

FOREWORDS

The proportion of hyperuricemia (HU), gout and metabolic syndrome (MS) in Viet Nam and the world are increasing.

HU has been known in a long time, it was an important risk factor of gout [101]. Some studies about HU had showed correlation with some cardiovascular risk factors (CRFs) such as hypertension (HP) [126], [129]; dyslipidemia [14]; insulin resistance, diabetes type 2 [21], [53]. In addition, serum uric acid (UA) levels also related to the MS [36], [65], [118].

In Viet Nam, some authors have studied about the prevalence of HU, gout, MS of the association about HU and MS [36]. Can Tho city has many rich natural resources such as seafood and animal. So those characteristics have provided a lot of purine – rich foods which increased proportion of HU. Addition, there have some bad habits such as smoking, drinking alcohol, eating salty foods, eating fatty foods. These were some CRFs which increased prevalence of MS [22], [32]. Although, some authors studied the rate of MS in the community [3]; the features of serum UA levels in hospitalized hypertensive patients [37]; the characteristics of hospitalized patients with gout [27]; specially some CRFs [22]...Today, we have not seen the study yet published on the percentage of HU, gout, the relationship between serum UA levels and MS or some CRFs, specially evaluating the effectiveness of interventions with lifestyle changes in subjects with HU, MS. So, we decided to study the topic “Investigation on serum uric acid levels, gout and metabolic syndrome in adults equal or over 40 years old in Can Tho city” with two objectives:

1. Reviewing serum uric acid levels, proportion and characteristics of gout and metabolic syndrome in adults equal or over 40 years old in Can Tho city.
2. Observing relationship between serum uric acid levels and metabolic syndrome or some cardiovascular risk factors. First appreciating the effectiveness of intervention with lifestyle changes in subjects who had hyperuricemia, metabolic syndrome.

NEW CONTRIBUTION OF THE THESIS

1. Determining prevalence of HU, proportion and characteristics of gout and MS in the community of Can Tho city.
2. Showing relationship between serum UA levels and MS or some CRFs. First appreciating the effectiveness of intervention with lifestyle changes in subjects who had HU, MS.

STRUCTURE OF THE THESIS

The thesis consists of 121 pages, with 4 chapters, 50 tables, 3 pictures, 5 charts, 130 reference documents including 43 Vietnamese documents and 87 English documents. 2 pages forewords, 31 pages overviews, 20 pages subjects and methods, 31 pages results, 31 pages discussions, 2 pages conclusions, 1 pages recommendation.

CHAPTER 1 OVERVIEW

1.1. OVERVIEW OF SERUM URIC ACID LEVELS, GOUT, METABOLIC SYNDROME

1.1.1. Serum uric acid levels

1.1.1.1. Definition of hyperuricemia

Serum UA levels was defined increasing when it is over 420 μ mol/l in men and over 360 μ mol/l in women [123].

1.1.1.2. Epidemiology

In the world, prevalence of HU in the study of Uaratanawong S. et al (2011) was 24.4% [120] and Lohsoonthorn V. et al (2006) was 10.6% (18.4% for male (M) and 7.8% for female (F)) [84].

In Vietnam, proportion of HU in the investigation of Bui Duc Thang (2006) was 33.8% [35] and Quyen Dang Tuyen (2001) was 22.4% [33].

1.1.1.4. Cause and classification of hyperuricemia

It includes the increasing of serum UA synthesis, the reducing of UA excretion through the kidney or coordinating two reasons above.

According to Taniguchi A. et al (2008): the human genome contains the sequence for urate oxidase but the gene has lost function because of deleterious mutations. Human are thus at risk for plasma urate levels exceeding urate solubility because of the deficiency of urate oxidase as a species and a renal UA handling system, resulting in net tubular urate reabsorption [117].

1.1.1.5. Treatment

In HU phase with no symptoms, patients do not need to take the drugs. They just change the lifestyle, test serum UA levels and visit the doctor to take the examination regularly [13].

1.1.2. Gout

1.1.2.1. Conception

Gout is caused by the deposition of sodium urate crystals in organizations or by the saturation of UA in extracellular fluid [17].

1.1.2.2. Epidemiology

Gout is common disease in developed countries. It was about 0.16 - 1.36 % of the population, 95.0% for male and middle - aged (30 - 40 years old) [39].

In Vietnam, gout accounted for approximately 10.0 - 15.0% of arthritis diseases in hospital [39].

1.1.2.3. Cause and pathogenesis

Main cause of gout was the result of HU and high urate crystals which play a major role in the pathogenesis of gout [25], [99].

