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ความชุกของภาวะกรดยูริกในเลือดสูงและปัจจัยที่เกี่ยวข้องในประชากรในเขตชนบทจังหวัดขอนแก่น

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The Prevalence of Hyperuricemia and Associated Factors in the Rural Community, Khon Kaen Province.

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หลักการและวัตถุประสงค์: ภาวะกรดยูริก ในเลือดสูง นอกจากจะทำให้เกิดโรคเกาต์และโรคนิ่วไตแล้ว ยังสัมพันธ์กับโรคเรื้อรังหลายชนิด การศึกษานี้มีวัตถุประสงค์เพื่อหาความชุกของภาวะกรดยูริกในเลือดสูงในชุมชนชนบทของจังหวัดขอนแก่น และวิเคราะห์ตัวแปรที่มีความสัมพันธ์กับการมีภาวะกรดยูริกในเลือดสูง

วิธีการศึกษา: เป็นการศึกษาแบบตัดขวาง (cross sectional study) สุ่มตัวอย่างโดยวิธีการสุ่มแบบหลายขั้น (multi-stage sampling) **ในผู้ที่มีอายุ 15- 65 ปี ใน 4 อำเภอ จ.ขอนแก่น**

ผลการวิจัย: ในผู้เข้ารับการตรวจมีข้อมูลของ serum uric acid จำนวน 2,128 ราย เป็นชายร้อยละ 36.4 **(774 คน)** อายุ 46-60 ปีเป็นร้อยละ 47.5 อาชีพเกษตรกรรม ร้อยละ 75.8 ความชุกของการมีกรดยูริกในเลือดสูงปรับตามกระจายตามเพศและกลุ่มอายุของประชากรไทย โดยวิธีปรับแบบตรง (direct method) คิดเป็นร้อยละ 11.8 (ค่าช่วงความเชื่อมั่น 95% เป็น 10.4,13.2) ในเพศชาย (uric >7.0 mg/dl) เป็นร้อยละ 14.9 ในเพศหญิง (uric > 5.7 mg/dl) เป็นร้อยละ 8.6 เมื่อวิเคราะห์โดยใช้เทคนิค multiple logistic regression พบความสัมพันธ์ระหว่างภาวะกรดยูริกในเลือดสูงกับเพศ (ชาย) ภาวะอ้วน การผิดปกติต่ออาหารที่มีพิวรีนสูง โดยมีค่า adjusted odds ratio (95%CI) เป็น 1.5 (1.1,2.0), 1.6 (1.2,2.1) และ 1.4 (1.1,1.9) **ตามลำดับ**

สรุป: ประมาณ 1 ใน 8-9 ราย ของคนชนบทขอนแก่นมีภาวะกรดยูริกในเลือดสูง ซึ่งไม่แตกต่างจากค่าที่ได้จากการศึกษาอื่น ในประเทศไทย และพบว่าสัมพันธ์กับการผิดปกติเมื่อรับประทานอาหารพิวรีนสูงนอกเหนือจากสัมพันธ์ปัจจัยอื่นๆ ที่เคยมีรายงานมาก่อนหน้านี้

Background and objective: Hyperuricemia is not only related to gout and renal stones but also various kinds of chronic diseases. This study aimed to investigate the prevalence of hyperuricemia and its association with various factors in rural residents of Khon Kaen.

Methods: A cross-sectional study in 16 villages from 4 districts of Khon Kaen was conducted. Studied population were randomly selected by multistage sampling.

Results: The study included 2,128 subjects aged 15 to 65 years, 36.4 % were male, 47.5% were between 46-60 years old and 75.8% were farmers. The prevalence of hyperuricemia with age and sex adjustment was 11.8% (95%CI: 10.4, 13.2), in males (>7.0 mg/dl) 14.9% and in females (>5.7 mg/dl) 8.6%. By multiple logistic regression hyperuricemia was significantly associated with sex (male), obesity and purine rich food aggravation. The adjusted odds ratios and 95%CI were 1.5 (1.1,2.0), 1.6 (1.2,2.1) and 1.4 (1.1,1.9), respectively.

Conclusions: One in 8-9 rural dwellers in Khon Kaen had hyperuricemia which is comparable to the results of other studies in other parts of Thailand. In this region purine rich food aggravation (bamboo shoots, meat, insects) is remarkably one of the three associated factors out of male and obesity.

