International Journal of Research (IJR)

e-ISSN: 2348-6848
p-ISSN: 2348-795X
Vol. 9 Issue 09
September 2022

Strategies for Mitigating Driving Factors of Metabolic Syndrome in Cameroon

Fomboh N. Richard[1, 2], Mary Bi Suh Atanga[2], Samje Moses[2] Vincent P.K. Titanji[3],

[1]Faculty of Nursing and Biomedical Sciences, Cameroon Christian University Institute, Bamenda, Cameroon

[2]Faculty of Health Sciences, University of Bamenda, Cameroon

[3] Biotechnology Unit, University of Buea, Cameroon

Corresponding author: Fomboh N. Richard, Cameroon Christian University Institute, Bamenda, email: drfombohrich@gmail.com.

Abstract

Metabolic syndrome (MS) has become one of the major challenges to public health worldwide due to its significant association with an increased risk of developing type II diabetes and cardiovascular disease among children, adolescents, and adults. The objective of this review was to outline strategies for mitigating driving factors of Metabolic Syndrome. The prevalence of Metabolic Syndrome varies depending on the definition applied, the ethnicity, and the age of the study population. There is evidence of a significant association between causative factors of metabolic syndrome and behavioural risk factors, physical inactivity, and excess weight, emphasizing the importance of early diagnosis. The first-line therapy to prevent and treat Metabolic Syndrome is, therefore, lifestyle modification, such as the consumption of a healthy diet and the performance of physical activities. New methods are needed to improve adherence to a healthier and more active lifestyle such as exposing all strategies in local languages and their outlines placed in health centres to increase awareness in driving factors of MS.

Keywords: Metabolic syndrome, risk factors, strategies, mitigation, lifestyle, Cameroon

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

e-ISSN: 2348-6848
p-ISSN: 2348-795X
Vol. 9 Issue 09
September 2022

1. Introduction

Metabolic Syndrome (MS) is a modern-day epidemic that predicts total and cardiovascular disease (CVD) mortality [1], the incidence and progression of carotid atherosclerosis [2] and sudden death independent of other cardiovascular risks [3]. Subjects with MS have a three-fold risk of a heart attack or stroke, a two-fold risk of CVD or dying from such events, and a five-fold greater risk of developing type 2 diabetes mellitus in both sexes when compared to people without it [4].

Various bodies such as the World Health Organization (WHO) [5], the European Group for the study of Insulin Resistance (EGIR) [6], the National Cholesterol Education Program–Adult Treatment Panel III (NCEP–ATP III) [7], and the International Diabetes Federation (IDF) [8] share common ground to define MS by acknowledging the disorders of glucose metabolism, hypertension, dyslipidaemia, and obesity. These underlying mechanisms are exacerbated by the complex interplay between age, genetic conditioning, and an inappropriate lifestyle comprising a sedentary lifestyle and surplus availability of energy-dense salt-enriched food [9].

The prevalence of MS varies depending on the definition applied, the ethnicity, and the age of the study population. The age-adjusted prevalence among the adult population was estimated to be 24%–25% in the United States, approximately 23% in European countries, and estimated to be 20%–25% among South Asians [10]. The prevalence in Asia has increased rapidly in recent years due to rapid socioeconomic transitions to increasing affluence, urbanization, mechanization, auto-mobilization, and urban migration.

Some strategies have been used to manage and reduce the prevalence of metabolic syndrome. The most important therapeutic intervention effective in subjects with MS has been focused on modest weight reduction and regular leisure-time physical activities, which have proven to reduce the risk

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

of developing diabetes by over 50 %. (11). However, these management/preventive strategies have been confronted with several challenges; Parallel with globalization pronounced changes in the human environment, behaviour, and lifestyle have resulted in escalating rates of both obesity and diabetes [12]. The more prevalent sedentary lifestyle and the globalization of "fast" and overly rich nutrition promotes the development of risk factors for the Metabolic Syndrome and the development of diabetes [13]