1.1.2.7. Treatment

* In acute gout stage, it requires non-steroid, cortico-steroid or colchicin [30], [77].

* In basic treatment, diet (eg, purin - poor foods, low fat, low protein, drinking plenty of water, avoiding from alcohols and beers [31]) and drugs (eg, Probenecid, Allopurinol... [5], [50]) are needed.

1.1.3. Metabolic syndrome

1.1.3.2. Epidemiology

In the word, prevalence of MS in the study of Cai Z. et al (2009) was 8.4% [54] and Ryu S. et al (2007) was 15.0% [109].

In Vietnam, proportion of MS in the investigation of Duangta Thiphakhouanxay (2011) was 33.1% [36].

1.1.3.4. The pathogenesis of metabolic syndrome

According to the National Heart, Lung, and Blood Institute (2004), MS seems to have three potential etiological categories: obesity and disorders of adipose tissue; insulin resistance; and a constellation of independent factors (eg, molecules of hepatic, vascular, and immunologic origin) [74].

1.1.3.5. Some issues about the treatment in metabolic syndrome

- * Treatment of obesity and disorders of body fat distribution: weight loss.
- * Treatment of insulin resistance: losing weight, increasing physical activities, using medications (metformin and glitazon).
- * Treatment of metabolic syndrome as a special risk factor
 - + Dyslipidemia: medications (statin, fibrat), diet, exercise.
 - + Hypertention: lifestyle changes, medications.
 - + Coagulation disorders: low - dose aspirin.
 - + Treatment of inflammation: statin.
 - + Treatment of hyperglycemia: lifestyle changes, drugs [2].

1.2. CHARACTERISTICS OF GEOGRAPHY, ECONOMY, SOCIETY IN CAN THO CITY

Can Tho city is located in the center of Mekong Delta. It has the agricultural economy. Mostly people are farmers. They have some bad habits such as smoking, drinking alcohol, eating salty and fatty...

1.3. DOMESTIC AND FOREIGN STUDIES ON SERUM URIC ACID LEVELS, METABOLIC SYNDROME

1.3.1. Associations between serum uric acid levels with metabolic syndrome and some cardiovascular risk factors

1.3.1.1. Domestic studies

Duangta Thiphakhouanxay author (2011) studied proportions, characterized MS and concentration in serum UA officials in unit X. Conclusion: serum UA rate was 59.1% MS group (male: 96.9 %; females: 3.1%). Percentage of relevant UA with hypertension, increased serum glucose, increased serum triglycerides (TG), reduce serum HDL-C was 66.2%, 55.0%, 62.4%, 55.3% [36].

In 2004, Tuan Anh Huy authors studied the correlation between HU with dyslipidemia, hypertension. Result: in elderly men, HU involved some CRFs, serum UA levels proportion increases with age. Group of HU had drinkers (62.4%), body mass index (BMI) ≥ 25 kg/ m² (8.5%), hypertension (67.5%), ischemic muscle heart (7.7%), stroke (7.7%), hypercholesterolemia (48.7%), hypertriglyceridemia (20.5%), hyperlipidemia (53.8%), hyperglycemia (25.6%) [14].

In 2014, Dang Hoai Thu research serum UA levels in patients with hypertension at Can Tho university of medicine and pharmacy. Conclusion: Average concentration of serum UA levels was $390,13 \pm 90,83$ $\mu\text{mol/l}$. Percentage of HU was 47.9% [37].

Tran Kim Cuc (2012) conducted a study of MS and some related factors in Can Tho city. Results: Prevalence of MS was 18.5% (8.3% for male and 24.2% for female) [3].

1.3.1.2. Foreign studies

Liu P. W. et al (2010) studied association between serum UA levels and MS in Taiwanese adults. Conclusion: there was a positive

association between serum UA levels and MS and an inverse association between UA and fasting plasma glucose in Taiwanese adults [83].

In 2008, Numata T. et al investigated the link between UA levels and MS. Conclusion was HU which may be often associated with MS in Japanese people [94].

Choi H. K. et al (2007) determined prevalence of MS according to serum UA levels in a nationally representative sample of US adults. Conclusions: prevalence of MS increased substantially with increasing serum UA levels [60].

1.3.2. The research of intervention with lifestyle change in hyperuricemia and metabolic syndrome

Nguyen Thi Lam et al (2011) investigated effectiveness of nutrition counseling about the changes of food intakes, disease status, biomarkers and anthropometric indicators of gout patients. Results: dietary counseling for gout patients based on available local foods wick has positive impacts on dietary intake changes, choice food, reduction of clinical signs as changes in serum UA and lipid level, and anthropometric indicators [19].

