

Effect of Nutrition Intervention on the Prevalence of Metabolic Syndrome at Kon Tum General Hospital, Vietnam

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ANNOTATION

Metabolic syndrome (Mets) is a global problem today and tends to increase, it is a risk factor for cardiovascular disease, stroke and leading to death. Intervention to change lifestyle and eating habits is a good measure to improve the status of metabolic syndrome. We studied on 1039 patients diagnosed with metabolic syndrome, selected 226 patients for follow-up with interventional therapy combined with lifestyle behavior modification communication, and evaluated the effectiveness after 6 months. The rate of patients with Mets in males was 12.7%, females was 9.05%, the overall prevalence of Mets was 21.75%, the rate of Mets tends to increase with age. After the intervention, the indicators to evaluate Mets all changed in a good direction. The rate of adverse habits decreased statistically significantly compared to before the intervention. The highest efficiency index was the reduction in the proportion of people who were sedentary (64.29%), followed by the reduction in the rate of salty and fatty foods. The habits of smoking, drinking alcohol decreased slightly. The highest efficiency index was the reduction in the proportion of people with hypertension (50.28%), followed by a reduction in people with low HDL-C (35.34%). However, the percentage of waist circumference reduction has not been statistically significant. The reduction rate of Mets was 25.66%. These findings provides objective evidences for dietary and physical activity management on metabolic syndrome as an efficient intervention.

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Introduction

Metabolic syndrome is a global problem today and tends to increase, the prevalence of metabolic syndrome ranges from less than 10% to 84% depending on region, sex, age, race and ethnicity.^[1, 2] An estimated one-quarter of the world's population suffers from metabolic syndrome.^[3] The Asia Pacific region is found to have a rapid increase in obesity, type 2 diabetes and cardiovascular diseases.^[4] Meta-analytical study by S. O'Neill and L. O'Driscoll on metabolic syndrome in 2015 showed that metabolic syndrome is a global socioeconomic problem through the burden of disease burden of the syndrome. Metabolism of central obesity, insulin resistance, dyslipidemia and hypertension of any ethnic group. Accurate, timely diagnosis of metabolic syndrome is important for global health and economy.^[5]

In Vietnam, research by Tran Quang Binh and et al in middle-aged people in the Red River Delta shows that The MetS prevalence and its components are common and major public health burden in the middle-aged adults. Habitants living in urban, being never-married, having an increase in age, BMI, and siesta time per day are significantly associated with MetS.^[6] Research by Le Huu Loi et al in 2017 on metabolic syndrome in 95 patients who are middle and high-ranking cadres under the management of the Provincial Standing Committee of the Provincial Party Committee in Kon Tum showed that the results of metabolic syndrome were 27.36%, the proportion of metabolic syndrome components with 3-4 disorders accounts for the majority.^[7] Therefore, strategies are needed to initially prevent an increase in the effects of metabolic syndrome and to reduce the disease burden, morbidity and mortality of metabolic syndrome.

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Previous studies showed that lifestyle interventions should be prioritized for prevention and treatment of metabolic syndrome, optimal weight maintenance by caloric restriction, and dietary adherence. Improving blood lipid disorders, limiting alcohol use, stopping smoking and increasing physical activity are measures to reduce the risks of metabolic syndrome. Indication of drugs to treat when there are disorders of blood lipids and hypertension.^[8-11]

Kon Tum is a mountainous province in the North Central Highlands, Vietnam, where has low population density, high poverty rate, with many ethnic groups living, including many ethnic minorities. Lifestyle interventions not only treat but also prevent complications, progression of comorbidities (diabetes, hypertension...). Therefore, we study this topic with the objectives to evaluate the proportion of patients with metabolic syndrome and the effectiveness of treatment interventions combined with lifestyle behavior modification communication in patients with metabolic syndrome at the study site.

MATERIALS AND METHODS

Research Subjects

Study on 1039 patients who visiting the Kon Tum Provincial General Hospital, diagnosed with metabolic syndrome, monitored treatment interventions combined with lifestyle behavior modification communication, and evaluated the effectiveness after 6 months.