2. Problem statement

In a study carried out by Jules et al., [14] in the Centre and Littoral Regions of Cameroon, the prevalence of individual components of metabolic syndrome were hyperglycaemia (47.1%), obesity (24.0%), hypertension (20.5%), Low High Density Lipoprotein Cholesterol (16.3%) and hypertriglyceridemia (3.7%). In Cameroon, the prevalence of hypertension is reported to vary from 31.1% in rural milieu [15], 32.2% in semi-urban [16] to 47.5% in urban milieu [17] with a national average of 31.0% [18]. In a study carried out by William and Victor in the Western Region, the prevalence of MS was 32.45% with highly significant female predominance (46.11% for females and 14.01 % for males) [19]. This increase in the rate of MS is due to the changes in dietary and affluent lifestyle where the traditional dietary lifestyle has been replaced with the westernised lifestyle. This lifestyle changes have therefore attracted the various driving factors of metabolic syndrome. Hence, the objectives of this review were:

a) To describe the risk factors of Metabolic Syndrome
b) To outline the strategies for mitigating driving factors of Metabolic Syndrome
c) To describe other dietary pattens that can be used to prevent metabolic syndrome

3. Risk factors of Metabolic Syndrome

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

There is evidence of a significant association between causative factors of metabolic syndrome and behavioural risk factors, physical inactivity, and weight excess, emphasizing the importance of early diagnosis [20a]. Associated with a sedentary lifestyle, weight excess is responsible for dyslipidaemia and increased blood pressure in adolescents. Some of the risk factors are outlines as shown in table I.

Table I: Distribution of risk factors of metabolic syndrome and their effects

Risk factors	Effect/consequences
Behavioural risk factors, physical inactivity, and excess weight [20b].	Causative factors of metabolic syndrome. Increase risk of obesity and high blood pressure
Sedentary lifestyle	Increasing secondary factors for MS. A conditioning factor on. Waist circumference, fasting blood glucose, total cholesterol, and HDL-C appear altered when compared to active and sedentary groups. Development of cardiovascular risk factors, metabolic syndrome, and increasing age [21].
Sedentary lifestyle	Excess weight is responsible for dyslipidaemia and increased blood pressure in adolescents. The higher the body mass index (BMI), the greater the chance of altered biochemical tests, increasing the probability of having two or more risk factors in this group [22].
Little or no physical activity and fitness	Decreased physical activity promotes weight gain, decrease insulin sensitivity by not enhancing glucose transport and insulin action in

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

	muscles, decreases HDL cholesterol levels, higher triglyceride levels, and promote hypertension [23].
Dietary habits	Dietary pattern analyses have shown that a diet that includes cereals, fish, vegetables, and fruits was independently associated with reduced levels of clinical and biological markers linked to MS, whereas a greater prevalence of MS has been found among individuals with "Western" dietary patterns characterized by high intakes of refined grains, processed meat, fried foods, and red meat [24].

4. Strategies for Mitigating risk factors

The first-line therapy to prevent and treat MS is lifestyle modification, such as the consumption of a healthy diet and the performance of physical activities [25]. The Diabetes Prevention Program (DPP) reported a reduction of 41% in the incidence of MS in the lifestyle modification group and 17% in the metformin group compared with that in the placebo group for participants with impaired glucose tolerance but without diabetes [26]. Several strategies to mitigate drivers of metabolic syndromes are outline in table II.

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

Table II: Distribution of mitigation strategies for driving factors of metabolic syndrome

Strategies	Risk factors	Intervention	Conclusion/recommendation
lifestyle modification	Risky dietary habit	The IGOBE program was proposed as a new and effective therapeutic approach to be implemented in real-life practice for obesity treatment [25].	Consumption of a healthy diet and the performance of physical activities [26].
Low-sodium diet	High blood pressure	A meta-analysis that summarized the effect of a low-sodium diet on blood pressure demonstrated that dietary sodium restriction had greater efficacy in hypertensive patients than in non-hypertensive patients [27].	The Dietary Approaches to Stop Hypertension (DASH) diet lowered blood pressure significantly at each sodium concentration compared and decreasing sodium intake alone incrementally decreased blood pressure. DASH promoted lower salt intake (< 60 mmol/d) and more foods enriched in potassium, calcium, magnesium, fibre, and protein. Sacks et al. [28]
Weight loss	Hypertension	Increasing weight has been shown in several studies to be strongly associated with the development of hypertension, so the effect of weight loss on blood pressure control has been a focus of study [29]. Multiple randomized	The lifestyle interventions involved regular educational and behavioural sessions, dietary changes, weight loss, and increased physical activity.