In addition, the study of Tsouli S. G. et al (2006) had results: an aggressive in implementation of lifestyle changes that could reduce the adverse impact of serum UA in MS [118].

CHAPTER 2

SUBJECTS AND METHODS OF THE STUDY

2.1. SUBJECTS OF THE STUDY

There were 1.185 subjects who agreed to enter the study. They lived in two counties and two districts at Can Tho city. Their age were equal or over 40 years old. We selected 65 subjects in the study

at the time of the census 2nd.

2.1.1. Time research

From January 2012 to December 2012.

2.1.2. Exclusion criteria

- + Choosing subjects before intervention stage:
 - Subjects used the drugs which affect the production and secretion of UA within 10 days. Patients with end - stage chronic renal failure were dialysis. Patients got malignancies (cancer, cirrhosis...).
 - Patients used medications (eg, diet pills, drugs for dyslipidemia) or had liposuction abdomen or suffered from diseases (acute diseases, diabetes type 1, hypertension with causes).
 - Selected subjects did not agree to participate in research.
- + Choosing subjects in intervention stage: subjects were using medications which affect to serum UA levels or MS.

2.2. METHODS OF THE STUDY

2.2.1. Standard criteria

2.2.1.1 Sample size

Using this formula to determine the rate:

$$n = \frac{Z_{1-\alpha/2}^2 p(1-p)}{d^2}$$

n: minimum sample size.

$Z_{1-\alpha/2} = 1.96$ (95%, $\alpha = 0.05$).

$p = 13.1\%$ [59].

$d = 0,03$

$n = (1,962 \times 0,131 \times (1 - 0,131)) / 0,032 = 485.92 = 486$

Due to using the method of taking sample following with group, we adjusted impacts on reducing accuracy of selecting group

by increasing sample size with design coefficient about 2. In addition, the provisions of subjects could not be collected data (absent, inference reduction, etc) then increased more 10.0% of sample. Thus, sample size in this research was: n equal or over 1070.

2.2.1.2. Sampling techniques

* Selecting of the first sample: We chose samples with intentional system, stratified and randomized method.

* Selecting of the intervention group:

We chose 277 subjects which had HU or MS from 1185 subjects in the sample. After that, we ejected these subjects:

+ Using medications effecting the results of serum UA levels or MS in the study.

+ The subjects had hypertension, dyslipidemia which were not to allow intervention with alone lifestyle changes.

Next, we proceeded to invite subjects joining in research. There were 109 subjects. After intervention by changing lifestyle for three months, there were only 65 subjects who have enough conditions joining in the second data collection.

+ Criteria of the second data collection: subjects agreed to participate in research and provided their informations. Futhermore, they went to the clinic every month to be consulted directly and received the form of lifestyle changes. In addition, they had to perform with right counselling equal or over 5 days per week for three months. After three months, they went to clinic for the second data collection.

2.2.2. Methods of collecting informations

2.2.2.4. The diagnostic criteria, assessment and classification

* Drinking alcohol: subjects drunk alcohol equal or over 2 glasses for men (or equal or over 20 g ethanols per day), equal or over

1 glass for women (equal or over 10 g ethanol per day) (1 glass equivalent to 10 g of ethanol or 100 ml of wine or 240 ml of beer) [113].

* Smoking: subjects were smoking equal or over 10 cigarettes per day or stopped smoking under 12 months [86].

* How to assess waist circumference: waist circumference which was equal or over 90 cm for male and equal or over 80 cm for female, was defined increasing [2].

* MS was diagnosed by ATP criteria for Asian - Pacific people [74].

* Gout was diagnosed by Bennet P.H and Wood criteria in 1968 [30].

* Method for determining biochemical indicators:

+ All test were done in laboratory department of Can Tho central general hospital.

+ How to draw blood: all subjects were bled in the morning. They had to fast 12 hours previously.

+ Equipment: AU 640 biochemical machine of Olympus company, Japan.

+ Reagents of Olympus company, Japan.

* Diet: we used guidance of the Ministry of Health [43]. Subjects were asked doing equal or over 5 days per week.

* Exercise:

+ Kind of exercise: walking, cycling, Tai Chi, swimming, jogging...

+ Time for exercise was equal or over 150 minutes per week (average 20-30 minutes per day). Average time was equal or over 5 days per week [86].

