Original Article

Survey of Hyperuricemia and Gout Management among Thai Physicians

Chiowchanwisawakit P, MD[1], Katchamart W, MD[1], Srinonprasert V, MD[2]

[1] Division of Rheumatology, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

[2] Division of Geriatric Medicine, Department of Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand

Objective: To survey the management of hyperuricemia and gout among Thai physicians.

Materials and Methods: The present study was a cross-sectional questionnaire survey sent to 3,916 Thai physicians working in Thailand. Participants with no experience managing hyperuricemia and gout were excluded.

Results: Of the 742 (18.9%) physician respondents, 607 (81.8%) reported having experience managing hyperuricemia and gout. Regarding acute gouty arthritis management, oral colchicine (98%) and non-steroidal anti-inflammatory drugs (91%) were the two most commonly prescribed medications to control acute gouty arthritis. High-dose regimen of colchicine (1.2 mg followed by 0.6 mg every two hours until symptom relief or marked toxicity) would be ordered by 28% of physicians. Regarding urate-lowering therapy (ULT), 33% of participants would start ULT in a patient with asymptomatic hyperuricemia, and 59% would start ULT if serum uric acid (sUA) was more than 11 mg/dl. Approximately 70% of physicians would start allopurinol at no more than 100 mg/day, 63% set the sUA target at less than 6 mg/dl, and, 80% would limit the maximal dosage of allopurinol according to renal function. Only 14% of respondents would continue ULT lifelong. Most physicians (95%) would prevent gout flare when starting ULT, and most (95%) used colchicine to prevent gout flare.

Conclusion: The results of the present study revealed suboptimal management of hyperuricemia and gout, especially high-dose regimen of colchicine for acute gout, the sUA target and ULT duration, among Thai physicians. Improved condition-specific training and updated management guidelines are needed to improve the care and outcomes of hyperuricemia and gout patients in Thailand.

Keywords: Gout, Hyperuricemia, Physicians' survey, Colchicine, Allopurinol

J Med Assoc Thai 2019;102(9):1025-32
Website: http://www.jmatonline.com
Received 13 Aug 2019 | Revised 21 Aug 2019 | Accepted 22 Aug 2019

Hyperuricemia is a common medical problem and its prevalence increased from 10.6% in 2000[1] to 24% in 2010[2] in Thailand. The prevalence of symptomatic hyperuricemia was estimated to be 35%, and gout was the most common manifestation (89%) at a university hospital in Thailand[3]. Gout is a curable disease; however, it is often misdiagnosed and its management is often inappropriate[4,5]. To improve the quality of care for patients with gout and/or hyperuricemia, international and national recommendations were published[6-9]; however, misdiagnosis and mismanagement of gout were still reported[10-16] due to poor adherence to recommended practice and lack of knowledge[11,16]. Improved knowledge and understanding about what is known about hyperuricemia and gout among Thai physicians and how they treat these conditions will help us improve training, treatment, and patient outcomes. Accordingly, the aim of this study was to survey Thai physicians to better understand how patients with hyperuricemia and/or gout are managed in Thailand.

Correspondence to:

Chiowchanwisawakit P.

Division of Rheumatology, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, 2 Wang Lang Road, Bangkoknoi, Bangkok 10700, Thailand.

Phone: +66-2-4197775, **Fax**: +66-2-4183222

Email: preveena.chi@mahidol.ac.th

Materials and Methods

The present study was a cross-sectional questionnaire sent to 3,916 Thai physicians practicing in Thailand. Paper and online versions of the questionnaire were developed. To avoid duplication

How to cite this article: Chiowchanwisawakit P, Katchamart W, Srinonprasert V. Survey of Hyperuricemia and Gout Management among Thai Physicians. J Med Assoc Thai 2019;102:1025-32.

