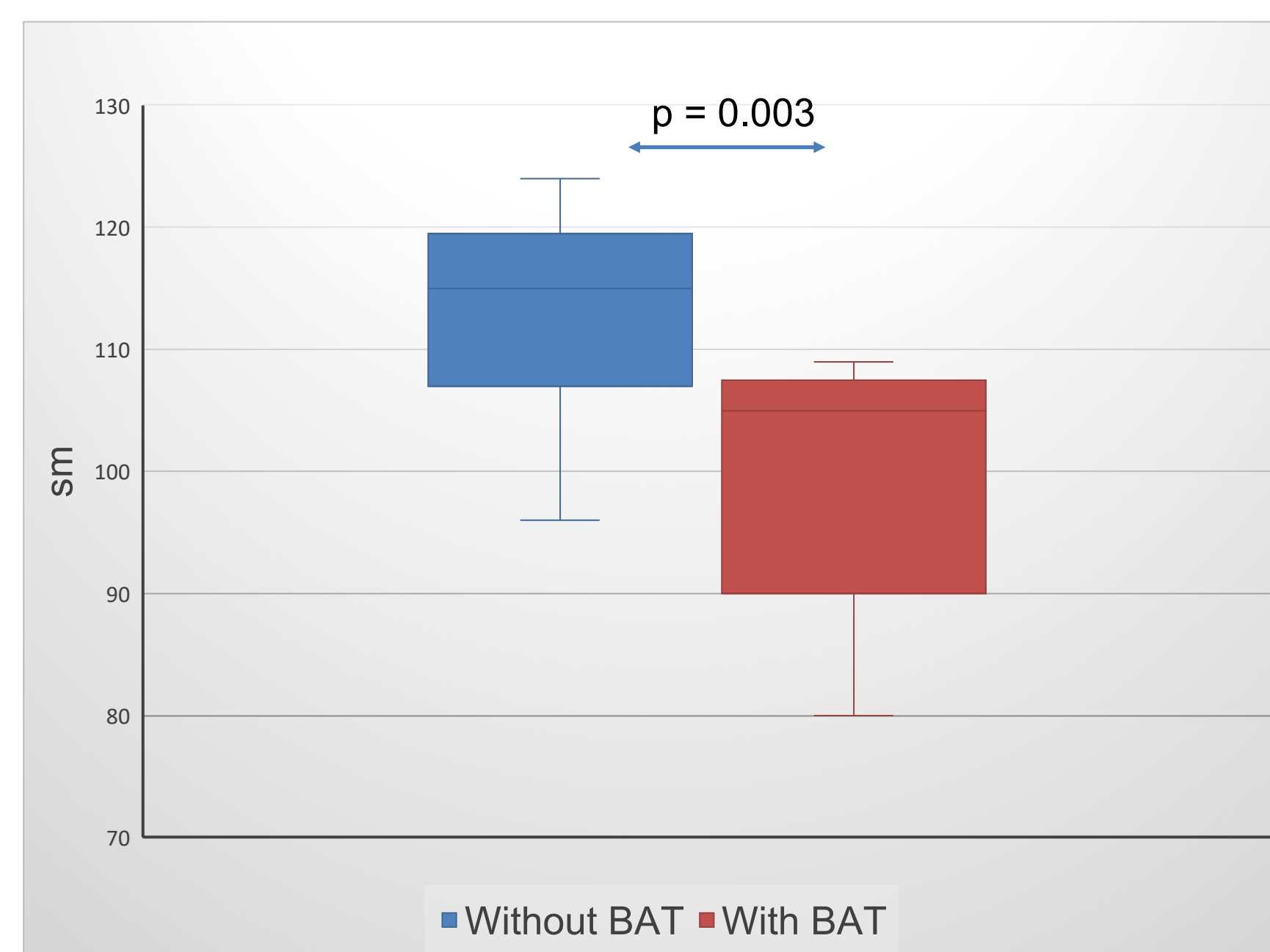
**BMI** - Body Mass Index. **HOMA-IR** - Homeostasis Model Assessment of Insulin Resistance. **HOMA-B** - Homeostasis model assessment - pancreatic B-cell function. **TC** - Total cholesterol. **HDL-C** - High-density lipoprotein cholesterol. **LDL-C** - Low-density lipoprotein cholesterol. **TG** - Triglycerides. **CRP** - C-reactive Protein. **SBP** - Systolic Blood Pressure. **DBP** - Diastolic Blood Pressure.