* Some CRFs in the study that were age, gender, hypertension, diabetes, dyslipidemia, overweight/ obesity ($BMI \geq 23$), drinking alcohol, smoking.

2.2.4. Design of study

A method of epidemiological research which designed descriptive cross-sectional, combined with community intervention trials have tracked down, initially applied interventions by lifestyle changes at home by guiding directly and send cards to guide lifestyle changes each month for those with increased serum UA or MS comparison before then.

CHAPTER 3

RESULTS OF THE STUDY

3.1. SERUM URIC ACID LEVELS, PREVALENCE AND CHARACTERISTICS OF GOUT AND METABOLIC SYNDROME

3.1.1. Serum uric acid levels

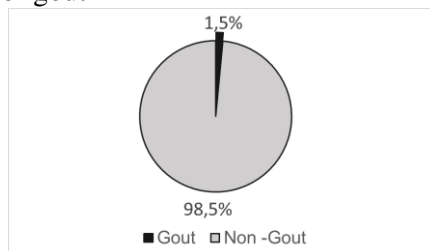
Table 3.10. Serum uric acid levels (n=1185)

HU	Quantity (Qu.)	(%)	($\bar{X} \pm SD$) ($\mu\text{mol/l}$)
Yes (Y)	149	12.6	288.91 \pm 86.08
No (N)	1036	87.4	
Total	1185	100.0	

There were 149 subjects which have HU (12.6%). Average value of serum UA levels was 288.91 \pm 86.08 $\mu\text{mol/l}$.

3.1.2. Prevalence and features of gout

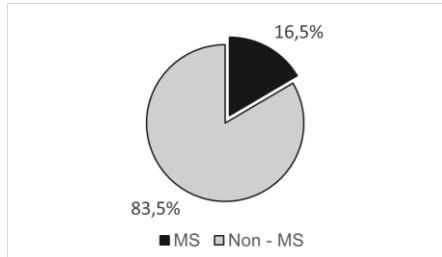
3.1.2.1. Prevalence of gout



Graph 3.2. Prevalence of gout (n=1185)

Quantity of gout people were 18 people, hold 1.5%.

3.1.3. Prevalence and features of metabolic syndrome



Graph 3.3. Prevalence of metabolic syndrome (n=1185)

There were 196 MS people, hold 16.5%.

Table 3.17. The distribution of subjects according to quantity of metabolic syndrome components (n=1185)

Quantity	Male (%)	Female (%)	Total (%)	p
0	64 (19.9)	131 (15.2)	195 (16.5)	< 0.001
1	124 (38.5)	217 (25.1)	341 (28.8)	
2	96 (29.8)	357 (41.4)	453 (38.2)	
3	32 (9.9)	84 (9.7)	116 (9.8)	
4	5 (1,6)	63 (7,3)	68 (5,7)	
5	1 (0,3)	11 (1,3)	12 (1,0)	
Total	322 (100.0)	863 (100.0)	1185 (100.0)	

Proportion of women with two components of MS was highest (41.4%). Proportion of all people with two components of MS was highest (38.2%). Proportion of group with 3, 4, 5 components of MS were 9.8%; 5.7%; 1.0%, respectively ($p < 0.001$).

Table 3.19. Prevalence of metabolic components of metabolic syndrome (n=196)

Characteristics	Quantity	(%)
Waist circumference: male ≥ 90 , female ≥ 80 cm	141	71.9
TG $> 1,7$ mmol/l	191	97.4
HDL-C: male < 1.03 ; female < 1.29 mmol/l	121	61.7
Blood pressure:systolic ≥ 130 ;diastolic ≥ 85 mmHg	164	83.7
Glycemia ≥ 6.1 mmol/l	63	32.1

Proportion of metabolic components of MS was different. In particular, proportion of TG > 1.7 mmol/l was highest (97.4%).