Criteria for diagnosis of metabolic syndrome: according to the IDF/AHA consensus (2009) when at least 3/5 of the following criteria are present.^[12] Increased waist circumference (waist circumference ≥ 90 cm (men), or ≥ 80 cm (women)); hypertriglyceridemia: triglycerides ≥ 1.7 mmol/L or being treated with drugs to increase triglycerides; lowering high-density lipoprotein cholesterol (HDL-C): HDL-C <1.0 mmol/L (men) or <1.3 mmol/L (women) or taking medication to lower HDL-C; hypertension (BP): systolic BP ≥ 130 mmHg and/or diastolic BP ≥ 85 mmHg; or are taking medication for high blood pressure. Hyperglycemia fasting: blood glucose ≥ 100 mg/dL (5.6 mmol/L) or being treated with blood sugar drugs.

Research Methods

Screening 1039 patients randomly, selected 226 patients with metabolic syndrome to evaluate the time before intervention and 6 months after the intervention: Take medication to regulate blood sugar, blood pressure, triglycerides and HDL-C as indicated. Nutrition: low energy diet, each time reduce 200-300 kcal monthly at follow-up examination by instructing the patient to follow the following diet: Limit foods with high glycemic index (GI - glucose index), increase use of foods with low glycemic index based on the Vietnamese Food Composition Table of the National Institute of Nutrition.^[13] Increase the use of unsaturated fats (vegetable oils, fish fats...), limit saturated fats (animal fats) and cholesterol (animal organs and egg yolks). Increase the use of fiber (eat more green vegetables, fresh fruits). Limit salty foods, limit alcohol, don't smoke. Physical activity mode: increase movement, exercise to achieve the intensity of exercise according to the level of physical activity, ≥ 30 min/day or ≥ 150 min/week.^[14]

Monitoring research subjects during the intervention period: Develop a "Track record of subjects with Metabolic Syndrome" for monitoring. Monitoring content includes the implementation of nutrition, daily exercise as well as monthly examination results of the study subjects in the two groups.

Research Variables

Anthropometric characteristics: gender, age group. Rate of metabolic syndrome: according to IDF/AHA consensus (2009).^[12] Adverse habits: eating salty, fatty, low fiber, smoking, drinking alcohol, sedentary. Clinical and biochemical indicators: waist circumference, blood pressure, glucose, triglycerides, HDL-C.

Data Processing

Using SPSS 20.0 software, using routine biomedical statistical analysis. Continuous and discrete variables were presented with mean and \pm SD, and number and percentage, respectively. Chi-square analyses were used to test the difference between biochemical variables between the two groups. Multiple logistic regression analysis was used to examine associations between risk factors of metabolic syndrome and sociodemographic factors as independent and dependent variables, respectively. P-values less than 0.05 were regarded as statistically significant.

RESULT

Prevalence of MetS according to genders was showed in Fig. 1, the rate of metabolic syndrome in men was 12.7%, in women was 9.05%, and 21.75% in the general group. The rate of patients with metabolic syndrome tends to increase with age, the highest in people over 70 years old (Fig. 2).