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

		trials have assessed the utility of lifestyle intervention on blood pressure [30]	
Lower medication	High blood pressure	The Trial of Nonpharmacologic Interventions in the Elderly (TONE) study randomized 875 men and women aged 60 to 80 years with a baseline blood pressure of less than 145/85 mm Hg to either usual care, reduced sodium diet, weight loss (obese participants only), or a combination of low-sodium/weight-loss diet [31].	It does encourage patients to make lifestyle changes, as they may significantly reduce the number of dosages of their medications, to achieve desired result in the reduction of blood pressure
Lifestyle modification to prevent diabetes	High blood sugar	Finnish Diabetes Prevention Study Group randomized 552 men and women at risk for developing diabetes to a lifestyle counselling intervention versus control [32].	After 2.8 years of follow-up, 38% of lifestyle participants had achieved at least 7% weight loss and 58% met the physical activity goal.
Plant-Based Diets	Risk of coronary heart disease	Studies have found a lower risk of mortality from ischemic heart disease in vegetarians compared with non-vegetarians [33].	Plant-based diets have consistently been associated with beneficial cardiometabolic effects, specifically with a lower risk of developing MS and all its components [34]. There was a 28% reduction in the risk of coronary heart disease following a vegetarian diet [35].

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

Low-Carbohydrate (CH) Diet	Insulin resistance	Low-CH dietary patterns are characterized by a reduction of total CH intake (<50% of daily calorie intake from CH). This implies a restriction in the intake of several ultra-processed foods, refined grains, starches, and foods rich in simple or added sugars [36].	Risk of developing MS was increased in individuals with higher CH intake (2.5% increase in the risk of MS per 5% energy from CH intake (95% CI 0.4 to 4.8) [37]. Health benefits observed in low-carbohydrate diets are the avoidance of the rapid absorption associated with some types of carbohydrates, such as glucose and refined grains.
Low-Fat Diet	Obesity	Low-fat diets in weight-loss-oriented dietary interventions showed a reduction in the risk of premature mortality in obese adults [38].	Low-fat diets usually include foods and products with reduced total fat content, such as low-fat dairy products instead of whole-fat products and derivatives.
High-Protein Diet	Obesity and hyperglycaemia	A meta-analysis of 18 studies on the effect of a high-protein diet in T2DM patients showed that a high-protein diet did not significantly decrease body weight compared to a regular protein diet [39].	Evidence suggests that a high-protein dietary pattern leads to greater weight loss and CVD improvements than standard protein diets (0.8 g protein/kg body weight). High-protein diets are characterized by 20–30% of daily energy intake from protein, which means around 1.34 to 1.5 g protein/kg body weight [40].

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

5. Other dietary patterns and strategies to reduce metabolic syndrome

Other dietary alterations have been shown to improve the MS condition, such as the Nordic Diet, which is characterized by a high content of whole-grain high-fibre products (such as rye, barley, oat, rice, vegetables, fruits, and nuts), with rapeseed oil as the main source of dietary fat and a high intake of fish and shellfish [41]. Like the DASH and the MedDiet, the Nordic diet is a healthy dietary pattern in that it promotes the intake of vegetables, fruits, fish, poultry, and nuts, and is low in sodium, red meat, and processed foods.

Table III: Distribution of other dietary pattens for the prevention of metabolic syndrome

Diet	Description/diet content	Benefits
Nordic Diet	high content of whole-grain high-fiber products (such as rye, barley, oat, rice, vegetables, fruits, and nuts), with rapeseed oil as the main source of dietary fat and a high intake of fish and shellfish [41]	Nordic diet in improving some MS criteria, mainly systolic and diastolic BP
Intermittent fasting	has shown benefits for CVD, T2DM, metabolic disturbances, and cancer, mainly because of the daily caloric restriction involved [42].	cardiometabolic effects observed after an intermittent-fasting intervention are weight loss and improvements in insulin resistance, dyslipidaemia, BP levels, and inflammation [43].

6. Conclusion

- ✓ Lifestyle modification incorporating behavioural, dietary, and physical activity changes to induce modest weight loss exerts beneficial effects on the various components of the metabolic syndrome and improves overall survival.

