Original article

Assessment of Nutritional Status of Elderly People in a Family Medicine Practice in Relation to MNA Test, Comorbidity and Chronic Therapy

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Abstract

Introduction: Nutrition assessment is one of the biggest challenges in family medicine practice because of the increasing number of older people with more comorbidities and chronic therapy. The MNA (Mini Nutritional Assessment) test has proven to be the most sensitive and exact tool for this type of research. The aim of this study was to assess whether there is a difference in the nutritional status of elderly people, over 65 years of age, with respect to sociodemographic characteristics, number and type of chronic diseases, and number of medications used in chronic therapy.

Materials and methods: Research subjects were 207 patients at the age of 65 treated at the Medical Centre Slavonski Brod during a period of 3 months. During the visit, the nutritional status was examined by using the MNA test. The information on chronic diseases and number of medications the patients were using has been collected from the Medicus computer program.

Results: According to the MNA test results, 62 subjects (30%) showed risk of malnutrition, average age of the subjects was 72 years and the median of MNA test results was 25.50. Also, multimorbidity is present in 64.73% of the subjects and 42% of them take more than three medications in chronic therapy. No statistically significant difference was found in the results of the MNA test regarding the number of chronic diseases (p =0.89) and number of medications (p = 0.87).

Conclusion: It is important to regularly monitor the nutritional status in order to prevent progression of chronic diseases and reduce additional cost of treatment.

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Introduction

According to the latest epidemiological data, there is a negative demographic trend in the Republic of Croatia that is evident by the increased number of older people (1,2). Demographic aging has affected the Republic of Croatia, with particular focus on people over 65 years of age who represent the fastest-growing population segment in the world (3,4). According to the 2011 population census data for the Republic of Croatia, 24.1% persons were older than 60 and 17.7% of persons were over 65 years of age. According to the World Health Organization (WHO), the Republic of Croatia is among the countries with a high percentage of population over 65 (3). According to data of the Croatian Institute for Public Health (HZJZ), life expectancy for elderly people has increased from 71.0 years in total (66.1 for men, 76.2 years for women) in the year 1991, to 77.9 years in total (74.7 for men, 81 for women) in the year 2014 (4). With the increase of the percentage of older population, there is also a significant increase in the number of medical examinations, consumption of medicinal products and the number of hospitalizations, which requires better socioeconomic awareness and new strategies in treatment of patients.

Aging weakens the integrative functions of the endocrinological and immune systems. It also causes the accumulation of free radicals, which, in turn, leads to morphological and functional changes in the body and shortens the cellular life span. Morphological changes are observable in all organs. These changes are characterized by reduction in cell volume, atrophy and progressive loss of cells (5, 6, 7). Also, changes in the cardiovascular system imply lower heart rate, decrease in catecholamine sensitivity and in myofibril contractility (6, 7). There are also changes in the respiratory function, which are characterized by an increased residual volume, decreased parenchyma elasticity and higher risk of developing atelectasis.

Chronic disease is defined by WHO as a long-lasting and slow-progressing condition. Today it is the most common and most expensive health care problem. There are numerous factors which contribute to its development. These are, in addition to the medical ones, socioeconomic factors and political, cultural and environmental aspects (8). Therefore, comorbidity represents one of the greatest challenges in 21st century medicine, because it describes the simultaneous occurrence of two or more diseases. This presents a challenge in both scientific research and daily clinical practice and treatment of patients. Sometimes treatment for one disease leads to the appearance or exacerbation of another disease, including potentially a fatal outcome and premature death. Furthermore, the presence of more diseases and conditions concurrently is directly related to higher mortality, deficient functioning, lower quality of life and more frequent hospitalizations.

Malnutrition can be defined as a nutrient imbalance in which the intake of energy and other nutritional factors is lower than their consumption. This leads to the development of chronic diseases. Malnourished patients are reported to be prone to infections, which lead to prolonged hospitalizations and increased costs of healthcare (10, 11). Also, numerous diseases of different organ systems can lead to malnutrition. This means that malnutrition is caused by changes in intake, digestion or absorption of food but also by changes in the metabolism and excretion and/or metabolic requirements for energy, protein and other nutrients (12). In addition, malnutrition can also be a result of low socioeconomic level, inadequate nutritional support as well as the nature of the disease itself (loss of appetite in various acute and chronic diseases).