and misclassification, a plan for distribution was developed and implemented. In the first phase of questionnaire distribution, the paper-based questionnaire was sent to 1,816 physicians working at Siriraj Hospital between December 1, 2011 and December 31, 2011. In distribution phase 2, the online version of the questionnaire was emailed to 2,100 physicians working outside of Siriraj Hospital in Thailand since 1 January 2012. The e-mail addresses of physicians were requested from all royal colleges, and all professional societies or associations of physicians in Thailand. The Royal College of Orthopaedic Surgeons of Thailand, The Royal College of Physiatrists of Thailand, The Royal College of Ophthalmologists of Thailand, Gastroenterological Association of Thailand, Thai Rheumatism Association, Thai College of Emergency Physicians, and Dermatological Society of Thailand provided the requested e-mail addresses. Participation in the survey was voluntary and anonymous. Participants were asked to fill out the survey only one time. The protocol for the present study was reviewed by the Siriraj Institutional Review Board (SIRB), and it was rated as exempt from the procedural review and approval process (SIRB 301/2554). The present study abided by the ethical principles set forth in the 1964 Declaration of Helsinki, to include those set forth in all subsequent amendments.

Questionnaire

The questionnaire was designed to assess a physician's ability to identify comorbidity and associated factors of hyperuricemia, to interpret serum uric acid (sUA) level during gout flare, to manage asymptomatic hyperuricemia, gout flare, and prophylaxis of gout flare, and, to evaluate knowledge relative to sUA level target, lifestyle modification, and the use of urate-lowering therapy (ULT). A high dose regimen of colchicine was defined as 1.2 mg followed by 0.6 mg every two to three hours until symptom relief or diarrhea. There were 13 questions and four different response formats according to the type of question, as follows: 1) yes/no question, 2) multiple-choice question with one best answer, 3) multiple-choice question with the opportunity to select more than one answer, and 4) written response.

Statistical analysis

Physician respondents were categorized into the three following groups, rheumatologists, internal medicine physicians, and physician1 (physicians other than rheumatologists and internal medicine physicians). Descriptive statistics were used to summarize participant information. Pearson's chi-square test or Fisher's exact test was used to compare categorical data. Independent t-test and Mann-Whitney U test were used to compare continuous parametric and continuous non-parametric data, respectively, between two groups. ANOVA was used to compare parametric data among three groups. A p-value of less than 0.05 was regarded as being statistically significant. Imputation was not conducted for missing data. Data were analyzed using PASW Statistics version 18 (SPSS Inc., Chicago, IL, USA).

Results

Of the 3,916 physicians that were invited to join the study, 742 (18.9%) responded. Of those, 437 (24.1%) physicians were from Siriraj Hospital, and 305 (14.5%) were from outside Siriraj Hospital. Of the 742 respondents, 607 [391 (77.3%) practicing in an academic hospital] reported having experience in hyperuricemia and gout management. The remaining 135 physicians that reported having no related experience were excluded from further analysis. Two hundred sixty (42.8%) physician1, 308 (50.7%) internal medicine physicians, and 39 (6.4%) rheumatologists were eligible for further analysis. There were some missing data. The results of the survey are shown in Table 1-4. Participants from academic hospital were more likely to disagree with "normal sUA during acute arthritis could be excluded gout" than participants from non-academic hospital [351 (92.6%) versus 181 (85.4%), p=0.005], and less likely to aim sUA target ≤6 mg/dl [231 (57.4%) versus 150 (73.5%), p<0.001]. Use of high dose regimen of colchicine, starting dose of allopurinol 100 mg/day, and lifelong therapy of ULT were comparable between groups, p>0.05 (data not shown).

In each group of physician1 and internal medicine physicians analysis, there were no significant differences in frequency of attending scientific conferences (less than three times per year versus from three times per year), and duration of medical degree graduation regarding the target of sUA level, using high dose regimen of colchicine, starting dose of allopurinol 100 mg/day, target sUA less than 6 mg/dl, and lifelong therapy of ULT, p>0.05 (data not shown).

