BIOMEDICAL INDICES AND PREVALENCE OF METABOLIC SYNDROME ON STRICT VEGETARIAN POPULATION AT HUE CITY IN 2015

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Abstract

Background: Vegetarianism is a global trend and considered as a healthy diet. The aims of our research were to: *measure some biological paramenters on strict vegetarian population at Hue City in 2015* and to *identify the prevalence of metabolic syndrome of this population*. **Population and methods**: A descriptive, cross- sectional study on 120 monk and nuns who were ≥30 years of age and practicing a strict vegetarian diet for at least 5 years. **Results:** Gender: Male: 21.7%; Female: 78.30%. The average age was 55.58 ± 15.96 years in males and 60.72 ± 16.23 in females. Height: Males: 161.37 ± 6.33 cm; Females: 148.94 ± 6.89 cm; Weight: Males: 56.65 ± 8.06 kg; Females: 48.97 ± 7.19 kg.Waist circumference: Males: 75.77 ± 9.07cm; Females: 76.70 ± 10.19 cm; Blood pressure: Males: 126.73 ± 17.89/80.19 ± 10.34 mmHg; Females: 121.86 ± 18.32/75.96 ± 8.62 mmHg; Fasting glucose: Males: 100.08 ± 30.42 mg/dL; Females: 91.80 ± 24.84 mg/dL; Triglycerides: Males: 197.75 ± 228.38 mg/dL; Females: 144.38 ± 79.63 (mg/dL); HDL-Cholesterol: Males: 38.27 ± 13.53 mg/dL; Females: 44.85 ± 10.43 mg/dL. Prevalence of Metabolic Syndrome was 25% in total population and was 19.23% in males and 26.60 % in females and was from 50-80 years. **Conclusion:** Vegetarian diet was not associated with a low prevalence of metabolic syndrome in Hue's context. Therefore, further studies are necessary before guidelines can be provided for people who practise this diet in the region and in Vietnam.

Key words: *metabolic syndrome, strict vegetarian, diet, Buddhist Monks and Nuns, Hue.*

1. INTRODUCTION

Nowadays, the importance of diet and nutrition in human health is well established. Epidemiological, observational and clinical studies have contributed to our understanding of how and to what extent dietary factors may induce or prevent diseases.

Among many different kind of diets, the vegetarian diet has quickly found supporters in Western countries when it was shown that such a diet is an effective way to prevent diseases (eg. cardiovascular and metabolic diseases and even cancer) as well as to promote health [6], [10], [11], [12], [13]. In many Asian countries, vegetarianism originated from Buddhist principles with some variability in the diet composition.

For many reasons, vegetarian diets have become a global trend. While it is believed that vegetarian diet overall is healthy, some studies indicate that vegetarianism may result in a deficiency of some minerals and nutrients [8], [15], [18], [19]. Vegetarianism is still a controversial issue and needs to be studied systematically and thoroughly. Therefore, our research was conducted to investigate the following objectives:

1.Investigate some biological parameters in

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a population following a strict vegetarian diet in Hue City in 2015.

2. Identify the prevalence of metabolic syndrome in a population following a strict vegetarian diet.

2. POPULATION AND STUDY METHODS

2.1. Population: The participants were vegetarians ≥30 years of age and practicing a strict vegetarian diet for at least 5 years. Based on these requirements, the Buddhist Monks and Nuns who are living in pagodas within Hue city were selected as study subjects.

We excluded the participants who have medical history of cardiovascular diseases, mental disorders or do not agree to participate in the study.

2.2. Methods

2.2.1. Study design: cross- sectional study

2.2.2. Sampling: a convenient sample of 120 participants was selected from the name list of Thua Thien Hue Budhist Church. All participents were checked for inclusion and exclusion criteria.

2.2.3. Time and place: the study was implemented at Hue city, Thua Thien Hue province, Vietnam from January-April of 2015.

2.2.4. Variables:

2.2.4.1. Demographic variables: gender, age, educational background

2.2.4.2. Biomedical parameters: height, weight, BMI, waist circumference, hip circumference, waist and hip ratio (WHR), blood pressure, fasting lipids (Total cholesterol, Triglycerides, HDL-cholesterol, LDL-cholesterol) and fasting glucose.

2.2.4.3. Instruments:

A questionnaire was designed to collect the required information of each participant through an interview, which was followed by a physical exam and a fasting blood sample. The interview was performed by the study personnel while blood sampling was performed by the medical technicians. The blood sample was analyzed at Laboratories of Hue University Hospital.

Criteria for the diagnosis of the metabolic syndrome (the definition of the Consensus Statement of IDF, NHLBI, AHA, WHF, IAS, IASO 2009 was used with specific thresholds waist circumference for Asians) [7]

Risk Factor	Defining Level
Abdominal obesity* Men Women	Waist circumference** >90 cm >80 cm
Triglycerides	≥150 mg/dL
HDL - Cholesterol Men Women	 <40 mg/dL <50 mg/dL
Blood pressure	≥130/≥85 mmHg
Fasting glucose	≥100 mg/dL

2.3. Data analysis: statistical procedure was performed using SPSS software version 16.0, the data were measured and displayed by decimal number, percentage, means ± standard deviations.