Older age is associated with the presence of chronic diseases. This, due to various pathophysiological mechanisms, such as an increased degree of chronic inflammation and oxidative stress, leads to muscular wasting, but also to other changes related to malnutrition (e.g. loss of some micronutrients). Multimorbidity, malnutrition and muscular wasting (sarcopenia) increase the risk of negative health outcomes, such as

hospitalizations, dependence on others to perform daily activities and premature death (13). Important indicators of nutritional status are biochemical methods based on blood and urine tests, where serum protein levels are an especially important factor. Albumin is the most prominent in the serum proteins and also the most cited biochemical parameter mentioned in literature as an indicator of malnutrition (14, 15).

Questionnaires for nutrition status testing are the most useful tools because they are more comprehensive than other measures (based on multiple measured parameters) used in the assessment. Furthermore, the literature describes many different questionnaires that have been used so far in clinical practice. The MNA-SF (Mini Nutritional Assessment - Short Form) test is a widely used screening tool designed to examine the nutritional status of the elderly, whether they are hospitalized, housed in nursing homes or living independently in a community. This test is used by healthcare professionals and it is based on recording the BMI, food intake, weight loss in the last three months, mobility and the presence of psychological stress and neuropsychological problems in the last three months. Screening of the elderly for malnutrition is easier to carry out in general/family medicine practice because it is easier retrieve general population data there. For this purpose, simple but comprehensive and accurate screening tools are required. The MNA test has proven to be one of the most appropriate tools (16, 17).

The aim of this study was to assess whether there is a difference in the nutritional status of the elderly, at the age of 65 or over, with respect to sociodemographic status, number and type of chronic diseases, number of medications in chronic therapy and the achievement on the MNA test.

Patients and methods

The study was conducted on 207 patients (N=207), aged 65 and over, who were treated at the family medicine practice in the Health Centre of Slavonski Brod (Dom zdravlja Slavonski Brod). This was done during a period of three months (from January to March 2019). Research subjects were treated for various reasons, except those listed as exclusion criteria (patients suffering from acute illnesses and sudden health problems, patients with malignancies, patients with limb amputations, patients examined during home visits, patients on chronic haemodialysis program). When it comes to gender, 90 of the research subjects were men (N=90, 43.47%) and 117 were women (N= 117, 56.52%).

A Medicus computer program was used to obtain information on chronic diseases and the number of medications in chronic therapy. During the patients' ambulatory visit, a nutritional assessment was performed using the MNA test. The longer version of this test was used. It consisted of 18 questions, which examined patients' eating habits, type of food they consume, the number of medications in chronic therapy and patients' personal opinion about their own health condition. The maximum number of points that could be scored in the MNA test was 30. The score ranging from 24 to 30 points indicates a good degree of nutrition, 17 to 23.5 indicates a risk of malnutrition and less than 17 points indicates malnutrition (16, 17).

Clinical characteristics of patients are presented descriptively (categorical variables as absolute and relative frequency, and numerical variables as mean and standard deviation and as interquartile range and median). The chi-square test was used to examine the difference between categorical variables. Fischer's exact test was also used. All p-values are two-sided. The significance level will be set to alpha = 0.05. The IBM SPSS 23 software package (IBM Corp. (2015) IBM SPSS Statistics for Windows, Version 23.0. Armonk, New York: IBM Corporation) was used for statistical analysis.

Results

According to the MNA test results, 62 patients (30%) showed malnutrition risk and only 2 patients (0.9%) had malnutrition. Personal history of 134 subjects (64.73%) showed they suffered from more than three chronic diseases and 87 subjects (42%) took more than three medications (Table 1).

Table 1. Descriptive data of nutritional status (number and relative frequency) of the categorical variables used in the study

		N	Relative frequency
Gender	male	90	43.47%
	female	117	56. 52%
Nutritional status	well-nourished	143	69.1%
	risk of malnutrition	62	30%
	malnutrition	2	0.9%
	stage 4	2	1%
Number of chronic diseases	< 3	73	35.26%
	≥ 3	134	64.73%
Number of drugs in chronic therapy	< 3	120	58%
	≥ 3	87	42%