Discussion

This is the first survey to investigate the management of hyperuricemia and/or gout among physicians in Thailand. Similar to several previous reports[10-17], the results of the present study revealed

Table 1. Assessing associated comorbid diseases and factors with hyperuricemia† and diagnosis of acute gouty arthritis# according participants' specialty

	Total (n=607) n (%)	Physician1 (n=260) n (%)	Medicine (n=308) n (%)	Rheum (n=39) n (%)
Underlying disease				
Renal disease/urolithiasis	541 (89.1)	217 (83.5)	286 (92.9)	38 (97.4)*
Hypertension	532 (87.6)	218 (83.8)	280 (90.9)	34 (87.2)**
Diabetes mellitus	512 (84.3)	205 (78.8)	271 (88.0)	36 (92.3)**
Dyslipidemia	463 (76.3)	178 (68.5)	251 (81.5)	34 (87.2)*
Atherosclerosis	317 (52.2)	95 (36.5)	188 (61.0)	34 (87.2)*
Hematologic disease	267 (44.0)	61 (23.5)	173 (56.2)	33 (84.6)*
Associated medication and alcoholic drink				
Diuretics	521 (85.8)	192 (73.8)	291 (94.5)	38 (97.4)*
Low dose aspirin	244 (40.2)	61 (23.5)	150 (48.7)	33 (84.6)*
Cyclosporine	162 (26.7)	42 (16.2)	89 (28.9)	31 (79.5)*
Ethambutol	146 (24.1)	28 (10.8)	87 (28.2)	31 (79.5)*
Levodopa	57 (9.4)	16 (6.2)	25 (8.1)	16 (41.0)*
Alcoholic drink	226 (81.3)	91 (76.5)	98 (81.7)	37 (94.9)**
Physical examination				
Blood pressure	531(87.5)	210 (80.8)	284 (92.2)	37 (94.9)*
Body weight and height	442 (72.8)	164 (63.1)	240 (77.9)	38 (97.4)*
Musculoskeletal system	471 (77.6)	187 (71.9)	250 (81.2)	34 (87.2)**
Investigations				
Complete blood count	360 (59.3)	138 (53.1)	203 (65.9)	19 (48.7)**
Liver function	170 (28.0)	74 (28.5)	87 (28.2)	9 (23.1)
Renal function	540 (89.0)	224 (86.2)	284 (92.2)	32 (82.1)**
Fasting blood glucose	391 (64.4)	149 (57.3)	211(68.5)	31 (79.5)**
Lipid profile	374 (61.6)	134 (51.5)	209 (67.9)	31 (79.5)*
Urine analysis	466 (76.9)	180 (69.2)	255 (83.1)	31 (79.5)**
Normal sUA during acute arthritis could be excluded gout#	59/591 (10.0)	42/63 (16.5)	17/299 (5.7)	0/38 (0.0)*

Medicine=internal medicine physicians; Physician1=all physicians excluding internal medicine physicians and rheumatologists; Rheum=rheumatologists; sUA=serum uric acid level

* p<0.001, ** p<0.05 to 0.001,

† According a case without history of arthritis consulting with serum uric acid 8 mg/dl (normal range <7 mg/dl) from annual checkup, which history, physical examination and investigation(s) would you like to assess?

Did you agree with "Regarding a patient presented with acute arthritis with normal serum uric acid level during arthritis, his symptoms was not due to gout?"

that improvement is needed in the diagnosis and management of gout in Thailand. Regarding gout diagnosis, physician1 (16.5%) was more likely than other specialties to misunderstand that gout could be excluded if the patient has normal sUA during gout flare. This is consistent with the results of a 2017 study from Australia[11], and this may be due to a lack of knowledge. Some physicians diagnose gout based on sUA[14,17]. The sUA can be temporarily lower or may be within normal range during gout flare[18]. Conversely, a patient with hyperuricemia will not always have gout. Searching comorbidities (e.g., obesity, metabolic syndrome, cardiovascular disease, urolithiasis, and kidney disease) and medications associated with