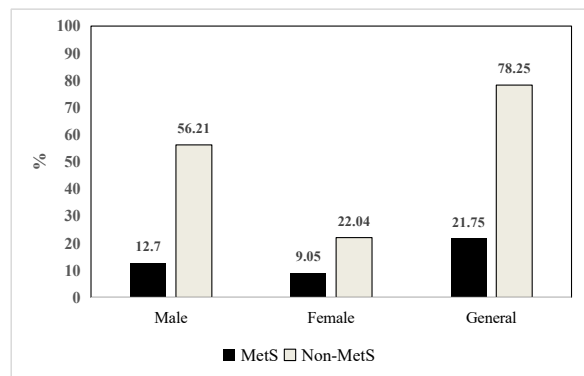


Fig. 1: Prevalence of MetS according to genders

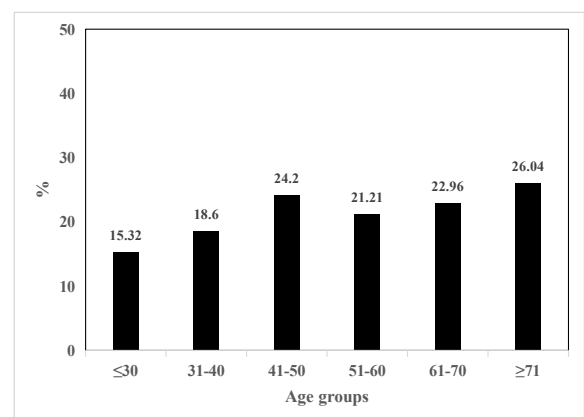


Fig. 2. Prevalence of metabolic syndrome according to age group

Effectiveness of interventions to reduce adverse eating habits was showed in Table 1. After the intervention, the rate of adverse habits decreased statistically significantly compared to before the intervention. The highest efficiency index was the reduction in the proportion of people who were sedentary (64.29%), followed by the reduction in the rate of salty and fatty foods. The habits of smoking, drinking alcohol decreased slightly.

After the intervention, the rates of hypertension, hyperglycemia, increased triglycerides, decreased HDL-C and the incidence of MetS decreased statistically. The highest efficiency index was the reduction in the proportion of people with hypertension (50.28%), followed by a decrease in people with low HDL-C (35.34%). The percentage of waist circumference reduction has not been statistically significant. The reduction rate of MetS was 25.66% (Table 2).

Table 2 showed that, after the intervention, the indicators to evaluate MetS all changed in a good direction as decrease in waist circumference, maximal blood pressure, blood glucose and increase in HDL-C. The mean values of diastolic blood pressure and triglyceride reductions were not statistically significant, relatively low efficiency index (10% approximately).

DISCUSSION

In this study, screening 1039 patients randomly who visiting the Kon Tum Provincial General Hospital, selected 226 patients with metabolic syndrome to evaluate the time before intervention and 6 months after the intervention. The rate of people with metabolic syndrome in our study was higher than some previous studies in other provinces in Vietnam such as Ha Nam (16.3%), Thai Binh (19.6%), Ho Chi Minh City (18.5%).^[6, 15, 16] Research results show that it is necessary to have in-depth studies on the situation of metabolic syndrome in the Central Highlands in particular and other highlands of Vietnam. The association between age and metabolic syndrome has been documented in some studies.^[17-20] In this study, the youngest age at diagnosis of metabolic syndrome was 19 years old. In Ho Chi Minh City, the rate of metabolic syndrome in people 13-16 years old was 4.6%.^[16] These results suggest the need for early communication and screening for metabolic syndrome, including in young adults, who are considered to have a low prevalence of metabolic syndrome. The primary focus in the management of metabolic syndrome is on minimizing modifiable risk factors through lifestyle changes (increasing physical activity and modifying diet).^[21-24] Physical activity is essential in the management of metabolic syndrome because

Table 1: Effectiveness of interventions to reduce adverse eating habits

Habits	Before		After		P	Efficiency index (%)
	n	%	n	%		
Eating salty foods	129	57.08	78	34.51	0.000	39.53
Eating a lot of fat	148	65.49	96	42.48	0.000	35.14
Eating less fiber	150	66.37	98	43.36	0.000	34.67
Smoking	142	62.83	107	47.35	0.001	24.65
Drinking alcohol, beer	165	73.01	142	62.83	0.027	13.94
Sedentary	126	55.75	45	19.91	0.000	64.29

Table 2: Effectiveness of interventions to reduce the proportion of components of the metabolic syndrome