Assessment of metabolic parameters (fasting glucose, glycated hemoglobin, lipids), anthropometric parameters (BMI, blood pressure, waist circumference (WC)). PET/CT with 18F-fluorodeoxyglucose was performed to determine the presence of BAT. Densitometry in the «Total body» mode was performed to estimate the amount of fat mass/fat free mass. After examination, patients were randomized to treatment with Reduxin 10 mg/day (n = 18) or Reduxin Forte (10 mg Reduxin and 850 mg Metformin) (n = 20). Patients were taken therapy for 6 months with followed by a re-examination.

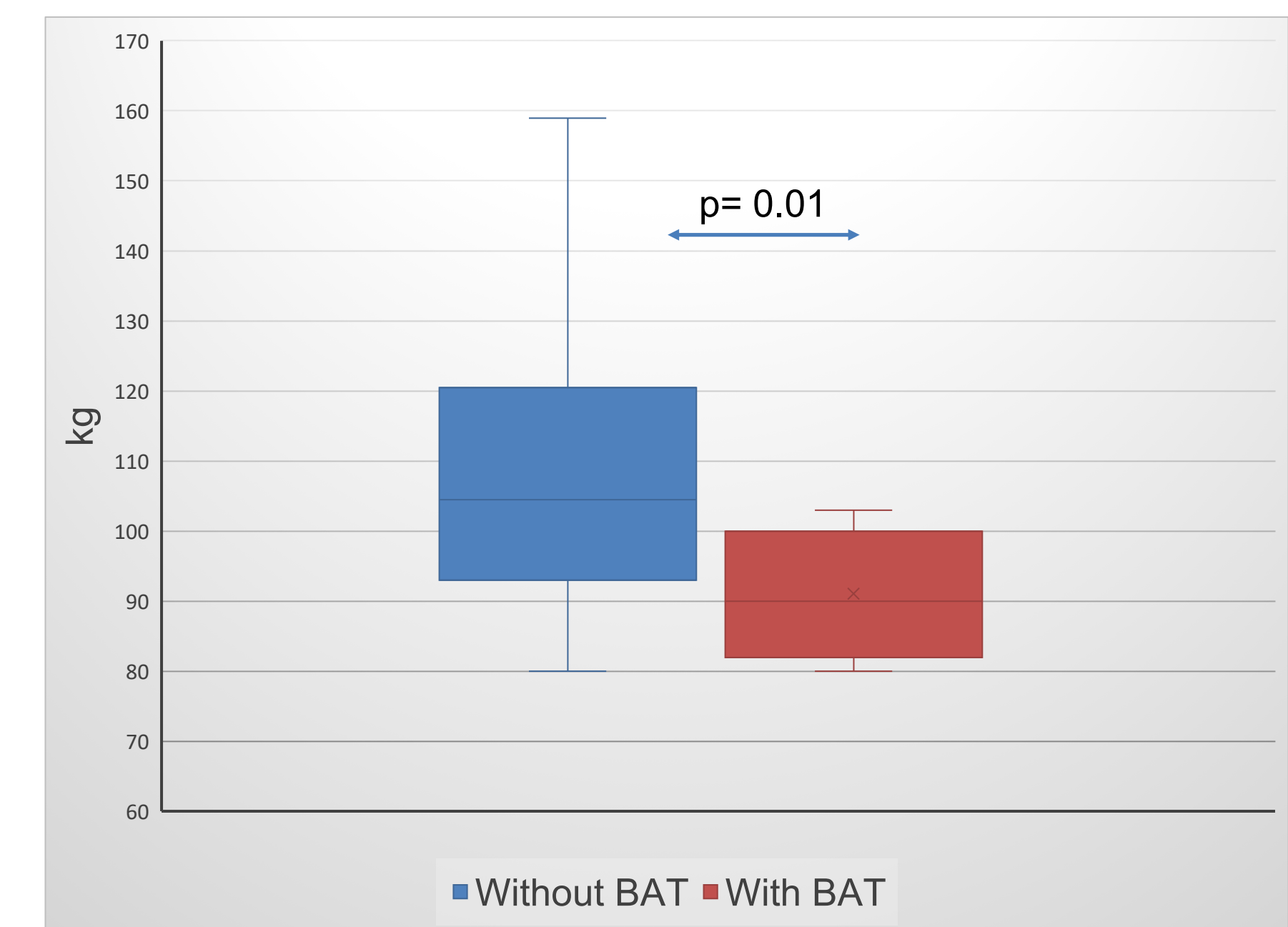
## Results

Patients having classical brown adipose tissue from PET/CT with 18F-FDG had lower weight and lower fat mass (p = 