

Belovičová Mária<sup>1,2,3</sup>, Popovičová Mária<sup>1</sup>,  
Babečka Jozef<sup>4</sup>, Ivanková Viera<sup>5,6</sup>, Hudáková Tatiana<sup>5,7,8</sup>

## Metabolic syndrome in seniors – project results

- <sup>1</sup>St. Elizabeth University of Health and Social Sciences,  
Bratislava  
<sup>2</sup>Internal Clinic for Liver Disease Diagnosis and Treatment,  
Remedium s.r.o., Bardejov Spa  
<sup>3</sup>SSPO Bardejov  
<sup>4</sup>Catholic University in Ruzomberok,  
Faculty of Health  
<sup>5</sup>St. Elizabeth University of Health and Social Sciences,  
Bratislava (doctoral student)  
<sup>6</sup>Hospital and Health Care Centre (NsP), Michalovce  
<sup>7</sup>Medical Secondary School, Michalovce  
<sup>8</sup>Hospital and Health Care Centre (NsP), Trebišov

Беловічова Марія<sup>1,2,3</sup>, Поповічова Марія<sup>1</sup>,  
Бабечка Йозеф<sup>4</sup>, Іванкова Вера<sup>5,6</sup>, Гудакова Татяна<sup>5,7,8</sup>

## Метаболічний синдром у людей похилого віку – результати проекту

- <sup>1</sup>Університет здоров'я та соціальних наук Св. Єлизавети,  
Братислава  
<sup>2</sup>Внутрішня клініка діагностики та лікування  
захворювань печінки, Remedium s.r.o., Bardejov Spa  
<sup>3</sup>SSPO Bardejov  
<sup>4</sup>Католицький університет у Ружомбероку,  
Факультет охорони здоров'я  
<sup>5</sup>Університет здоров'я та соціальних наук Св. Єлизавети,  
Братислава (докторант)  
<sup>6</sup>Лікарня та центр охорони здоров'я (NsP), Міхайловець  
<sup>7</sup>Медичний фаховий коледж, Міхайловець  
<sup>8</sup>Лікарня та центр охорони здоров'я (NsP), Требішов

mriab9@gmail.com

### Introduction

Metabolic syndrome currently affects around 20-30% of the adult European population of working age. The incidence of metabolic syndrome increases significantly with age. It rises up to 40% in the older age categories over 60. Patients diagnosed with metabolic syndrome have approximately four-fold higher risk of developing ischemic heart disease and approximately 25-fold higher risk of developing type 2 diabetes mellitus compared to patients without the development of metabolic syndrome. The incidence of metabolic syndrome and its components in Slovakia is comparable to the incidence in European population in other countries [5].

**The aim of the research** was to determine the incidence of metabolic syndrome (MS) and the nutritional status of seniors in care homes in the Bardejov district. All examinations were carried out on a voluntary basis. The project consisted of several phases: a) weighing the seniors on a Tanita scale; b) determination of the fat spectrum from capillary blood (CHOL, TAG, HDL, LDL, CHOL/HDL, /HDL); c) venous blood sampling (albumin, total proteins, glycemia, urea, creatinine, uric acid, AST (aspartate aminotransferase), ALT (alanine aminotransferase), ALP (alkaline phosphatase), GMT (gammaglutamyltransferase), CHOL, TAG, TBIL. Subsequently, we compared the results of individual facilities.