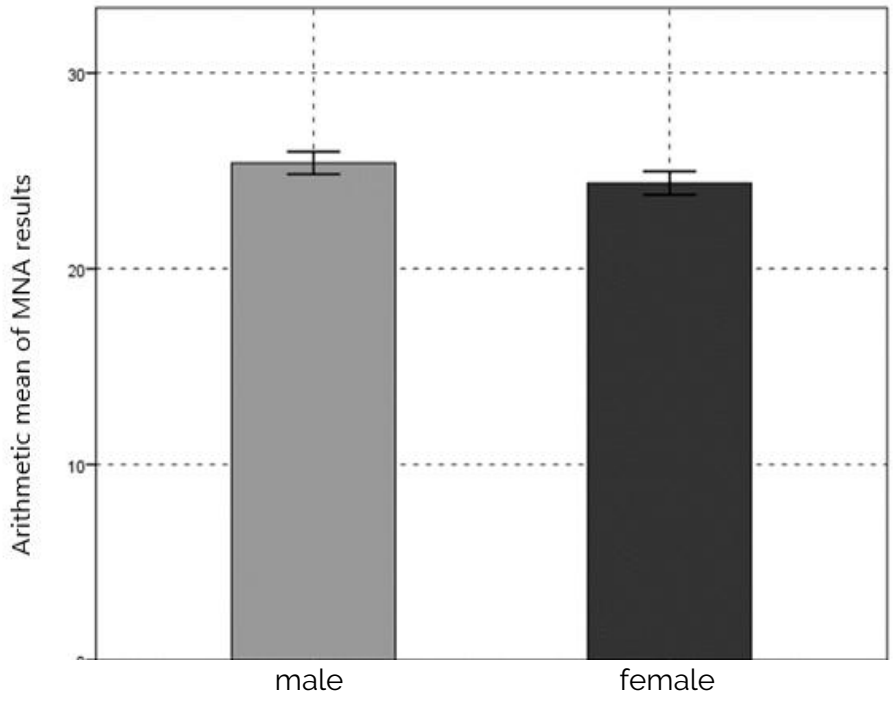
The average age of the research subjects was 72 years (interquartile range 69 to 76 years) and the median MNA test result was 25.50 (interquartile range 23 to 27). Overall, both genders had three or more chronic illnesses present. Hypertension was most prevalent as a chronic disease in both genders. Musculoskeletal disorders were more common in women, especially osteoporosis. Diabetes and COPD were equally present in both genders (Table 2).

Table 2. Descriptive data (absolute and relative frequencies) on the type and number of chronic diseases depending on gender

	Number of respondents			
	Male		Female	
	N	Relative frequency	N	Relative frequency
> 3 chronic diseases	57	63.33%	77	65.8%
< 3 chronic diseases	33	36.7%	40	34.2%
Diabetes	17	18.9%	22	18.8%
Hypertension	79	87.8%	108	92.3%
Gastrointestinal diseases	27	30%	45	38.5%
COPD	7	7.8%	6	5.1%
Musculoskeletal disorders	34	37.8%	61	52.1%
Osteoporosis	1	1.1%	20	17.1%
Arthritis	11	12.2%	19	16.2%

The analysis of nutrition with respect to gender, showed a lack of significant difference in the frequency of nutrition status, 2(1) = 2,04, p = 0,15. The result would be somewhat different if the achievement in the MNA test was measured by the average number of points, rather than the categories of malnutrition. Accordingly, the results in the Student's t-test show a significant difference between the genders (t (205) = 2.40, p = 0.02), with men having a higher score (M = 25.41, SD = 2.77) than women (M = 24.38, SD = 3.24). These results are shown in Figure 1.

Figure 1. Arithmetic mean of MNA scores and associated confidence intervals (95%) in relation to gender



There was no difference in nutrition when taking into consideration the number of chronic diseases (<3, ≥3), 2 (1) = 0.02, p = 0.89. Moreover, most of the men who are suffering from three or more diseases, showed good nutritional status.

On the other hand, further difference in nutritional status was examined regarding the presence of a single chronic disease (hypertension, musculoskeletal diseases, COPD, osteoporosis, arthritis). No significant statistical difference was observed in the distribution of frequencies of a specific chronic disease between well-nourished patients and patients at risk of malnutrition.

When it comes to examining the nutritional status of older women, regarding the number of chronic diseases, it should also be mentioned that most women suffering from three or more diseases showed good nutritional status. The nutritional status with respect to the presence of an individual disease did not show a significant statistical difference in the nutritional status between well-nourished elderly women and women at risk of malnutrition.