Table 2. Acute gouty arthritis management† according participants' specialty

	Total n/N (%)	Physician1 n/N (%)	Medicine n/N (%)	Rheum n/N (%)
Physiotherapy	206/594 (34.7)	103/253 (40.7)	88/303 (29.0)	15/38 (39.5)**
Topical NSAIDs	154/594 (25.9)	80/253 (31.6)	67/303 (22.1)	7/38 (18.4)**
Colchicine§	437/594 (73.6)	157/253 (62.0)	252/303 (83.1)	28/38 (73.7)*
NSAIDs§	254/594 (42.8)	126/253 (49.8)	110/303 (36.3)	18/38 (47.4)
NSAIDs	539/594 (90.7)	230/253 (90.9)	271/303 (89.4)	38/38 (100)
Oral colchicine	582/594 (98.0)	242/253 (95.7)	302/303 (99.7)	38/38 (100)**
≤3 tabs/day	368/558 (65.9)	113/221 (51.1)	218/299 (72.9)	37/38 (97.4)*
High-dose#	157/558 (28.1)	84/221 (36.1)	72/299 (24.1)	1/38 (2.6)*
Corticosteroid	286/594 (48.1)	73/253 (28.9)	176/303 (58.1)	37/38 (97.4)*
Oral	133/245 (54.3)	32/56 (57.1)	70/153 (45.8)	31/36 (86.1)*
Intra-muscle/venous	52/245 (21.2)	16/56 (28.6)	26/153 (17)	10/36 (27.7)
Intra-articular	146/245 (59.6)	21/56 (37.5)	92/153 (60.1)	33/36 (91.7)*
Initiate allopurinol	43/594 (7.2)	28/253 (11.1)	15/303 (5.0)	0 (0.0)**

Medicine=internal medicine physicians; NSAIDs=non-steroidal anti-inflammatory drugs (non-specific and selective cyclooxygenase inhibitors); Physician1=all physicians excluding internal medicine physicians and rheumatologists; Rheum=rheumatologists

* p<0.001, ** p<0.05 to 0.001, § As the first choice treatment

† Regarding a question about "What drugs were used for the management of acute gout? (You could choose more than one; please fill in with the number in order, e.g., 1 if it was the first choice, 2 if it was the second choice)"

High dose regimen (1.2 mg followed by 0.6 mg every 2 hours until relief or diarrhea)

hyperuricemia or gout is widely recommended[6-9]; however, approximately 40% of respondents did not investigate fasting blood sugar and lipid profile, and 30% of participants did not assess body weight. Most respondents (80% to 85%) inquired about diuretic use and alcohol consumption (both of which are notorious causes of hyperuricemia), while low-dose aspirin, cyclosporine, ethambutol, and levodopa were assessed by less than half of participants. This may be due to a lack of familiarity with these medications and a lack of knowledge.

To control acute gouty arthritis, colchicine, non-steroidal anti-inflammatory drugs (NSAIDs), or corticosteroid are recommended as the first-line options depending on severity, duration of attack, and patient comorbidities[6-9]. Colchicine (73.6%) was chosen as the first-line treatment for acute gouty arthritis more often than NSAIDs (42.8%) in the present study. High-dose colchicine is a well-known effective treatment for pain control in acute gouty arthritis; however, there is a very high risk of adverse events[19]. In 2010, Terkeltaub et al reported low-dose colchicine (1.8 mg total over one hour in the first 24 hours of treatment) to be as effective as high-dose regimen, and that it had a safety profile similar to that of placebo[20]. High-dose regimen of colchicine has not been recommended since 2006 by the European League Against Rheumatism Gout Task Force (EULAR)[6]. However, almost 40% of physician1 and 24% of internal medicine physicians used the high-dose regimen. Corticosteroid may be the drug of choice for acute gouty arthritis in some conditions (e.g., non-per oral condition). Interestingly, rheumatologists (97.4%) were more likely to use corticosteroid, especially intra-articular and oral route for treating this condition than physician1 (28.9%) and internal medicine physicians (58.1%). Rheumatologists may have more experience in intra-articular injection and using corticosteroid. Other specialties may lack intra-articular injection skills[12].