### Characteristics of the research sample group and methodology

The project "Metabolic syndrome in seniors in care homes in the Bardejov district" ran from 6/2021 to 7/2022. It was carried out within the institutional project of St. Elizabeth

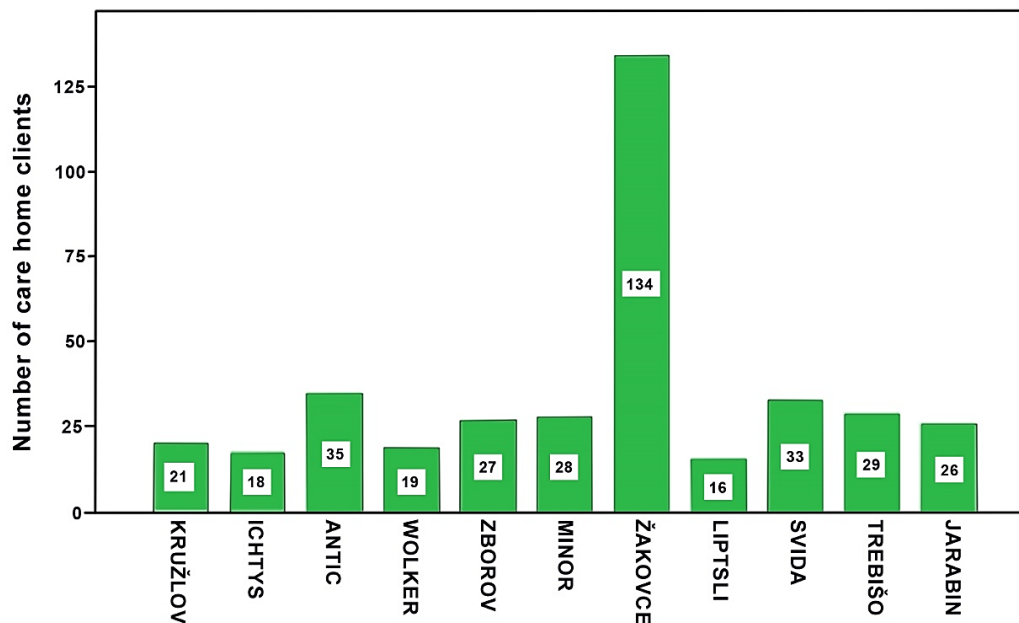
University of Health and Social Sciences in Bratislava and the Slovak Society of Practical Obesity (SSPO).

Leading researchers of the project: Prof. MUDr. Mária Belovičová, PhD., Doc. PhDr. Mária Popovičová, PhD. MBA. mim. prof., PhDr. Jozef Babečka, PhD. Research team: PhDr. Viera Ivanková, PhDr. Tatiana Hudáková, MPH., Mgr. Ivana Klobošová, PhD. MPH, Doc. RNDr. Pavel Matula, CSc.

During the project, we visited a total of 12 facilities: DSS (care home) Lipový dom in Kružlov, DSS Antik in Bardejov, DSS Pro Vitae in Zborov, ZSS (Social Services Facility) Minor in Zborov, DSS on Wolkerová street in Bardejov, DSS Ichthys in Bardejov Spa, DSS Svida in Svidník, DSS Jarabina, IKV (Institute of Christ the High Priest) in Žakovce, IKV House of Divine Mercy in Ľubica, DSS in Liptovské Sliače, DSS Prameň nádeje in Trebišov.

**In total, on a voluntary basis, we examined 620 people (386 clients/62.3% and 234 employees/37.7%).** Men made up 34% of the group (211), women 66% (409). The average age of clients was 72.7 years, the average age of employees was 47.1 years. We examined a total of 21 clients in Kružlov, 18 clients in the Ichthys facility, 35 clients in the Antic facility, 19 clients in Wolkerová Street, 27 in DSS Zborov, 28 in ZSS Minor in Zborov, 16 clients in Liptovský Sliač, 33 clients in the facility in Svidník, 29 clients in Trebišov, 26 clients in Jarabina, 134 clients together in IKV Žakovce and Ľubica. The results are clearly shown in graph no. 1.

The project was mainly focused on clients in care homes, but we also tried to examine the employees who take care of them and who often do not have time to undergo some professional examinations themselves.