2.4. Ethical considerations

The research was approved by the Science Committee of Hue UMP and the Thua Thien Hue Buddhist Church. All participants gave written informed consent before any study procedure was performed.

3. RESEARCH RESULTS

3.1. Demographic characteristics

Table 1. Demographic characteristics of study group

Demographic characteristics		n=120	%
Gender	Male	26	21.7
	Female	94	78.3
Ave.Age	Male: 55.58 ± 15.96 (Min: 31; Max:78)		
	Female: 60.72 ± 16.23 (Min:30; Max:97)		
Educational background	Illiterate	1	0.83
	Primary	32	26.67
	Secondary	28	23.33
	High school	20	16.67
	College, University and Graduate	39	32.50

The percentage of female was major (78.3%); Most of participants were educated at least primary level (99.17%).

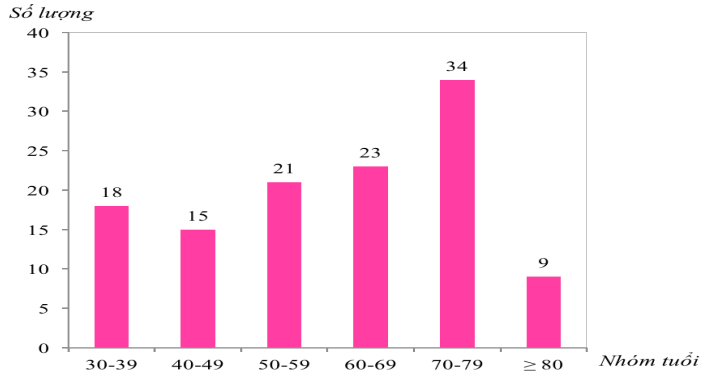

Fig 1. Age distribution of study group

3.2. Some Biomedical Parameters of study group

Table 2. Average values of some biomedical parameters of the study group

Parameters	Male	Female
Height (cm)	161.37 ± 6.33	148.94 ± 6.89
Weight (kg)	56.65 ± 8.06	48.97 ± 7.19
BMI (kg/m2)	21.70± 2.45	22 ± 2.55
Waist circumference (cm)	75.77 ± 9.07	76.70 ± 10.19
Hip circumeference (cm)	89.15 ± 5.80	88.02 ± 6.65
WHR	0.85± 0.06	0.87 ± 0.08
Blood pressure (mmHg)	126.73 ± 17.89/80.19 ± 10.34	121.86 ± 18.32/75.96 ± 8.62
Fasting glucose (mg/dL)	100.08 ± 30.42	91.80 ± 24.84
Total –cholesterol (mg/dL)	155.41 ± 32.86	172.42 ± 34.43
Triglycerides (mg/dL)	197.75 ± 228.38	144.38 ± 79.63
LDL- cholesterol(mg/dL)	87.37 ± 24.74	101.28 ± 32.86
HDL-cholesterol(mg/dL)	38.27 ± 13.53	44.85 ± 10.43

Most of biomedical parameters remained in normal range, except Triglycerid and HDL- Cholesterol

Table 3. Distribution of biomedical parameters based on Consensus Statement 2009

Risk factors		Number (n=120)	Percentage (%)
Abdominal Obesity	Yes	40	33.30
	No	80	66.70
Triglycerid	≥ 150 mg/dL	42	34.80
	<150 mg/dL	78	65.20
HDL-Cholesterol	< 40 mg/dL(male); < 50 mg/dL (female)	81	67.50
	≥ 40 mg/dL(male); ≥ 50 mg/dL (female)	39	32.50
Blood pressure	≥ 130/≥ 85 mmHg	50	41.70
	<130/<85 mmHg	70	58.30
Fasting Glucose	≥ 100 mg/dL	9	7.50
	<100 mg/dL	111	92.50

The Metabolic Syndrome factor most often fulfilled were low HDL-cholesterol (67.50%), elevated blood pressure (41.70%), and elevated triglycerides (34.80%).

3.3. The prevalence of Metabolic Syndrome

Table 4. The prevalence of Metabolic Syndrome in study group

Metabolic syndrome	Number (n)	Percentage(%)
No defining factor	15	12.50
1 Metabolic Syndrome factor	33	27.50
2 Metabolic syndrome factor	42	35.00
Metabolic Syndrome	**30**	**25.00**
Total	**120**	**100**

The prevalence of Metabolic syndrome was 25% ; and only in 12.5% none of the factors defining the Metabolic Syndrome was present

Table 5. Distribution of Metabolic Syndrome by gender

Metabolic syndrome	Males		Females		Total (N)	%
	N1	%	N2	%		
No defining factor	4/26	15.40	11/94	11.70	15	12.50
1 Metabolic Syndrome factor	10/26	38.50	23/94	24.50	33	27.50
2 Metabolic syndrome factor	7/26	26.90	35/94	37.20	42	35.00
Metabolic Syndrome	**5/26**	**19.23**	**25/94**	**26.60**	**30**	**25.00**
Total	**26**	**100**	**94**	**100**	**120**	**100**

N1: male population; N2: female population

In general, The prevalence of Metabolic Syndrom in Females (26.60%) was higher than in male (19.23%).