The appropriate use of ULT to dissolve monosodium urate (MSU) crystals in the body is the key to curing gout; however, the risk of potential adverse effects must be weighed against the benefits. Moreover, treatments may vary between low resource settings and high resource settings. All guidelines recommend the use of ULT if patients have tophi, radiographic change from gout, and/or renal stone[6,7,9,21]. ULT was also recommended in patients who have gout flare at least two times per

Table 3. The use of urate-lowering therapy for hyperuricemia and gout according participants' specialty

Question	Response	Total n/N (%)	Physician1 n/N (%)	Medicine n/N (%)	Rheum n/N (%)
Regarding asymptomatic hyperuricemia, did you start ULT if sUA 8 mg/dl?	No	553/597 (92.63)	218/253 (86.25)	296/305 (97.0)	39/39 (100)
Which sUA would you like to start ULT? (only participants would start ULT for asymptomatic hyperuricemia)	>11 mg/dl	117/199 (58.8)	34/75 (45.3)	70/110 (63.6)	13/14 (92.9)*
Which was the target of sUA when treating with ULT?	<6 mg/dl	369/582 (63.4)	120/244 (49.2)	211/300 (70.3)	38/38 (100)*
Would you initiate ULT during acute gouty arthritis?	Yes	43/594 (7.2)	28/253 (11.1)	15/303 (5.0)	0/37 (0.0)**
Which dose would you start when initiating allopurinol in a patient with normal renal function?	≤100 mg/day	425/599 (71.0)	159/253 (62.8)	232/307 (75.6)	34/39 (87.2)*
Which maximal dose of allopurinol had you ever ordered in your practice?	mg/day, Mean (SD)	357.5 (152.6)	332.6 (147.2)	349.3 (135.7)	564.5 (158.9)*
Should the maximal dose of allopurinol be limited according creatinine clearance in a patient with renal insufficiency?	Yes	466/581 (80.2)	220/245 (89.8)	232/299 (77.6)	14/37 (37.8)*
Regarding a patient taking ULT for a while, will you pause ULT if a patient has illness or acute gouty arthritis?	Yes	95/570 (16.7)	52/240 (21.7)	43/293 (14.7)	0 (0.0)**
How long the duration of ULT treatment for gout?	Life-long	82/570 (14.4)	25/240 (10.4)	42/293 (14.3)	15/37 (40.5)*
	Stop if no tophi for 5 years	206/570 (36.1)	58/240 (24.2)	131/293 (44.7)	17/37 (45.9)*
	Stop if no symptoms for 5 years	224/570 (39.3)	106/240 (44.2)	107/293 (36.5)	11/37 (29.7)
	Stop if reaching target sUA for 5 years	324/570 (56.8)	145/240 (60.4)	163/293 (55.6)	16/37 (43.2)
Will you prevent gout flare when you start ULT?	Yes	540/567 (95.2)	219/236 (92.8)	284/294 (96.6)	37/37 (100)**
Which medication is the first choice for prevention gout flare?	Colchicine	510/536 (95.1)	195/216 (90.3)	278/283 (98.2)	37/37 (100)*

Medicine=internal medicine physicians; Physician1=all physicians excluding internal medicine physicians and rheumatologists; Rheum=rheumatologists; SD=standard deviation; sUA=serum uric acid level; ULT=urate-lowering therapy