Keywords: purine rich food aggravation, hyperuricemia, obesity, rural area

Introduction

Research in several countries has found a relationship between the level of uric acid in the blood and cardiovascular diseases[1-3]. However, there is still no clear pathological explanation for this relationship. Some have suggested that the relationship as seen is not a true relationship, but may be an interaction through another variable arising from a high level of uric acid in the blood (hyperuricemia), such as obesity, hyperlipidemia, hypertension, use of diuretics and insulin rejection[4-6]. However, other studies have found that there is a relationship between hyperuricemia and metabolic syndrome, which consists of trunkal obesity, hypertension, diabetes and hyperlipidemia[7-10].

In Thailand, there have been studies on the level of uric acid in the blood in 1381 clients coming for an annual checkup at Chulalongkorn Hospital, with 376 males and 1005 females[11]. It was found that in 10.6% of cases there were high blood uric acid levels. In the females they found that the hyperuricemia was associated with body mass index, blood pressure, fat and the level of sugar in the blood. In the males there was a relationship with the metabolic syndrome.

There have been reports of studies of the average blood uric acid levels of civil servants in Bangkok, compared with civil servants in Phol District, Khon Kaen province. There was no statistically significant difference found between the two groups (totaling 274 people), but the prevalence of high blood uric level was not reported[12].

The relationship between the level of uric in the blood and renal stones has shown that patients with gout have a 20-30 times chance of having both uric stones and calcium oxalate renal stones than the general population higher[13, 14]. In one study in the north of Thailand, patients with gout had renal stones in 33% of cases[15].

However, diagnosis of small renal stones has a large false negative diagnosis, especially with uric acid stones which are non opaque. They cannot be found with normal x-ray (plain KUB), and if the stones are less than 5 mm, IVP can not diagnose. Ultrasound is also ineffective in diagnosis of renal stone sizes less than 5 mm. Thus diagnosis of renal stones in medical practice is usually confined to stones larger than 5 mm, and for diagnosis of the smaller stones we need Unenhanced Helical Computer Tomography (UHCT),which is expensive and not widely available. From studies of screening community renal stones using ultrasound from many directions (multiple anatomical approaches) it revealed that 90% of renal stones in the community are less than 10 mm[16].

The inaccuracy in diagnosis of small renal stones affects treatment of the patients profoundly. Unawareness of the presence of renal stones results in giving antibiotics for too short to eradicate infection. Recurrent chronic infections can result, and the patients will present the multiple chronic health complaints, known as “the I-sarn syndrome” which can lead to chronic pyelonepritis and chronic renal failure[17-19].

In this study the researchers wanted to know the prevalence of hyperuricemia in the rural community and the accompanying symptoms, and search for the associated of various factors such as sex, age, obesity, purine rich food (PRF) aggravation, joint pain, muscle pain, arm and leg pain and dyspepsia.

Materials and methods

This was a cross sectional study in 4 districts of Khon Kaen province. The sample size needed when estimating the prevalence of hyperuricemia at 11%, and accepting an error of 12.5% of the estimated prevalence, was calculated as 2042 cases. Data from 2 studies were used. The first was a cohort study to find the relationship between renal stones and chronic renal failure, for which data was collected from December 2005 to March 2009. The second study was a the prevalence of the multiple chronic health complaints (MCHC) which used multi stage sampling in 4 districts of Khon Kaen province. The total number of cases were 2128 with the serum uric acid data.

Data was entered in duplicate, and the program Epi Info 6 used to check for entry errors. Corrections were made, and initial analysis performed using Microsoft

Excel. Final data analysis used SPSS 15.0, recording results as percentages and means. Relationships between variables were tested with the Chi square test and logistic regression used to test the relationship of factors against the symptom of high blood uric level. The resulting prevalence was adjusted for sex and age group in the population for the year 2002[20].

This project received the grant support from Khon Kaen University. Data were derived from two projects, receiving approval from the Human Research Ethics Committee of Khon Kaen University (codes HE480831 and HE450309).

Results

Basic demographic data

From 2128 cases, consisting of 36.4% males (774 people) and 63.6% females (1354 people), 47.5% were aged 46-65 (1010 people) and lived in villages in Nam Pong district, Khon Kaen province (72.6%). Most were farmers (75.1%), followed by labours (10.4%) as shown in Table 1.