Apart from gender, differences in nutritional status were examined considering the age factor. Subjects were divided into four categories according to their age; 65 to 69, 70 to 72, 73 to 76 and 77 to 91 years of age. The first age group (65-69 years) was the one with the highest percentage of three or more chronic diseases (Table 3).

Table 3. Distribution of respondents by age categories and nutritional status

P

		Number (%) of respondents			
		Well-nourished	Insufficient nutrition	Total	P
Number of chronic diseases (65 – 69)	< 3	22 (33.3)	6 (9.1)	28	0.56*
	≥ 3	32 (48.5)	6 (9.1)	38	
	total	54	12	66	
Number of chronic diseases (70 – 72)	< 3	14 (31.8)	3 (6.8)	17	>0.99ǂ
	≥ 3	22 (50)	5 (11.4)	27	
	total	36	8	44	
Number of chronic diseases (73–76)	< 3	8 (16.7)	5 (10.4)	13	0.73ǂ
	≥ 3	24 (50)	11 (22.9)	35	
	total	32	16	48	
Number of chronic diseases (77 – 91)	< 3	6 (12.2)	9 (18.4)	15	0.79*
	≥ 3	15 (30.6)	19 (38.8)	34	
	total	21	28	49	

-statistical significance, * - Chi-square test, ǂ - Fisher's exact test

Examining the difference in nutritional status with regard to the number of medications a subject was taking, the chi-square had no significant use, 2 (1) = 0.02, p = 0.87. To check the potential direction of the difference, Student's t-test was again performed on the MNA resu nutritional assessment, comorbidity, polypharmacy lts, showing no significant difference (t (205) = 0.59, p = 0.55). However, upon examining the degree of malnutrition considering patients' age and score on the MNA test, it was observed that well-nourished patients were younger (M = 72.02, SD = 5.38) than malnourished patients (M = 75.64, SD = 6.12)

Discussion

One of biggest challenges for a family medicine doctor is to recognize and prevent malnutrition due to negative demographic situations and a large number of elderly people. Also, there are other factors that make this work and the objectivity of clinical judgment more difficult. These include a large number of outpatient examinations, lack of medical staff and working as a substitute in different outpatient clinics.

The results obtained in our research showed that elderly people are often diagnosed with two or more chronic diseases. However, the results also show that there is no significant correlation between the number of chronic diseases and nutritional status. It should be emphasized that elderly men and elderly women show signs of multimorbidity equally (Table 1).

One of the biggest challenges was to choose a proper screening tool for malnutrition (18, 19). Reasons for that are multimorbidity and a relatively high number of medications used in

chronic therapy, which are associated with higher mortality and a lower quality of life.

Previous research has shown that taking six different medications increases the risk of adverse effects up to 80%. Also, taking eight medications increases the risk of medication interactions up to 100% (19, 20). In our research, 87 participants (42%) took more than three medications (Table 1). Based on the given results, in order to prevent adverse effects, it is highly important to be aware of the number and type of medications used in chronic therapy. This study did not show any statistical difference between the number of medications and the nutritional status of elderly people.

In our research, only 62 (30%) participants out of 207 were at risk of malnutrition. These results confirm a good nutritional status of elderly people (Table 1). According to the results they achieved in the MNA test, research subjects were further examined based on differences in gender and age with regard to their nutritional status. It has been observed that men achieve a slightly higher score on the MNA test than women, which means that women are more at risk of malnutrition. These results are shown in Figure 1. On the other hand, it should be noted that the data obtained by the MNA result indicate a good degree of nutritional status in both cases (16, 17).

Results of this study do not differ significantly from the results found in the research by Kalan U. et al., who studied the connection between the MNA test, nutritional status and the potential factors that lead to malnutrition. Comparing our results to the results of the study conducted by Tavassoli et al., 30% of the results of participants at risk of malnutrition in our research are slightly lower than those for malnutrition according to the MNA test (21). In relation to age, we separated our participants into four groups. Patients at the age of 77 to 91, who make up 19,. 4% of our research subjects, showed risk for malnutrition. The adverse impact of multimorbidity on nutritional status is more manifested in older age groups (> 77 years), and the number of chronic disease (presence of 3 and > chronic diseases) is also increased (Table 3).