3.2. RELATIONSHIP BETWEEN SERUM URIC ACID LEVELS AND METABOLIC SYNDROME OR SOME CARDIOVASCULAR RISK FACTORS. FIRST APPRECIATING THE EFFECTIVENESS OF INTERVENTION WITH LIFESTYLE CHANGES IN SUBJECTS WHO HAD HYPERURICEMIA, METABOLIC SYNDROME

3.2.1. Relationship between serum uric acid levels and metabolic syndrome or some cardiovascular risk factors

3.2.1.1. Relationship between serum uric acid levels and metabolic syndrome

Table 3.20. Relationship between serum uric acid levels and metabolic syndrome

	MS (n=196)		Non-MS (n=989)		p
	Quantity	(%)	Quantity	(%)	
HU (n=149)	68	34.7	81	8.2	<0.001
Non-HU (n=1036)	128	65.3	908	91.8	
Average of serum UA ($\mu\text{mol/l}$)	330.83 \pm 101.98		280.60 \pm 80.06		<0.001

Proportion of HU in group of MS (34.7%) was higher than group of non-MS (8.2%) ($p < 0.001$). Average of serum UA levels in

group of MS ($330.83 \pm 101.98 \mu\text{mol/l}$) was higher than group of non-MS ($280.60 \pm 80.06 \mu\text{mol/l}$) ($p < 0.001$).

3.2.1.2. Relationship between serum uric acid and MS or some cardiovascular risk factors

Table 3.28. Relationship between serum uric acid levels and some cardiovascular risk factors.

Some CRFs		HU		Non-HU		p	OR
		Qu.	(%)	Qu.	(%)		
Age	> 60 (n=350)	56	16.0	294	84.0	<0.05	1.52 (1.06-2.17)
	≤ 60 (n=835)	93	11.1	742	88.9		
Gen-der	M (n=322)	66	20.5	256	79.5	<0.001	2.42 (1.70-3.45)
	F (n=863)	83	9.6	780	90.4		
HP	Yes (n=379)	64	16.9	315	83.1	<0.01	1.72 (1.21-2.45)
	No (n=806)	85	10.5	721	89.5		
Dia-betes	Yes (n=50)	10	20.0	40	80.0	>0.05	1.79 (0.88-3.66)
	No (n=1135)	139	12.2	996	87.8		
Dys-lipid-emia	Yes (n=132)	16	12.1	116	87.9	>0.05	0.95 (0.55-1.66)
	No (n=1053)	133	12.6	920	87.4		
BMI ≥23	Yes (n=506)	87	17.2	419	82.8	<0.001	2.07 (1.46-2.93)
	No (n=679)	62	9.1	617	90.9		
Drink-ing	Yes (n=349)	69	19.8	280	80.2	<0.001	2.33 (1.64-3.31)
	No (n=836)	80	9.6	756	90.4		
Smok-ing	Yes (n=199)	35	17.6	164	82.4	<0.05	1.63 (1.08- 2.47)
	No (n=986)	114	11.6	872	88.4		

Prevalence of HU in group of over 60 years old, male, hypertension, BMI ≥ 23 , drinking of alcohol, smoking were higher than

group of equal or lower 60 years old, female, non-hypertension, not drinking of alcohol, not smoking ($p < 0.05$). Besides that, the frequency of HU in group of over 60 years old, male, hypertension, BMI ≥ 23 , drinking of alcohol, smoking were higher than 1.52; 2.42; 1.72; 2.07; 2.33; 1.63 times group of equal or lower 60 years old, female, non-hypertension, BMI < 23 , not drinking of alcohol, not smoking, respectively.

Table 3.29. Relationship between average of serum uric acid levels and some cardiovascular risk factors (n=1185)

Some CRFs		Average of UA ($\bar{X} \pm SD$), $\mu\text{mol/l}$	Min $\mu\text{mol/l}$	Max $\mu\text{mol/l}$	P
Age	> 60 (n=350)	303.05 \pm 87.59	81	716	<0.001
	\leq 60 (n=835)	282.98 \pm 84.80	112	650	
Gen- der	M (n=322)	346.38 \pm 88.88	147	650	<0.001
	F (n=863)	267.46 \pm 74.45	81	716	
HP	Yes (n=379)	297.20 \pm 88.88	112	698	<0.05
	No (n=806)	285.01 \pm 84.52	81	716	
Dia- betes	Yes (n=50)	284.82 \pm 101.84	81	575	>0.05
	No (n=1135)	289.09 \pm 85.37	112	716	
Dyslip idemia	Yes (n=132)	299.36 \pm 83.53	117	555	>0.05
	No (n=1053)	287.60 \pm 86.35	81	716	
BMI ≥ 23	Yes (n=506)	299.93 \pm 87.43	115	716	<0.001
	No (n=679)	280.69 \pm 84.20	81	650	
Drink- ing	Yes (n=349)	332.41 \pm 93.60	151	650	<0.001
	No (n=836)	270.75 \pm 75.73	81	716	
Smok- ing	Yes (n=199)	346.20 \pm 81.67	166	650	<0.001
	No (n=986)	277.34 \pm 82.28	81	716	

Average of serum UA levels in group of over 60 years old, male, hypertension, BMI \geq 23, drinking of alcohol, smoking were higher than group of equal or lower 60 years old, female, non-hypertension, not drinking of alcohol, not smoking ($p < 0.05$).