Table 6. Distribution of Metabolic syndrome by group age

Group Age	Metabolic syndrome	
	Number (n)	Percentage (%)
30-39	0/18	0
40-49	0/15	0
50-59	7/21	33.33
60-69	5/23	21.74
70-79	18/34	52.94
≥ 80	0/9	0
Total	**30/120**	**25.00**

Metabolic Syndrome was observed in age group 50-80 years.

4. DISCUSSION

Our study was performed in 120 participants, most of the subjects were females (78.30%). This result is similar to the result of Nguyen Hai Thuy (2005) and Hoang Thi Thu Huong (2006). In fact, due to some religious reasons, the access to Monks is always more difficult [2], [3].

For age, our result showed a quite evenly distribution of group ages with the average age was 55.58 ± 15.96 years in males and 60.72 ± 16.23 in females. Also, 28.30 % of all participants achieved college, university and higher education. However, our participants were not as educated as those included in the study by Hoang Thi Thu Huong (2006). This may relate to the fact that in her study a younger population was included with more

educational opportunities than ours [2].

Concerning biomedical parameters: height and weight are important anthropometric indices related to nutriton status; body mass index has strong relation to the overweight and obesity- risk of metabolic syndrome. Our study population had lower values for height and weight than Krajcovicova (1994) [15], Le Nam Tra (2000) [5], Phan Thanh Son et al (2001 - 2002) [4] and Hoang Thi Thu Huong (2002) [1] while BMI was similar and in the normal range. This may relate to the fact that our study group was mainly middle age and older and had suffered from poor nutrition during the war than the younger populations of the other studies.

Blood pressure is an important parameter to diagnose metabolic syndrome. In Vietnam, together with the social economic developments, the prevalence of NCDs (Non - Communicable diseases) is increasing including hypertension. In our study group, average blood pressure was 126.73 ± 17.89/80.19 ± 10.34 mmHg in males and 121.86 ± 18.32/75.96 ± 8.62 mmHg in females. The values are within the normal range but higher than the values reported by Tran Thanh Binh (2014) in middle age group in the North of Vietnam [20].

Also, we found that the waist and hip circumferences and WHR were in the normal range in our study population. In addition, these values are similar or a little bit higher than those reported by Tran Thanh Binh (2014) [20].

On average fasting glucose was 100.08 ± 30.42 mg/dL in males and 91.80 ± 24.84 mg/dL in females. This result is similar to the one reported by Nguyen Hai Thuỷ (2005) [3] but different to the ones reported by Hoang Thi Thu Huong (2006) [2] and Tran Thanh Binh (2014) [20].

With respect to fasting lipids, we found similar values as reported by Hoang Thi Thu Huong (2006) and Tran Thanh Binh (2014) [2],[20].

Concerning the individual factors defining the Metabolic Syndrome (according to the Consensus Statement 2009) we found the following prevalences: low HDL-cholesterol (67.50%), high blood pressure (41.70%), high triglycerides (34.80%), abdominal obesity (33.30%) and elevated fasting glucose (7.50%).Based on these criteria, we found the prevalence of Metabolic Syndrome in our strictly vegetarian group to be 25%, which is similar to the predicted worldwide prevalence (20%) and to the prevalence published for Vietnam (8-40%) but higher than the value reported by the Vietnamese Nutrition Asscociation (2007). Concerning the age and gender distribution, it seems that Metabolic Syndrome doesn't occur in the younger and in the very old, but is mostly observed in the age groups 50-80 years [5], [9].

According to our study, vegetarian diet was not associated with a low prevalence of metabolic syndrome as in Western's context. It can be related to the different vegetarian diet in Hue with much rice, fatting oil, snack, sugar and lack of vegetable. Also, the late detection and control of risk factors contributed to high prevelance of Metabolic Syndrome in vegetarian group.

Limitation of the study:

Certain limitations of our study should be mentioned: unfortunately we could only include a small number of male participants because we could not gain sufficient access to Budhist monks. Another limitation is the lack of a control group, which could not be recruited due to lack of time, budget and human resources. Finally, it would have been ideal to include a control group of non- Budhist vegetarian subjects, however we could not recruit a sufficient number of subjects fulfilling these criteria.

5. CONCLUSION

The prevalence of Metabolic Syndrome was relatively high in this cohort of vegetarian monks and nuns and it was not different from that reported for the non-vegetarian population. In particurlar the metabolic syndrome factors low HDL, elevated triglycerides and elevated blood pressure are common, which may indicate that the subjects consume a diet high in carbohydrates and salt. However, more detailed analyses of the diet are necessary before any recommendations and guidelines can be provided.

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