Overall, hypertension was the most prevalent chronic disease in both genders (Table 2). When it comes to good nutritional status of elderly people, it is expected that the majority of them suffer from a cardiovascular disease. This can be explained by the generally high prevalence of hypertension in elderly people, where three out of four people suffer from hypertension (19). Despite the presence of hypertension in both genders, there was no significant difference in nutritional status between research subjects, when hypertension and number of chronic diseases are taken into consideration.

Similar results were obtained by Ivana Platuzic in her research, as a part of her graduate work at the Faculty of Food Technology in Osijek (22). When compared to other chronic diseases, musculoskeletal disorders are more common in women (Table 2). Osteoporosis and arthritis were the disorders that were most presented in our research. These kinds of diseases are associated with degenerative changes and carry the risk of falls. Furthermore, it is important to be aware of the development of the physical disability syndrome, also known as the frailty syndrome. It is a common clinical syndrome in older adults that carries an increased risk for poor health outcomes that include disability, hospitalization and mortality. That is why this syndrome is of great interest to scientific circles.

Despite the greater distribution of osteoporosis in older women, there was no significant connection between nutritional status, presence of musculoskeletal diseases and the number of chronic diseases. However, the presence of musculoskeletal disorders and multimorbidity (> 3 chronic diseases) may have an effect on malnutrition only in the third and fourth age group (>73 and >77 years, respectively).

Furthermore, in future research, more attention should be paid to the diagnosis of painful back. This is important because more and more people perform sedentary work, which, over time, leads to the development of painful back. Moreover, it is important to make a stratification of diagnosis of painful back by the severity of the

symptoms and the clinical manifestation in order to evaluate degenerative changes.

In our research, occurrence of diabetes mellitus is very similar in both genders (Table 2). Moreover, there was no significant difference in nutritional status between men and women if we take into consideration the presence of diabetes and the number of chronic diseases.

Ursulin-Trstenjak et al. studied the relationship between obesity, hypertension and diabetes mellitus in elderly people. They have tried to prove a direct link between obesity and chronic diseases (23). In previous studies, malnutrition was evident in situations where chronic respiratory diseases were present (24). According to the small number of participants who suffered from chronic respiratory diseases, the data obtained showed a similar distribution of disease in both genders, and there was no significant statistical difference between nutritional statuses. In future research, for a better understanding of the connection between chronic respiratory diseases and nutritional status, it is important to have more research subjects involved.

Even though the previous studies have proven there is a connection between malnutrition and chronic gastrointestinal diseases, the results of this study showed no significant difference in the nutritional status of elderly men and women. While we did not isolate gastrointestinal diseases as specific factors, in future research for better understanding of nutritional status, it will be useful to isolate participants who suffer from inflammatory bowel disease and multimorbidity.

The aim of this study was also to find a connection between age and nutritional status. Obtained data found a significant difference in the degree of nutrition with respect to age. It was observed that patients with normal nutrition were younger than those with poor nutritional status.

Even though there are many available screening tools for conducting research, the MNA test is still the most efficient one, because of its simplicity. According to the results of this cross-sectional study, as well as the results of previous studies, we can state that MNA is the optimal, accessible ambulatory tool for conducting research in family medicine practice.

This research has some limitations as it was conducted only in the Health Centre in Slavonski Brod. For more accurate data, it would be best to extend this research to other Health Centres in other counties and compare the results. One of the biggest problems that will affect family medicine practice in the next 40 years is an increased number of people over 60 years of age. It is expected that the number of elderly people will increase by 50%. Therefore, in future research, more attention should be focused on a comprehensive approach to nutrition monitoring in elderly people. To conclude, it is important to educate elderly people and raise their awareness of their own nutritional status in order to prevent malnutrition and improve their quality of life.

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References

1. The Census of Population, Households and Dwellings 2011. Croatian Bureau of Statistics, Zagreb, 2011. Available at: http://www.dzs.hr/. Accessed: 13 June 2019.

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2. Croatian Health Statistics Yearbook 2017. Available at: https://www.hzjz.hr/wp-content/uploads/2019/03/Ljetopis_2017.pdf. Accessed: 13 June 2019.