Bảng 3.34. Relationship between metabolic syndrome and some cardiovascular risk factors (n=1185)

Some CRFs		MS		Non-MS		p	OR
		Qu.	(%)	Qu.	(%)		
Age	> 60 (n=350)	74	21.1	276	78.9	<0.01	1.57
	\leq 60 (n=835)	122	14.6	713	85.4		1.14-2.16
Gen-der	F (n=863)	158	18.3	705	81.7	<0.01	1.67
	M (n=322)	38	11.8	284	88.2		1.15-2.44
HP	Y (n=379)	101	26.6	278	73.4	<0.001	2.72
	N (n=806)	95	11.8	711	88.2		1.99-3.72
Dia-betes	Y (n=50)	29	58.0	21	42.0	<0.001	8.01
	N(n=1135)	167	14.7	968	85.3		4.46-4.37
Dyslipidemia	Y (n=132)	27	20.5	105	79.5	>0.05	1.35
	N (n=1053)	169	16.0	884	84.0		0.85-2.12
BMI \geq 23	Y (n=506)	136	26.9	370	73.1	<0.001	3.79
	N (n=679)	60	8.8	619	91.2		2.73-5.27
Drink-ing	Y (n=349)	53	15.2	296	84.8	>0.05	0.87
	N (n=836)	143	17.1	693	82.9		0.62-1.22
Smok-ing	N (n=986)	174	17.6	812	82.4	<0.05	1.72
	Y (n=199)	22	11.1	177	88.9		1.08-2.78

Proportion of MS in group of over 60 years old, female, hypertension, diabetes, BMI \geq 23, not smoking were higher than group of equal or lower 60 years old, male, non-hypertension, non-diabetes, BMI $<$ 23, smoking ($p<0.05$). Besides that, the frequency of MS in group of over 60 years old, hypertension, diabetes, BMI \geq 23, smoking were higher than 1.57; 2.72; 8.01; 3.79; 1.72 times group of equal or lower 60 years of age, non-hypertension, non-diabetes, BMI $<$ 23, not smoking, respectively.

3.2.2. First appreciating the effectiveness of intervention with lifestyle changes in subjects who had hyperuricemia, metabolic syndrome

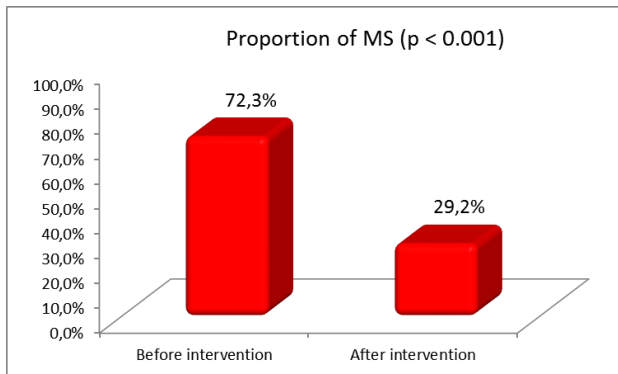
3.2.2.1. Characteristics of serum uric acid levels before and after intervention

Table 3.38. Average of serum uric acid levels before and after intervention (n=65)

Serum UA levels	Before intervention		After intervention		P
	Qu.	(%)	Qu.	(%)	
Proportion of HU	36	55.4	15	23.1	<0.001
Average of serum UA levels ($\mu\text{mol/l}$)	377.77 ± 116.75		325.25 ± 88.76		<0.01

Proportion of HU and average of serum UA levels after intervention (23.1% and $325.25 \pm 88.76 \mu\text{mol/l}$) were lower than before intervention (55.4% and $377.77 \pm 116.75 \mu\text{mol/l}$) ($p<0.01$).

3.3.2.2. Characteristics of metabolic syndrome before and after intervention



Graph 3.5. Comparing proportion of metabolic syndrome before and after intervention (n=65)

Proportion of MS after intervention (29.2%) was lower than before intervention (72.3%) ($p < 0.001$).

CHAPTER 4 DISCUSSION

4.1. SERUM URIC ACID LEVELS, PREVALENCE AND CHARACTERISTICS OF GOUT AND METABOLIC SYNDROME

4.1.1. Serum uric acid levels

Proportion of HU in our study was 12.6%; average concentration of UA was $288.91 \pm 86.08 \mu\text{mol/l}$. This result is lower than the majority of the authors in the country [4], [11], [35] and abroad [116], [122], [128] it can be caused by many factors such as sample size, subjects and time study, diet and habits of peoples can not similarities.