0.003), lower waist circumference (p = 0.003) before starting therapy, also less lipid impairment: higher level of HDL-C and lower level of TG. The incidence of glucose intolerance was not significantly different between the groups (23.3% without BAT versus 22.2% with BAT), as was the incidence of arterial hypertension (AH) (24.1% with BAT versus 22.2% without BAT). Weight loss did not depend on the presence of BAT, but depended on the medical treatment types, so it was higher on Reduxin than on Reduxin Forte (p < 0.05). Therapy with Reduxin as opposed to Reduxin Forte increased the percentage of patients with BAT.

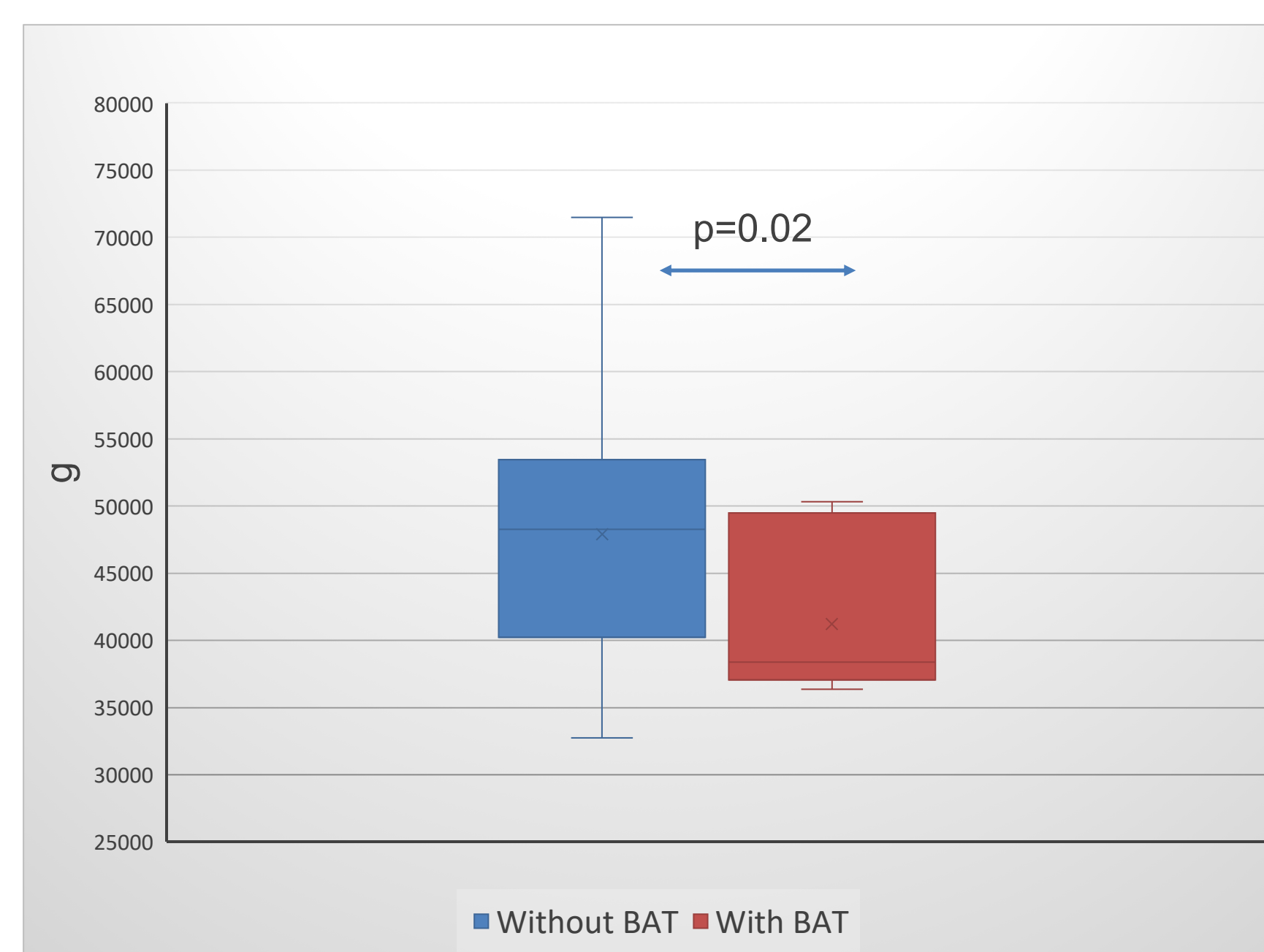
Waist circumference depending on the presence of brown adipose tissue