3. Nejašmić I, Toskić A. Starenje stanovništva u Hrvatskoj- sadašnje stanje

i perspektive. Croatian Geographical Bulletin, 2013;75/1, 89 –110.

4. Croatian Institute of Public Health. Usporedba pokazatelja o vodećim javnozdravstvenim problemima u Republici Hrvatskoj i Europskoj uniji. Available at: https://www.hzjz.hr/wp-content/uploads/2017/01/Pokazatelji_RH_EU.pdf. Accessed: 13 June 2019.
5. Damjanov I, Jukić S, Nola M. Patologija, 3rd reworked and supplemented edition. Zagreb: Medicinska naklada; 2011. pp. 41-42.
6. Vrndić O, Kostic I. Patofiziološki mehanizam procesa starenja. Medicinski časopis. 2010;3, 30-36.
7. Gamulin S, Marušić, M. Patofiziologija, 7th updated and modified edition. Zagreb: Medicinska naklada. 2011; pp. 24- 27.
8. Vukelić M. Percepcija bolesti i terapije u bolesnika s kroničnim bolestima. [Graduate thesis]. Zagreb: Faculty of Pharmacy and Biochemistry. 2016.
9. Perko G, Tomek- Roksandić S, Mihok D, Puljak A, Radašević H, Tomić B. Vodeći multifaktorijalni gerijatrijski sindrom u starijih osoba ("4N" u gerijatriji). Hrvatski časopis za javno zdravstvo. 2006; 20-22.
10. Krznarić Ž. Klinička prehrana u gastroenterologiji. Medicus [Internet]. 2006 [accessed: 18 August 2019];15(1_Gastroenterologija):169-181. Available at: https://hrcak.srce.hr/18845.
11. Vranešić Bender D, Krznarić Ž. Malnutrition - Undernutrition of Hospital Patients. Medicus. 2008. Volume 17, 71-79.
12. Jeejeebhoy KN. Hospital malnutrition: is a disease or lack of food? Clin Nutr. 2003;22: 219.
13. Haehling S von. The wasting continuum in heart failure: from sarcopenia to cachexia. Proceedings of the Nutrition Society. 2015;74:367–377.
14. Fuhrman MP, Charney P, Mueller CM. Hepatic proteins and nutrition assessment. J Am Diet Assoc. 2004;104:1258-64.
15. Fuhrman MP. The albumin-nutrition connection: separating myth from fact. Nutrition. 2002;18:199-200.
16. Kalan U, Arik F, Isik AT, Soysal P. Nutritional profiles of older adults according the Mini-Nutritional Assessment. Aging Clin Exp Res. 2019.
17. Soysal P, Veronese N, Arik F, Kalan U, Smith L, Isik AT. Mini Nutritional Assessment Scale-Short Form can be useful for frailty screening in older adults. Clin Interv Aging. 2019;14:693-699.
18. Hien H, Berthé A, Drabo MK, Meda N, Konaté B, Tou F i sur. Prevalence and patterns of multimorbidity among the elderly in Burkina Faso: cross-sectional study. Trop Med Int Health. 2014;19 (11):1328-33.
19. Katić M, Švab I et al. Obiteljska medicina. Zagreb 1st edition. Alfa; 2013.
20. Zadak Z, Hyspler R, Ticha A, Vlcek J. Polypharmacy and malnutrition. Current Opinion in Clinical Nutrition & Metabolic Care. 2013;16 (1):50-55.
21. Tavassoli N, Guyonnet S, Abellan Van Kan G, Sourdet S, Krams T, Soto MF et al. Description of 1,108 older patients referred by their physician to the "Geriatric Frailty Clinic" for assessment of frailty and prevention of disability at the gerontopole. J Nutr Health Aging. 2014;18:457-64.

22. Platužić Ivana. Procjena statusa uhranjenosti starijih osoba. [Graduate thesis]. Osijek: Faculty of Food Technology Osijek. Josip Juraj Strossmayer University of Osijek, 2018

23. Uršulin-Trstenjak N, Levanić D, Hasaković-Felja M. Pretilost kao faktor rizika za nastajanje kardiovaskularnih-koronarnih bolesti. Tehnički glasnik. 2015,9:230-234.

24. Ezzell L, Jensen GL. Malnutrition in chronic obstructive pulmonary disease. The American Journal of Clinical Nutrition, Volume 72, Issue 6. 2000;1415–1416.