### Care homes in MS survey

Graph no. 1. Care homes involved in the metabolic syndrome survey

First, we weighed the clients and employees on a Tanita SC-240 MA scale and measured the lipid spectrum from capillary blood on a Luxmeter device (CHOL, TAG, HDL, LDL, CHOLD/HDL, /HDL).

**The Tanita scale** allows to determine a number of parameters during one measurement: weight, BMI (body mass index), body fat in %, body fluid in %, visceral fat, adipose tissue in kg, lean tissue in kg, muscle mass, body fluid in kg, basal metabolic rate, bone mass and metabolic age.

**The Luxmeter device** determines the basic parameters of the fat spectrum from a few drops of capillary blood within 3 minutes. For the examination, 45 ul of blood is required for a complete cholesterol analysis.

During the entire duration of the project, we used **biochemical analyzer Skyla**, through which we performed venous blood sampling in care homes clients and employees (albumin, total proteins, glycemia, urea, creatinine, uric acid, AST (aspartate aminotransferase), ALT (alanine aminotransferase), ALP (alkaline phosphatase), GMT (gammaglutamyltransferase), CHOL, TAG, TBIL).

The biochemical analyzer Skyla is a compact and portable device providing fast results. After blood collection, the blood is pipetted onto reagent discs. The disc is then inserted into the device and after 15 minutes we have the results of 13 biochemical parameters. As part of the project, we used discs where we had the opportunity to evaluate the results of all 4 liver tests, total protein, albumin, indicators of kidney function, bilirubin and of fat spectrum.

After obtaining all the results, we compared individual measurement results of the clients and employees.

#### Analysis and comparison of the research sample

Since all the examinations performed were carried out on a voluntary basis, the number of clients and employees who

underwent individual examinations differed. Graph no. 2 lists the number of examined clients and employees in individual care homes.

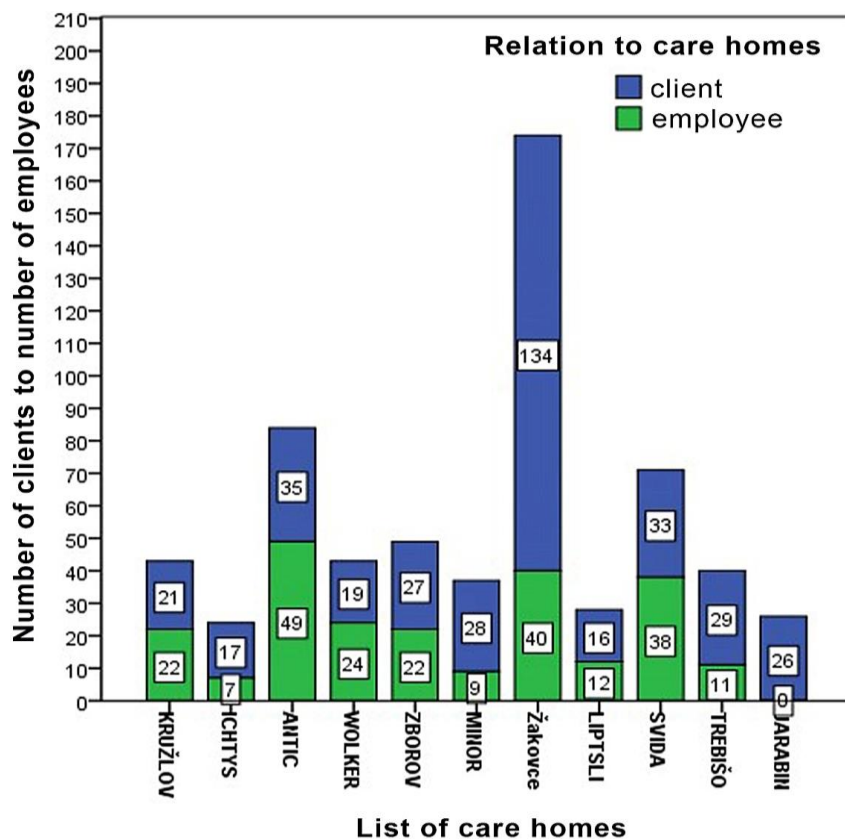
251 clients and 181 employees were measured on the Tanita scale. A requirement for successful measurement was that the client was able to stand without moving on the scale for at least 20-30 seconds until the measurement was completed. If body tremors were present, it was not possible to obtain all parameters.