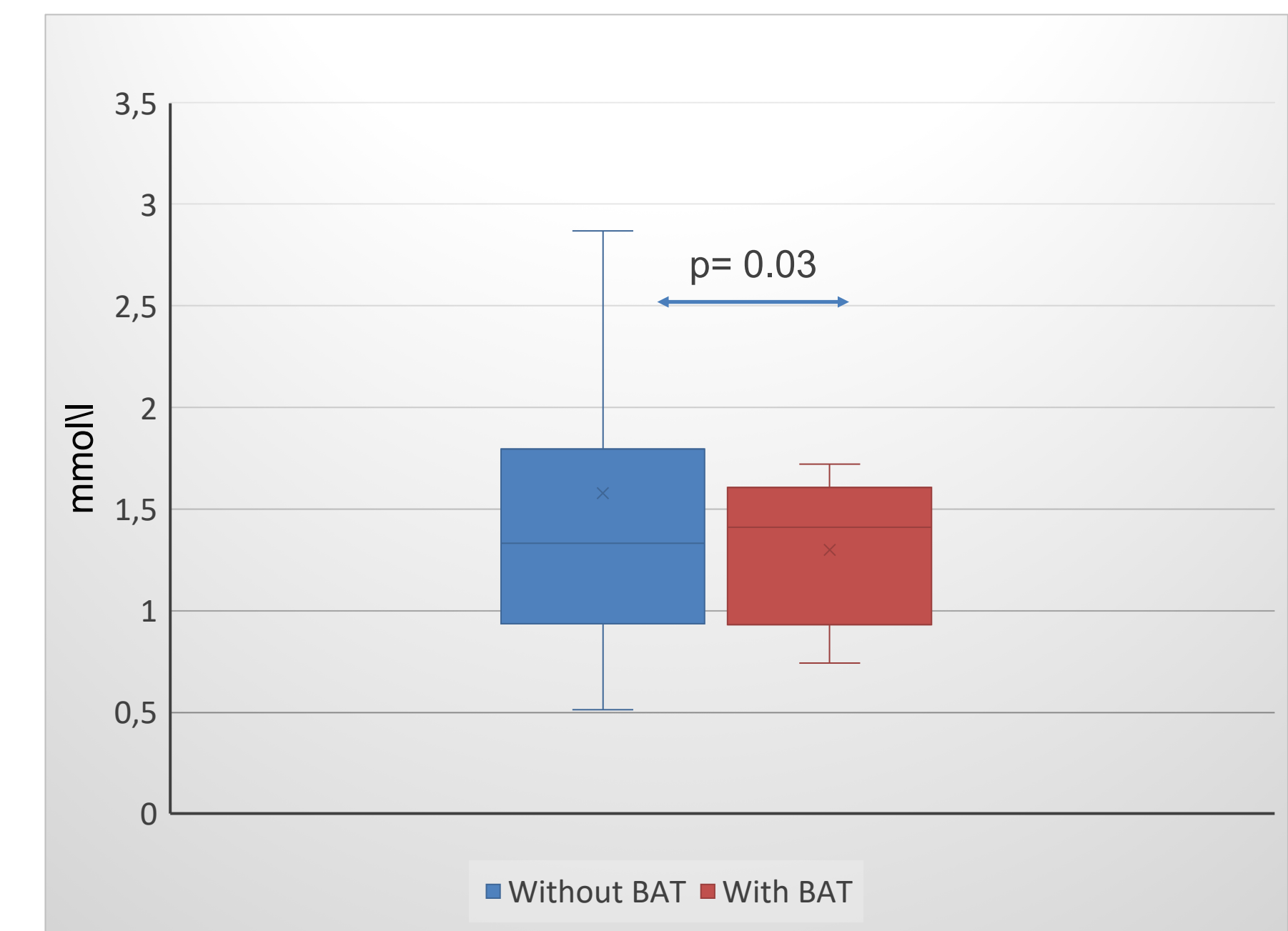
Weight depending on the presence of brown adipose tissue