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

- ✓ This holistic intervention should be the foundation to which pharmaceutical treatment is added as needed. The protective effects of healthy dietary patterns on MS seem to be due to the sum of small dietary changes rather than the restriction of any single nutrient.
- ✓ The nutritional distribution and quality of MedDiet allow health professionals to provide easy-to-follow dietary advice without the need for a restricted diet.

7. Recommendation

- ✓ New methods are needed to improve adherence to a healthier and more active lifestyle such as exposing all strategies in local languages and their outlines put in health centres in communities.
- ✓ Persuasive education is needed to improve adherence to a healthier and more active lifestyle
- ✓ In comparing low-fat diets and very-restricted diets, the scientific evidence supports the use of the MedDiet intervention as the new paradigm for MS prevention and treatment.

Competing interests

The authors declare that they have no competing interests

Reference

[1]. Nilsson, P.M.; Engstrom, G.; Hedblad, B. The metabolic syndrome and incidence of cardiovascular disease in non-diabetic subjects—A population-based study comparing three different definitions. Diabet. Med. 2007, 24, 464–472.

[2]. Bonora, E.; Kiechl, S.; Willeit, J.; Oberhollenzer, F.; Egger, G.; Bonadonna, R.C.; Muggeo, M. Carotid atherosclerosis and coronary heart disease in the metabolic syndrome. Prospective data from the Bruneck Study. Diabetes Care 2003, 26, 1251–1257.

[3]. Empanada, J.P.; Duciemetiere, P.; Balkau, B.; Joven, X. Contribution of the metabolic syndrome to sudden death risk in asymptomatic men: the Paris Prospective Study I. Eur. Heart J. 2007, 28, 1149–1154.

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

[4]. Stern, M.P.; Williams, K.; González-Villalpando, C.; Hunt, K.J.; Haffner, S.M. Does the metabolic syndrome improve identification of individuals at risk of type 2 diabetes and/or cardiovascular disease? Diabetes Care 2004, 27, 2676–2681.

[5]. Alberti, K.G.; Zimmet, P.Z. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. Diabet. Med. 1998, 15, 539–553.

[6]. Balkau, B.; Charles, M.A. Comment on the provisional report from the WHO consultation: European Group for the Study of Insulin Resistance (EGIR). Diabet. Med. 1999, 16, 442–443.

[7]. Grundy, S.M.; Cleeman, J.I.; Daniels, S.R.; Donato, K.A.; Eckel, R.H.; Franklin, B.A.; Gordon, D.J.; Krauss, R.M.; Savage, P.J.; Smith, S.C., Jr.; et al. Diagnosis and management of the metabolic syndrome: An American Heart Association/National Heart, Lung, and Blood Institute Scientific Statement. Circulation 2005, 112, 2735–2752.

[8]. Alberti, K.G.; Zimmet, P.; Shaw, J. The metabolic syndrome—A new worldwide definition. Lancet 2005, 366, 1059–1062. 10. Zimmet, P. Globalization, coca-colonization, and the chronic disease epidemic: can the doomsday scenario be averted? J. Intern. Med. 2000, 247, 301–310.

[9]. Zimmet, P. Globalization, coca-colonization, and the chronic disease epidemic: can the doomsday scenario be averted? J. Intern. Med. 2000, 247, 301–310.

[10]. Eapen, D.; Kalra, G.L.; Merchant, N.; Arora, A.; Khan, B.V. Metabolic syndrome, and cardiovascular disease in South Asians. Vasc. Health Risk Manag. 2009, 5, 731–743.

[11]. Grundy SM, Hansen B, Smith SC, Cleeman JI, Kahn RA, for Conference Participants. Clinical management of metabolic syndrome. Report of the American Heart Association/National Heart, Lung, and Blood Institute/American Diabetes Association Conference on scientific issues related to management. Circulation 2004; 109: 551-6.

[12]. Schwarz PE, Schwarz J, Bornstein SR, Schulze J. Diabetes prevention –from physiology to implementation. Horm Metab Res 2006; 38 (7): 460 – 464.

[13]. Schwarz PE, Bornstein SR. Pre-diabetes, and metabolic syndrome in Germans. Horm Metab Res 2006; 38 (5): 359.