4.1.2. Prevalence and features of gout

Proportion of gout was 1.5%. Compared to domestic research [25], the rate of our gout was higher perhaps due to the development of economic and social in Vietnam, the diet of Vietnamese are better than time long ago, Europeanization should follow the disease pattern which tends to increase, proportion of diseases related excess diet, including gout. Additionally, in medicine advances, the diagnosis of gout is also easier than before, detection rates of soon gout is increase and it is also higher. Compared to study abroad [63], [130] the percentage of our gout was lower. Perhaps it is due to the difference of disease patterns between the countries with highly developed economy and beside country whose economy is gradually developing.

4.1.3. Prevalence and features of metabolic syndrome

+ Proportion of metabolic syndrome

The results showed MS was 16.5% rate. Our results was lower than some domestic studies [3], [9], [34] and international studies [90], [109], [114] may be, it related selecting sample, subjects and time study, the sample size, diet and habits of the people ethnic may not similarities

+ The distribution of subjects according to quantity of metabolic syndrome components

Percentage of subjects in MS with two components was highest (38.2%). This is what we need attention by the medical intervention and community. If there is not group two components of MS transformed into three components of MS, whereas proportion in the community MS Can Tho city will.

+ Percentage of metabolic components in metabolic syndrome

In some components of MS, proportion of serum TG > 1.7 mmol/l was highest (97.4%). In the country, compared with studies of Duangta Thipphakhounxay author (2011), the result of us like the rising trend TG > 1.7 mmol/l, almost equal to the ratio of the remaining elements [36]. Overseas, our results higher than results of Bauduceau B. et al (2005) [52].

4.2. RELATIONSHIP BETWEEN SERUM URIC ACID LEVELS AND METABOLIC SYNDROME OR SOME CARDIOVASCULAR RISK FACTORS. FIRST APPRECIATING THE EFFECTIVENESS OF INTERVENTION WITH LIFESTYLE CHANGES IN SUBJECTS WHO HAD HYPERURICEMIA, METABOLIC SYNDROME

4.2.1. Relationship between serum uric acid levels and metabolic syndrome or some cardiovascular risk factors

4.2.1.1. Relationship between serum uric acid and metabolic syndrome

Relationship between serum UA and MS have been noted a long time [38]. In our study, proportion of HU and average concentrations of serum UA in MS group (34.7% and $330.83 \pm 101.98 \mu\text{mol/l}$) was higher than in non-MS group (8.2% and $280.60 \pm 80.06 \mu\text{mol/l}$) ($p < 0.001$). Our study was different from the studies at domestic and abroad. But generally, these studies were recorded: average concentration and rate of HU in subjects with MS were high and they had the correlation [103], [105], [125].

4.2.1.2. Relationship between serum uric acid levels and metabolic syndrome or some cardiovascular risk factors

+ Relationship between serum uric acid levels and some cardiovascular risk factors

Prevalence of HU in group of over 60 years old, male, hypertension, $\text{BMI} \geq 23$, drinking of alcohol, smoking were higher

than group of equal or lower 60 years old, female, non-hypertension, not drinking of alcohol, not smoking ($p < 0.05$). Besides that, the frequency of HU in group of over 60 years old, male, hypertension, $BMI \geq 23$, drinking of alcohol, smoking were higher than 1.52; 2.42; 1.72; 2.07; 2.33; 1.63 times group of equal or lower 60 years old, female, non-hypertension, $BMI < 23$, not drinking of alcohol, not smoking, respectively. About risk factors for age, gender, drinking of alcohol, smoking: our results is nearly results Duangta Thiphakhouanxay (2011) [36]. As for the risk factors of hypertension, $BMI \geq 23$: Our study similarities near Le Kim Uyen (2014) [42].

+ Relationship between metabolic syndrome and some cardiovascular risk factors

Proportion of MS in group of over 60 years old, female, hypertension, diabetes, $BMI \geq 23$, not smoking were higher than group of equal or lower 60 years old, male, non-hypertension, non-diabetes, $BMI < 23$, smoking ($p < 0.05$). Besides that, the frequency of MS in group of over 60 years old, hypertension, diabetes, $BMI \geq 23$, smoking were higher than 1.57; 2.72; 8.01; 3.79; 1.72 times group of equal or lower 60 years of age, non-hypertension, non-diabetes, $BMI < 23$, not smoking respectively.