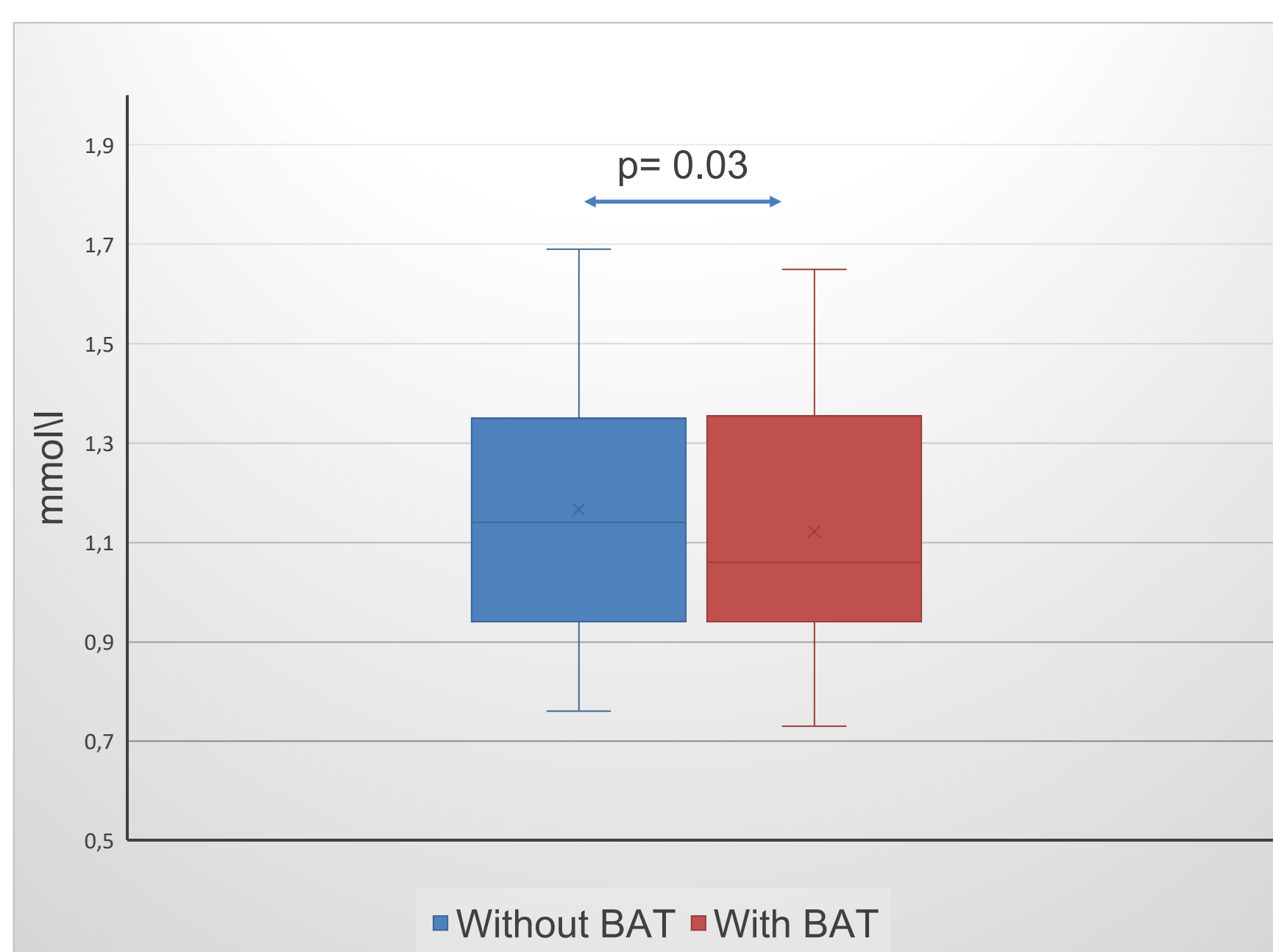
Fat mass depending on the presence of brown adipose tissue