When comparing clients and employees in terms of BMI and the presence of obesity, we found that 34% of clients were obese. Among employees, obesity occurred in 23% of cases. The differences are statistically significant ( $p=0.044$ ). For evaluation, we used the Mann Whitney test, which is intended for determining statistical significance between sets with a non-parametric distribution of data. The results are clearly displayed in graph no. 3. A statistically significant difference ( $p=0.001$ ) between clients and employees was also found in the distribution of visceral fat.

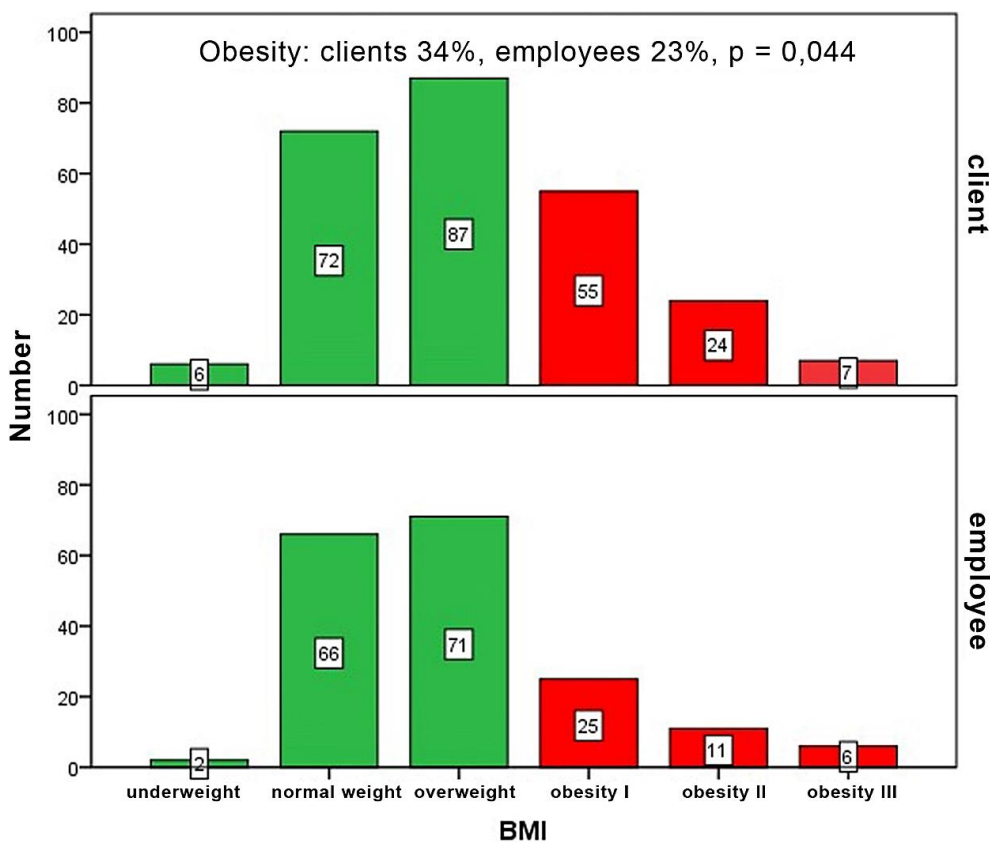
However, when we count the total number of clients with overweight and obesity, it represents up to 67.7% of the group, in employees it is 62.4% of the group.

When analysing the fat spectrum, we found significant presence of dyslipoproteinemia in both groups – in the clients as well as in the employees.