[14] Jules Destin Djeufouata, Walter Ebot Ojong, Theophile Nana Njamen, Jules Clement Nguedia Assob, Bruno Phelix Telefo. Prevalence and Risk Factors of Metabolic Syndrome in Pregnant

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

Women in the Centre and Littoral Regions of Cameroon. European Journal of Clinical and Biomedical Sciences. Vol. 6, No. 5, 2020, pp. 104-115. doi: 10.11648/j.ejcbs.20200605.16.

[15] Arrey WT, Dimala AC, Atashili J, Mbuagbaw JAJ, Monekosso GL. Hypertension, an Emerging Problem in Rural Cameroon: Prevalence, Risk Factors, and Control. International Journal of Hypertension;2016 (6): 1-6.

[16] Ntentie FR, Ngondi JL, Azantsa KBG, Santy EV, Dimodi HT, Mbong AM-A, et al. Urbanization and Metabolic Syndrome in Cameroun: Alertness on Less Urbanised Areas. Endocrinol Metab Syndr. 2014; 3(2): 1-8.

[17] Dzudie A, Kengne A, Muna WFT, Ba H, Menanga A, kouam KC, et al. Prevalence, awareness, treatment and control of hypertension in a self-selected sub-Saharan African urban population: a cross-sectional study. BMJ. Open. 2012; 0:e001217. doi:10.1136/bmjopen-2012-001217.

[18] Kingue S, NdongNgoe C, Menanga A, Fesuh B, Nouedoui C and Muna WFT. "Prevalence and risk factors of hypertension in urban areas of Cameroon: a nationwide population-based cross-sectional study". The Journal of Clinical Hypertension. 2015; 17(10): 819-824.

[19] Wiliane J. T. Marbou and Victor Kuete. Prevalence of Metabolic Syndrome and Its Components in Bamboutos Division's Adults, West Region of Cameroon. BioMed Research International.Volume 2019, pages 1-12. https://doi.org/10.1155/2019/9676984.

[20a]. Dengel, D. R., Kelly, A. S., Olson, T. P., Kaiser, D. R., Dengel, J. L., & Bank, A. J. (2006). Effects of weight loss on insulin sensitivity and arterial stiffness in overweight adults. Metabolism: Clinical and Experimental, 55, 907-911.

[20b]. Wang Q, Yin J, Xu L, Cheng H, Zhao X, Xiang H, et al. Prevalence of metabolic syndrome in a cohort of Chinese schoolchildren: comparison of two definitions and assessment of adipokines as components by factor analysis. BMC Public Health. 2013; 13:249.

[21]. Chechen MR, Bezerra AI, Bartholomeu T, Junqueira NO, Rezende JA, Basso L, et al. Cardiovascular risk and physical activity practice in children and adolescents of Muzambinho/MG: Influence of gender and age. Rev Bras Med Esporte. 2011; 17(4):232-6.

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

[22]. Martins RV, Bozza R, Barbosa Filho VC, Dellagrana RA, Campos W. Comparative study of blood pressure in adolescents with different grades of nutritional status. Motricidade. 2012; 8(Suppl 2):734-41.

[23] Magkos, F., Yannakoulia, M., Chan, J. L., & Mantzoros, C. S. (2009). Management of metabolic syndrome and type 2 diabetes through lifestyle modification. Annual Reviews of Nutrition, 29, 223- 256.

[24]. Esmaillzadeh, A., Kimiagar, M., Mehrabi, Y., Azadbakht, L., Hu, F. B., & Willett, W. C. (2007). Dietary patterns, insulin resistance, and prevalence of the metabolic syndrome in women. The American Journal of Clinical Nutrition, 85, 910-918.

[25]. Porca, C.; Rodriguez-Carnero, G.; Tejera, C.; Andujar, P.; Casanueva, F.F.; Crujeiras, A.B.; Bellido, D. Effectiveness to Promote Weight Loss Maintenance and Healthy Lifestyle Habits of a Group Educational Intervention Program in Adults with Obesity: IGOBE Program. Obes. Res. Clin. Pract. 2021, 15, 570–578.

[26]. Cornier, M.-A.; Dabelea, D.; Hernandez, T.L.; Lindstrom, R.C.; Steig, A.J.; Stob, N.R.; Van Pelt, R.E.; Wang, H.; Eckel, R.H. The Metabolic Syndrome. Endocr. Rev. 2008, 29, 777–822.

