Summary

The aim of the study was to investigate the relationship between dietary and lifestyle patterns and the risk of obesity and metabolic abnormalities in young men. The study was conducted in two stages as a cross-sectional study (stage I) and a cohort study (stage II). The cross-sectional study was carried out in 2017-2018 in 358 men aged 19-40, followed-up by a cohort study after 2 years in 95 men who participated in the first stage of the study.

Diet and lifestyle data were collected using a multicomponent food frequency questionnaire (KomPAN®). Dietary and lifestyle patterns were derived from the data collected in the first stage of the research using principal component analysis (PCA), including 25 dietary variables and 6 lifestyle variables. Diet quality was determined using two diet quality indices (predefined nutrition patterns): the pro-healthy diet index (pHDI) and the unhealthy diet index (nHDI), separately from the data collected in the 1st and 2nd stage of the research. Indicators of metabolic health were measured and analysed in both phases of the study.

The following indices and criteria were used in the assessment of body mass and body composition: body mass index (BMI, overweight: BMI=25–29.9 kg/m^2; obese: BMI=30–34.9 kg/m^2), waist-to-height ratio (WHtR, central obesity: WHtR≥0.5), body fat mass percentage (%FM, general obesity: %FM≥25%), amount of visceral adipose tissue (VAT, excessive amount of visceral adipose tissue: VAT≥median) and skeletal muscle mass (SMM, large muscle mass: SMM≥median).

Metabolic risk factors were considered in those with elevated levels of: fasting blood glucose (FBG≥100 mg/dl), triglycerides (TG≥150 mg/dl), total cholesterol (TC≥200 mg/dl) and systolic or diastolic blood pressure (≥ 130 or ≥85 mmHg). Changes after 2 years were determined by calculating relative differences (RD, %) in mean values and distributions of metabolic health markers.

Four patterns of dietary-lifestyle patterns were derived and labelled accordingly to the characteristics of the variables included in the given pattern. Multivariate logistic regression showed the greater adherence (upper vs. lower tertile as the reference group) to the "Protein food, fried-food, and recreational physical activity" pattern was associated with higher odds of being overweight and increased skeletal muscle mass and lower odds of the occurrence of: general obesity, an excessive amount of visceral adipose tissue and elevated levels of total cholesterol in the blood. Greater adherence to the "Healthy diet, active, past smokers" pattern was associated with higher odds of being overweight and lower odds of general obesity, excess visceral adipose tissue, and elevated blood glucose levels. Greater adherence to the "Sandwiches and convenient diet" pattern was associated with higher odds of central obesity, general obesity, excess visceral adipose tissue, elevated blood triglycerides, elevated total cholesterol, at least two metabolic risk factors, and lower odds of increased skeletal muscle mass. Greater adherence to the "Fast foods and stimulants" pattern was associated with higher odds of central obesity, general obesity, excessive visceral adipose tissue, and lower odds of increased skeletal muscle mass.

After two years, changes in diet quality were observed in three out of four dietary-lifestyle patterns. Changes in metabolic health were observed across all patterns. There were no significant changes in family, socio-economic and demographic status, and lifestyle factors. Among men with higher adherence to "Protein food, fried-food, and recreational

physical activity" and "Healthy diet, active, past smokers" patterns a deterioration in diet quality was observed, which was expressed in the decrease in the value of the pHDI index (RD=-13.6% and RD=-14.6%, respectively), as well as the worsening of adiposity indicators. Among men with higher adherence to "Sandwiches and convenient diet" pattern, an improvement in diet quality was observed, expressed as decrease in the value of the nHDI index (RD=-25.3%) as well as a decrease in fasting blood glucose (RD=-6, 1%). No significant changes in the diet were observed among men with higher adherence to the "Fast foods and stimulants", while obesity and systolic blood pressure increased.

Overall, dietary- lifestyle patterns that included healthy eating behaviours combined with an active lifestyle were associated with a lower risk of developing metabolic abnormalities, despite the presence of some unhealthy behaviours such as smoking in the past and eating fried foods. Unhealthy dietary-lifestyle patterns, in which a poor diet was accompanied by the use of stimulants, were associated with poorer metabolic health, despite the relatively young age of men. In a two-year perspective, the improvement of the diet was associated with improved glycaemic control, despite the lack of changes in body weight, while the deterioration of diet quality or the persistence of unhealthy eating behaviours was associated with worsening of metabolic health. The key conclusion of this study is that even small changes in the diet implemented over a relatively short period of time (2 years) can improve the metabolic health of young men.

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