Ingredient	Before		After		p	Efficiency index (%)
	n	%	n	%		
High waist circumference (cm)	214	94.69	208	92.04	0.345	2.80
Hypertension	177	78.32	88	38.94	< 0.001	50.28
Hyperglycemia	197	87.17	180	79.65	0.043	8.63
High triglyceride	209	92.48	168	74.34	< 0.001	19.62
Low HDL-C	116	51.33	75	33.19	< 0.001	35.34
MetS	22	100.00	168	74.34	< 0.001	25.66

Table 3: Intervention effect on metabolic syndrome components

Ingredient	Before		After		p	Efficiency index (%)
	Average	SD	Average	SD		
Waist circumference (cm)	88.92	6.03	88.18	7.74	0.030	0.83
Systolic pressure (mmHg)	133.96	14.45	124.38	10.10	0.000	7.15
Diastolic pressure (mmHg)	83.74	8.24	78.93	49.07	0.148	5.74
Blood glucose (mmol/L)	6.71	1.02	6.16	0.63	0.000	8.20
Triglyceride (mmol/L)	3.21	1.95	3.00	1.98	0.823	6.54
HDL-C (mmol/L)	1.19	0.38	1.31	0.31	0.000	-10.08

it regulates fat and glucose metabolism, leading to increased insulin action, while it also lowers blood pressure and improves blood pressure control in overweight people.^[25, 26] Our research showed that increasing movement has the highest efficiency index (64.29%). Some other habits such as reducing eating salty foods, eating fat, and increasing eating vegetables and fruits also have relatively high efficiency indexes (>30%). The two habits with the lowest reduction index are smoking and drinking alcohol. Counseling and interventions to reduce smoking and alcohol consumption are always difficult, especially for the elderly, a group of people who find it difficult to change long-established habits. Although the efficacy scores were habit-dependent, but all were reduced and it is clear that the intervention through counseling the patient about the risks of metabolic syndrome, the management of the metabolic syndrome through change lifestyle has worked. Increased waist circumference is the leading risk factor and the IDF mandatory diagnostic criteria for metabolic syndrome. People with metabolic syndrome often have an abnormal fat distribution, characterized by fat accumulation mainly in the upper body, in the peritoneum (visceral fat), or under the skin, and a reduction in waist circumference is the primary goal of metabolic syndrome management.^[12] However, unlike other indicators of metabolic syndrome that can be quickly adjusted with drugs, waist circumference is a very difficult criterion to achieve. The rate of increase in waist circumference in this study did not decrease significantly compared to before the intervention (efficiency index was 2.80%). However, other indicators such as the prevalence of hypertension, hyperglycemia, elevated triglycerides, decreased HDL-C, and decreased incidence of metabolic syndrome were statistically significant. Our results were similar to some previous studies.^[27, 28] This shows that, although in our study, the effectiveness of reducing waist circumference was low, but it is really necessary to communicate and encourage people with metabolic syndrome to increase exercise and change healthy lifestyles. And being able to persevere in physical activity for a long time combined with a healthy diet will help improve weight and waist circumference with a higher efficiency index.

CONCLUSION

The proportion of patients with metabolic syndrome tends to increase with age. After the intervention, the rate of adverse habits decreased statistically significantly compared to before the intervention, the proportion of components and indicators of metabolic syndrome all changed in a good direction. This finding provides objective evidences for dietary and physical activity management on metabolic syndrome as an efficient intervention.

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Statement of Ethics

The study protocol was approved by the Research Ethics and Detailed Protocol Review Board of the National Institute of National Institute of Malariology, Parasitology and Entomology, Hanoi, Vietnam (number of decision councils: No. 266/QD-VSR,

2018 March 13). All patients gave their informed consent for the publication of this study.

Author Contributions

L.H.L. designed the study, collected, analyzed the data and prepared the initial manuscript; D.T.V.A. collected the data; N.T.H., P.H.D., C.B.L. and N.Q.T. edited the initial version of the manuscript. All authors approved the final version of the manuscript.

Data Availability Statement

Data are not publicly available on legal or ethical grounds, but after this paper have published, these data can use as a reference.

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