The level of cholesterol was exceeded above the norm (in our group 5.17 mmol/l) in 14% of clients and 11% of employees. The level of triglycerides was exceeded in up to 82% of clients and 79% of employees. This can partly be explained by the fact that since we had to respect work regime of the individual care homes, the measurements were not always performed on an empty stomach, which of course contributed to the increase in the value of triglycerides in the serum.



Graph no. 2. Number of clients and employees involved in the project in individual care homes

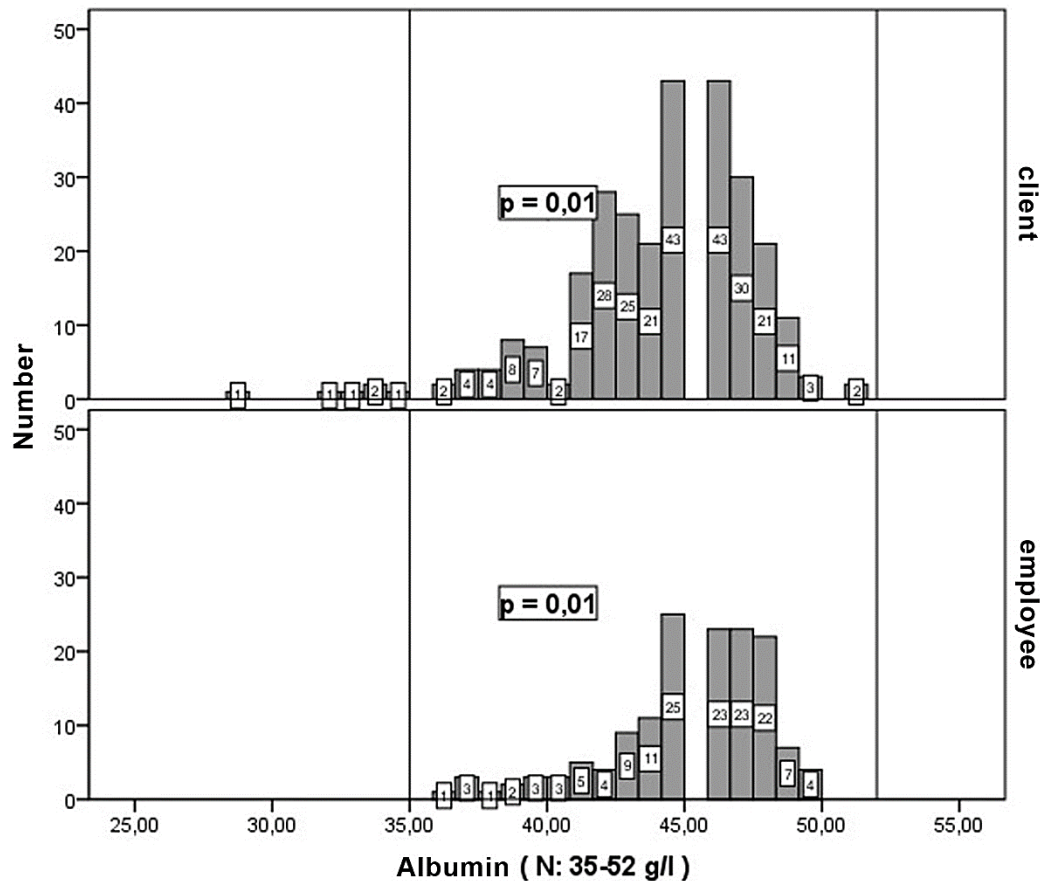


Graph no. 3. Differences in BMI distribution between clients and employees

HDL cholesterol was significantly reduced in men in both – clients and employees (50% versus 49%). In the group of women, in both groups, the level of HDL cholesterol was reduced below the norm in half of the set!!