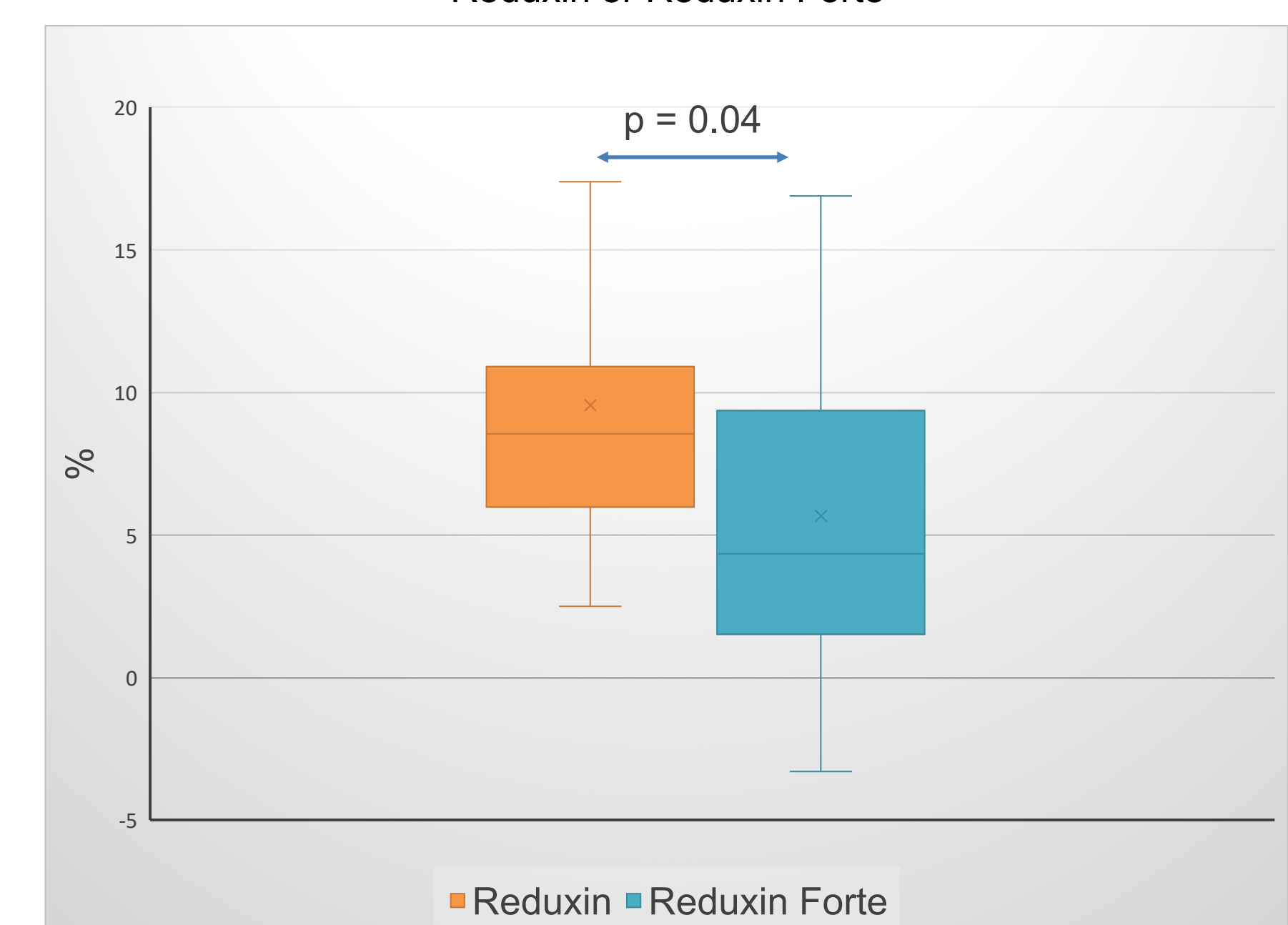
Triglycerides depending on the presence of brown adipose tissue



HDL-C depending on the presence of brown adipose tissue



Average weight loss depending on the type of therapy: Reduxin or Reduxin Forte



## Conclusion

The presence of BAT is associated with a better body composition (less waist circumference, less body fat) and with improved lipid parameters (lower TG level, higher HDL level). Thus, our data suggest that the presence of BAT is associated with a lower risk of lipid metabolism disorders and is a protective factor in metabolic health. Nevertheless presence of BAT does not affect the degree of weight loss using the therapy. Meanwhile, the therapy by Reduxin may increase the number of classic BAT in a long-term therapy, which may be considered as one of the mechanisms of drug's action. The dynamics of weight loss did not depend on the presence of BAT, however, it was more effective on Reduxin than on Reduxin-Forte in case of decreasing body weight.

## Acknowledgements

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