Hyperuricemia symptoms

The survey showed that from 2128 blood samples there were 238 people with high blood uric or 11.2% with 95%CI levels at 10.0, 13.0 %, using the uric level of >5.7 mg/dl for women and >7.0 mg/dl for men. Separating by sex, 10.1% of women were hyperuricemia, while for men the number was 13.0%. The prevalence of hyperuricemia in men was higher than women significantly (p-value= 0.039) as shown in Table 2.

The prevalence of hyperuricemia from this survey adjusted by age and sex for the population in 2002 by the direct method was 11.75% (95% CI: 10.4, 13.2). The prevalence (95% CI) of hyperuricemia adjusted for age of the standard population in males and women were 14.9 (12.5, 17.7) and 8.6 (7.1,10.2), respectively. (Table 3)

Table 1 Characteristics of samples

	characteristic	number	%
Sex (n=2,128)	male	774	36.4
	female	1,354	63.6
Age (years) (n=2,124)	< 30	187	9.0
	31-45	764	35.9
	46-60	1,010	47.5
	> 60	163	7.7
District (n=2,128)	Chonnabot	171	8.0
	Nong Song Hong	243	9.5
	Chumpae	285	13.4
	Nam Pong	1,429	67.2
Occupation (n=2,127)	farmer	1,614	75.8
	labour	194	9.2
	merchant	190	8.9
	civil servant	100	4.7
	other	29	1.4

Table 2 Distribution of blood uric acid level by sex

Uric level		male n (%)	female n (%)	total n (%)
hyperuricemia *		101 (13.0)	137 (10.1)	238 (11.2)
	95% CI	(11.0,15.0)	(9.0,12.0)	(10.0, 13.0)
Uric level**	<3 mg/dl	6.5 (8.4)	286 (21.1)	351 (16.5)
	3.0-4.9	313 (40.4)	806 (59.5)	1,119 (52.6)
	5.0-7.0	295 (38.1)	238 (17.6)	533 (25.0)
	> 7.0	101 (13.0)	24 (1.8)	125 (5.9)
	total	774 (100.0)	1,354 (100.0)	2!28 (100.0)

* male> 7.0 mg/dl, female > 5.7 mg/dl ; ** p=0.039: Ordinal Chi-Square

Table 3 Calculation of prevalence of hyperuricemia adjusted for age and sex for the standard population by the direct method

	male					female				
1 Age group (years)	2 Pop (persons)	3 Hyp uric	4[*1] Prev (%)	5[*2] St . pop (x1000)	6[*3] Estimate of hyp uric	7 Pop (persons)	8 Hyper -uricemia	9 Prev (%)	10[§] St . pop (x1000)	11 Estimate of hyp uric
15-24	47	6	12.77	5,788	738.89	59	3	5.08	5,616	285.6
25-34	61	14	22.95	5,608	1,287.08	149	14	9.40	5,438	511
35-44	184	19	10.33	4,690	484.29	396	31	7.83	4,736	370.7
45-54	283	36	12.72	3,386	430.73	452	44	9.74	3,519	342.6
>55	199	26	13.06	2,133	278.68	298	45	15.1	2,347	354.4
total	774	101		21,605	3,219.68	1,354	137		21,656	1,864

The prev of Hyp uric in males adjusted to the st. pop. =100 x 3,219.68/21,605= 14.9% (95%CI:12.5,17.7),
The prev of Hyp uric in females adjusted to the st. pop. =100x 1,864.23 /21,656 =8.6% (95%CI:7.1,10.2),
The prev of Hyp uric adjusted for age and sex of the st. pop.= 100 x (5,083.91)/ (4,3261) = 11.8 % (95%CI: 10.4, 13.2)

[*1] ,column 4 =100xcolumn 3/column 2; [*3], column 6= (column 4x column 5)/100.[*2],Thailand demography 2003(20) ; Hyp uric, Hyper uricemia; Prev, prevalence; Pop, Population; St. pop, Standard population

Factors associated with hyperuricemia

By bivariate analysis the variables under study, we found the significant association between hyperuricemia and obesity, dyspepsia with p-value=0.003 and 0.037, respectively as shown in Table 4. As to other symptoms of illness such as myofascial pain, no statistically significant relationship was found with hyperuricemia.