After analysing venous blood samples, we compared the individual examined biochemical parameters of care homes clients and employees. The differences between clients and

employees in glycaemic values are statistically significant ( $p=0.001$ ). The clients had blood glucose levels elevated above the norm in 66% of cases, employees in 30% of cases. For illustration, in graph no. 4, we will also show the results of differences in albumin levels in clients and employees. The results are statistically significant ( $p=0.001$ ). Hypoalbuminemia was only observed in the group of clients.



Graph no. 4. Comparison of albumin levels in the group of clients and employees

Briefly summarizing the results of biochemical examinations, we can state that **statistically significant differences between care homes clients and employees were found in the following parameters:** albumin, glycemia, cholesterol, LDL, alkaline phosphatase, aspartate aminotransferase, urea, creatinine, uric acid.

Statistically insignificant differences between care homes clients and employees were found in laboratory parameters such as: total proteins, alanine aminotransferase, gamma glutamyltransferase, total bilirubin.

### Discussion

**Obesity** is the main risk factor for non-communicable diseases such as cardiovascular diseases (23%), cardiometabolic diseases – type 2 diabetes mellitus (T2DM), arterial hypertension, fat metabolism disorders, but also some types of cancer [4].

The prevalence of obesity in older age is constantly increasing. BMI increases with aging in both sexes, slightly more in women. Determining the ideal weight remains an open question. There are several calculators to calculate it, but none of them are validated for older age. At the age of 70-75, overweight people (BMI 25.6 kg/m<sup>2</sup>) have the best prognosis [5,6].

In our file, 34% of the clients were obese, which roughly corresponds to data from abroad (in the USA, the incidence of obesity among seniors is 37.4% – data from 2010).

**Dyslipoproteinemias** are metabolic diseases characterized by quantitative and/or qualitative changes in lipids and lipoproteins in the plasma, which are caused by a disorder in their synthesis and/or degradation. They represent a large group of diseases that are one of the most significant risk factors for the development of atherosclerosis, which is a progressive, inflammatory degenerative disease characterized by the formation of an atherosclerotic plaque that can lead to

rupture and to formation of a thrombus with obturation of the vessel lumen.

The differences in the groups of examined clients and employees in the parameters of the fat spectrum were not statistically significant, which indirectly indicates worse eating habits in care homes employees (they are significantly younger than the clients) compared to clients and requires further consideration and proposing solutions.

One of them could be the **introduction of a Mediterranean diet** for both care homes employees and clients (taking into account their other dietary restrictions). The Mediterranean diet is mainly composed of fresh fruits and vegetables, cereals, legumes, olive oil as the main source of fat, fish and a limited amount of meat, dairy products and wine. One of the basic features of this eating culture is that it is a balanced and poor diet. Balanced because it is not dominated by one single type of food (an opposite example can be the excessive consumption of meat in today's food culture), and poor not only because it was the diet of farmers and fishermen, i.e. the broadest sections of the population, but above all because the ingredients are not particularly expensive, they vary according to the season, their preparation is simple and they are easily available for everyday cooking [1].

In the research sample, 66% of examined clients had elevated blood glucose levels compared to 30% of employees. The incidence of T2DM was more frequent among the clients.

**Diabetes mellitus (DM)** is a disease of civilization that is constantly increasing and is becoming a major public health problem. According to many experts, diabetes mellitus is considered a disease of the 21st century. It belongs to medically serious and high-cost chronic diseases. As a result of acute and chronic complications, it significantly contributes to mortality, morbidity and deterioration of patients' quality of life [9].

In the group of examined clients, we also detected hypoalbuminemia, which may indicate possible malnutrition in part of the care homes clients. Even though age over 70 is a risk factor for the development of malnutrition, age-related changes do not directly cause malnutrition. However, they

contribute to its development, especially when cumulated with other unfavourable factors. The combination of malnutrition with increasing age increases mortality.