About the risk factors of age, gender: Our results fit with the trend of Tran Kim Cuc (2012) [3]. Risk factors for hypertension, $BMI \geq 23$, smoking: Our results are also consistent with trends in the study of Duong An Han (2013) (except smoking) [9].

4.2.2. First appreciating the effectiveness of intervention with lifestyle changes in subjects who had hyperuricemia, metabolic syndrome

According to Vázquez-Mellado J. et al (2004): chronic HU are considered risk factors for gout and related to alcoholism, obesity, hypertension, diabetes mellitus especially to MS. Primary prevention in patients with HU and gout, it includes patient education towards change nutrition, lifestyle and a few of these patients needed drug therapy [121].

4.2.2.1. Features of serum uric acid before and after intervention

In our study, the rate of HU was lower after intervention before the intervention (23.1% versus 55.4%; $p < 0.001$). The average concentration of serum UA after intervention before intervention was also lower ($325.25 \pm 88.76 \mu\text{mol/l}$ compared with $377.77 \pm 116.75 \mu\text{mol/l}$; $p < 0.01$). Our results fit of Hung Dinh Vu commented: HU stage alone (no symptoms) without medication, just lifestyle changes combined with testing, regular visits to tracking [13].

4.2.2.2. Features of metabolic syndrome before and after intervention

The study results showed that the rate of MS after lower intervention before intervention (29.2% versus 72.3%; $p < 0.001$). Thus, only with exercise combined with diet, salt, sugar and fats contribute reasonably well reduce a significant proportion of subjects with MS. Our results resemble some intervention studies of MS by changing lifestyle Deen D. et al (2004) [66], Tsouli SG et al (2006) [118].

CONCLUSIONS

1. Serum uric acid levels, proportion and characteristics of gout and metabolic syndrome

- Serum UA levels: prevalence of HU was 12.6%. The average concentration of UA was $288.91 \pm 86.08 \mu\text{mol} / \text{l}$.
- Percentage of gout was 1.5%.
- Proportion and characteristics of MS: prevalence of MS was 16.5%. Percentage of group 3, 4, 5 component of MS was 9.8%; 5.7%; 1.0%, respectively. In the metabolic components of MS, the rate of serum TG > 1.7 mmol/l occupied the highest (97.4%).

2. Relationship between serum uric acid levels and metabolic syndrome or some cardiovascular risk factors. First appreciating the effectiveness of interventions with lifestyle changes in subjects who had hyperuricemia, metabolic syndrome

2.1. Relationship between serum uric acid levels and metabolic syndrome or some cardiovascular risk factors

- The average concentration of UA and HU rate in MS group were higher than in non-MS group.

- The average concentration of UA and prevalence of HU in group of over 60 years old, male, hypertension, BMI ≥ 23 , drinking of alcohol, smoking were higher than group of equal or lower 60 years old, female, non-hypertension, not drinking of alcohol, not smoking ($p < 0.05$). Besides that, the frequency of HU in group of over 60 years old, male, hypertension, BMI ≥ 23 , drinking of alcohol, smoking were higher than 1.52; 2.42; 1.72; 2.07; 2.33; 1.63 times group of equal or lower 60 years old, female, non-hypertension, BMI < 23, not drinking of alcohol, not smoking, respectively.

- Proportion of MS in group of over 60 years old, female, hypertension, diabetes, $BMI \geq 23$, not smoking were higher than group of equal or lower 60 years old, male, non-hypertension, non-diabetes, $BMI < 23$, smoking ($p < 0.05$). Besides that, the frequency of MS in group of over 60 years old, hypertension, diabetes, $BMI \geq 23$, smoking were higher than 1.57; 2.72; 8.01; 3.79; 1.72 times group of equal or lower 60 years of age, non-hypertension, non-diabetes, $BMI < 23$, not smoking respectively.

2.2. First appreciating the effectiveness of intervention with lifestyle changes in subjects who had hyperuricemia, metabolic syndrome

- The average concentration of UA and HU rate after intervention was lower previous intervention.

- Percentage of after MS intervention was also lower than previous intervention. The average of MS components were also set in the trend better than previous intervention.

RECOMMENDATIONS

People who are equal or over 40 years old in the community, should be tested annually for screening serum uric acid levels and MS (blood pressure measurement, calculation indices body mass index, waist measurement, serum glucose testing, serum triglycerides and serum HDL-C).