When analyzing the data with multiple logistic regression to remove the effect of other variables, considering variables initially with p<0.20 by bivariate analysis, which were sex, obesity, dyspepsia, myofascial pain, and PRF aggravation. It was found that the variables which are statistically significant to hyperuricemia were sex(male), obesity and PRF aggravation, with the adjusted Odds ratio (95%CI) of 1.50 (1.13,2.00), 1.58 (1.20,2.09) and 1.41(1.06,1.87) as shown in Table 5.

Table 4 Relationship between hyperuricemia and different variables

Variables		Hyperuricemia		
		No	Yes	p-value*
Sex	female	1217 (89.9)	137 (10.1)	0.039
	male	637 (87.0)	101 (13.0)	
Age	< 45 years	826 (90.5)	87 (13.0)	0.33
	≥ 45 years	1,060 (87.5)	151 (12.5)	
Obesity BMI	< 25.0	1,221 (90.4)	129 (9.6)	0.003
	> 25.0	658 (86.2)	105 (13.8)	
PRF agg**.	no	1,060 (89.7)	122 (10.3)	0.158
	yes	830 (87.3)	116 (12.3)	
Dyspepsia	no	1,105 (87.6)	156 (12.4)	0.037
	yes	784 (90.5)	82 (9.5)	
Aching gen.***	no	730 (87.4)	105 (12.6)	0.102
	yes	1,160 (89.7)	133 (10.3)	
- joint pain	no	1,116 (88.6)	144 (11.4)	0.67
	yes	774 (89.2)	94 (10.8)	
- myofascial pain	no	1,255 (88.9)	157 (11.1)	0.84
	yes	629 (88.6)	81 (11.4)	

*, Pearson Chi-Square; PRF agg***, Purine rich food aggravation; ***aching gen., aching in shoulder/back/waist/ arm.

Table 5 Relationship between hyperuricemia and different variables by multiple logistic regression

Studied characteristic	Adjusted OR	95%CI	
Sex (male)	1.49	1.13	1.99
Obesity	1.58	1.19	2.09
PRF agg.	1.41	1.06	1.87
Dyspepsia	0.75	0.56	1.01
Ach gen.	.80	0.60	1.06

Variables included in stage 1: sex, PRF agg, obesity, dyspepsia, Ach gen.,(Shoulder/ back/ waist/ arm ache)

Discussions

This study involved the collection of data from 2128 individuals in 4 rural districts of Khon Kaen province. It discovered that the prevalence of hyperuricemia, when adjusted for sex and age group, was 11.7%, or when considering males and females separately, the prevalence was 14.9% and 8.9% respectively. It was found that hyperuricemia was associated with factors of sex (male), obesity and PRFaggravation.

When comparing the results of the study with others, the prevalence is close to that found in a study in civil servants in Bangkok, which was 10.6%[11].

The prevalence of hyperuricemia in the Seychelles, which are islands in the Indian Ocean with high mortality from cardiovascular, 37% of causes of death, was found to be 35.1% in males and 8.7% in females, in a study of 1011 people. Variables with significant associated with hyperuricemia were BMI, age, triglycerides, use of blood pressure reducing drugs and alcohol consumption[7].

Reports of the prevalence of hyperuricemia in Taiwanese people have shown that genetic factors related to ethnic groups affect serum uric levels, with the prevalence for the general Taiwanese people at 11%, but at 25.8%[21] in the aboriginal people. Apart from genetic factors, other factors were related such as alcohol consumption, obesity and the use of diuretic drugs.

The advantages of this study are the adequate sample number at 2180 which is larger than other studies, but the disadvantages are that since only 72.3% of the samples participated in the study, there may be some degree of selection bias, since those who took part may be those who thought they might have renal stones, or who had chronic pain.

Since this study involved using survey data about illness in the community, and did not plan to collect data about serum lipids level, measurement of blood pressure and consumption of alcohol, data is not available for these variables. However, other variables which were collected were sex, age and obesity, and the effect of these variables was not different from other studies. Variables which have not been reported in other studies as having an influence on prevalence of hyperuricemia are problems with PRF aggravation, and problems with foods containing purine are found in about 33.5% of the rural population of the Northeast of Thailand[19]. Examples of these foods are bamboo shoots, meat, insects etc.

In the rural areas of Northeast Thailand, the economic status of the people is lower than elsewhere, and yet they have the prevalence of hyperuricemia which is similar to reports from other parts of the country with difference economic status. We can conclude that one in eight or nine people in the Northeast has hyperuricemia, which is associated with sex, obesity and PRF aggravation.

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