**Malnutrition** is a state of impaired nutrition, which includes any deviation from the state of good nutrition: it arises as a result of insufficient intake of energy or proteins in relation to the requirements of one's body, but also as a result of insufficient intake of vitamins and trace elements [3]. Malnutrition is associated with a higher risk of complications during the treatment of diseases, with worse wound healing, an increased incidence of infections, greater complications in surgical procedures and other therapeutic interventions. It is associated with longer hospitalization and increased mortality [6].

The general recommendations for a healthy diet, lifestyle and prevention of metabolic syndrome for seniors are similar to those for adults in non-senior age (various, nutritionally rich and energetically balanced diet, several times a day in adequate portions, sufficient amount of good quality proteins, base of the diet being cereals, fresh vegetables and fruits, lean meat and fish, low content of saturated fat and trans fatty acids, moderate intake of refined sugar, salt and alcohol).

## Conclusions

We would like to sincerely thank all the supporters of this interesting project. We were given an opportunity to do something useful for seniors, to inform them about their health status, to educate them. For us, contact with seniors was rewarding. We got to know a lot of great people (nurses, social workers, caregivers) who work at care homes and really give a part of their heart to the clients. Each facility was specific and unique, thanks to the people who work there. Of course, our thanks also go to the senior staff of the individual care homes, who allowed us to enter the grounds of their facilities.

A more detailed analysis of the project will be processed in a monograph: Belovičová, Popovičová, Babečka: Metabolic syndrome in seniors in care homes.

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**The aim of the project** was to determine the incidence of metabolic syndrome and the nutritional status of seniors in selected care homes. All examinations were carried out on a voluntary basis. The project was mainly focused on the care homes clients, but we also tried to examine the employees.

The general recommendations for a healthy diet, lifestyle and prevention of metabolic syndrome for seniors are similar to those for adults in non-senior age (various, nutritionally rich and energetically balanced diet, several times a day in adequate portions, sufficient amount of good quality proteins, base of the diet being cereals, fresh vegetables and fruits, lean meat and fish, low content of saturated fat and trans fatty acids, moderate intake of refined sugar, salt and alcohol).

In this paper, the authors analyse the results of individual measurements, which were statistically processed, and based on the findings, they deduce recommendations for practice.

**Key words:** metabolic syndrome, old age, care homes, healthy eating, prevention.

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Метаболічний синдром (МС) в даний час вражає близько 20-30% дорослого європейського населення працездатного віку. Частота метаболічного синдрому значно зростає з віком. У вікових категоріях старше 60 років він зростає до 40%.

**Метою проекту** було визначити захворюваність на метаболічний синдром і стан харчування літніх людей у вибраних будинках престарілих. Усі експертизи проводились на добровільних засадах. В основному проект був зосереджений на клієнтах будинків престарілих, але ми також намагалися перевірити співробітників.

Загальні рекомендації щодо здорового харчування, способу життя та профілактики метаболічного синдрому для людей похилого віку подібні до рекомендацій для дорослих не похилого віку (різноманітне, насичене та енергетично збалансоване харчування, кілька разів на день достатніми порціями, достатня кількість якісного білку, основу раціону складають каші, свіжі овочі та фрукти, нежирне м'ясо та риба, низький вміст насичених жирів і трансжирних кислот, помірне споживання рафінованого цукру, солі та алкоголю).

У цій статті автори аналізують результати індивідуальних вимірювань, які були статистично оброблені, і на основі отриманих даних виводять рекомендації для практики.

**Ключові слова:** метаболічний синдром, старість, будинки престарілих, здорове харчування, профілактика.

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**Конфлікт інтересів:** відсутній.

**Conflicts of interest:** absent.

#### Відомості про автора для листування

**Prof. MUDr. Mária Belovičová, PhD** – Remedium s.r.o., Bardejov Spa 2037, Internal Clinic for Liver Disease Diagnosis and Treatment, St. Elizabeth University of Health and Social Sciences; Bratislava, Slovakia.  
mriab9@gmail.com, mbelovicova@kupele-bj.sk.