[27]. Westerterp, K. R. (2009). Assessment of physical activity: a critical appraisal. European Journal of Applied Physiology, 105, 823-828.

[28]. Dengel, D. R., Kelly, A. S., Olson, T. P., Kaiser, D. R., Dengel, J. L., & Bank, A. J. (2006). Effects of weight loss on insulin sensitivity and arterial stiffness in overweight adults. Metabolism: Clinical and Experimental, 55, 907-911.

[29]. Appel LJ, Champagne CM, Harsha DW, et al.: Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. JAMA 2003, 289:2083–2093. 31. Miller ER III, Erlinger TP, Young DR, et al.: Results of the Diet, Exercise, and Weight Loss Intervention Trial (DEWIT). Hypertension 2002, 40:612–618.

[30]. Stevens VJ, Obarzanek E, Cook NR, et al.: Long-term weight loss and changes in blood pressure: results of the Trials of Hypertension Prevention, phase II. Ann Intern Med 2001, 134:1–11.

[31]. Whelton PK, Appel LJ, Espeland MA, et al.: Sodium reduction and weight loss in the treatment of hypertension in older persons: a randomized controlled trial of nonpharmacologic interventions in the elderly (TONE). TONE Collaborative Research Group. JAMA 1998, 279:839–846.

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*

[32]. Tuomilehto J, Lindstrom J, Eriksson JG, et al.: Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med 2001, 344:1343–1350.

[33]. Crowe, F.L.; Appleby, P.N.; Travis, R.C.; Key, T.J. Risk of hospitalization or death from ischemic heart disease among British vegetarians and nonvegetarians: Results from the EPIC-Oxford cohort study. Am. J. Clin. Nutr. 2013, 97, 597–603.

[34]. Kahleova, H.; Levin, S.; Barnard, N. Cardio-Metabolic Benefits of Plant-Based Diets. Nutrients 2017, 9, 848.

[35]. Kahleova, H.; Salas-Salvadó, J.; Raheli´c, D.; Kendall, C.W.; Rembert, E.; Sievenpiper, J.L. Dietary Patterns and Cardiometabolic Outcomes in Diabetes: A Summary of Systematic Reviews and Meta-Analyses. Nutrients 2019, 11, 2209.

[36]. Mozaffarian, D. Dietary and Policy Priorities for Cardiovascular Disease, Diabetes, and Obesity: A Comprehensive Review. Circulation 2016, 133, 187–225.

[37]. Liu, Y.S.; Wu, Q.J.; Xia, Y.; Zhang, J.Y.; Jiang, Y.T.; Chang, Q.; Zhao, Y.H. Carbohydrate intake and risk of metabolic syndrome: A dose-response meta-analysis of observational studies. Nutr. Metab. Cardiovasc. Dis. 2019, 29, 1288–1298.

[38]. Ma, C.; Avenell, A.; Bolland, M.; Hudson, J.; Stewart, F.; Robertson, C.; Sharma, P.; Fraser, C.; MacLennan, G. Effects of weight loss interventions for adults who are obese on mortality, cardiovascular disease, and cancer: Systematic review and meta-analysis. BMJ 2017, 359, j4849

[39]. Zhao, W.T.; Luo, Y.; Zhang, Y.; Zhou, Y.; Zhao, T.T. High protein diet is of benefit for patients with type 2 diabetes: An updated meta-analysis. Medicine 2018, 97, e13149.

[40]. Campos-Nonato, I.; Hernandez, L.; Barquera, S. Effect of a High-Protein Diet versus Standard-Protein Diet on Weight Loss and Biomarkers of Metabolic Syndrome: A Randomized Clinical Trial. Obes. Facts 2017, 10, 238–251.

[41]. Fogelholm, M. New Nordic Nutrition Recommendations are here. Food Nutr. Res. 2013, 57.

[42]. de Cabo, R.; Mattson, M.P. Effects of Intermittent Fasting on Health, Aging, and Disease. N. Engl. J. Med. 2019, 381, 2541–2551.

[43]. Wan, R.; Camandola, S.; Mattson, M.P. Intermittent food deprivation improves cardiovascular and neuroendocrine responses to stress in rats. J. Nutr. 2003, 133, 1921–1929.

Received: *09 August 2022*
Revised: *18 September 2022*
Final Accepted for publication: *29 September 2022*