* p<0.001, **p<0.05 to 0.001

Table 4. The diet and lifestyle advice for a patient with hyperuricemia or gout

Advice	Total (n=271) n (%)	Physician1 (n=116) n (%)	Medicine (n=117) n (%)	Rheum (n=38) n (%)
Lose weight†	223 (82.3)	87 (75.0)	98 (83.8)	38 (100)**
Increase exercise	141 (52.0)	53 (45.7)	61 (52.1)	27 (71.1)**
Drinking water ≥2 L/day	166 (61.3)	61 (52.6)	78 (66.7)	27 (71.1)**
Avoid poultry	196 (72.3)	95 (81.9)	81 (69.2)	20 (52.6)**
Avoid vegetable	198 (73.1)	97 (83.6)	84 (71.8)	17 (44.7)*
Avoid alcohol	262 (96.7)	108 (93.1)	116 (99.1)	38 (100)*
Avoid organ meat	216 (79.7)	95 (81.9)	95 (81.2)	26 (68.4)
Avoid red meat	45 (16.6)	16 (13.8)	17 (14.5)	12 (31.6)*
Avoid soup	64 (23.6)	19 (16.4)	32 (27.4)	13 (34.2)*

Medicine=internal medicine physicians; Physician1=all physicians excluding internal medicine physicians and rheumatologists; Rheum=rheumatologists

* p<0.001, ** p<0.05 to 0.001, † Lose weight if over weight

year by EULAR 2006[6], by EULAR 2016[7], and by the American College of Rheumatology (ACR) 2012[21], while ULT was recommended in patients with gout flare at least three times per year in Thailand in 2012[9]. In addition, there is a variety consideration for ULTs, including gouty arthritis plus chronic kidney disease stage 2 by ACR 2012[21], urine uric acid more than 1,100 mg/day by the Thai Rheumatism Association (TRA) 2012[9], initiating closely to the first diagnosis of gout if patients are younger than 40 years old or they have a sUA above 8.0 mg/dl and/or there is a presence of comorbidities (renal impairment, hypertension, ischemic heart disease, heart failure) by EULAR 2016[7]. However, ULT for asymptomatic hyperuricemia is not recommended because of inadequate evidence and mainly based on expert opinion[7,22]. The three physician groups were comparable relative to their use of ULT to treat asymptomatic hyperuricemia (approximately 30% to 36%); however, rheumatologists were more likely to treat at a higher level of sUA (more than 11 mg/dl) than other specialties.

Target sUA of 6 mg/dl[6] or less than 6 mg/dl is widely recommended[6-9]. More than half of physician1 set the target higher than the recommendation. This was one of the most common pitfalls[23], and it may be due to a lack of knowledge. However, the proportion of physicians practicing in non-academic hospitals that knew this target was higher than the proportion working in academic hospitals. Allopurinol is recommended as the first-line ULT by EULAR 2006[6], ACR 2012[21], and EULAR 2016[7]. Starting allopurinol at low dose (not more than 100 mg daily) is recommended to decrease risk of gout flare[6,21] and hypersensitivity syndrome[21]. The physician1 group had the lowest proportion of starting allopurinol not more than 100 mg/day at 60%, which was comparable to the results from a survey among Dutch rheumatologists in 2008[13]. Most physician1 (89.8%) and internal medicine physicians (77.6%) limited the maximal allopurinol dosage according creatinine clearance, while approximately one-third of rheumatologists limited the dosage. This difference in practice may be due to different recommendations[6,7,21]. EULAR 2006[6] and EULAR 2016[7] recommended adjusting the dose of allopurinol in patients with renal impairment[6]. Conversely, ACR 2012 recommended that allopurinol could be increased above 300 mg/day even in patients with renal impairment if adequate patient education is provided and there is no observed toxicity[21]. Stamp et al reported that allopurinol dose above the proposed creatinine clearance-based dose improved achievement of the target sUA level, and that it did not increase toxicity[24]. This issue is not addressed by TRA2012. There is no consensus regarding the duration of ULT treatment after achieving the sUA level. EULAR 2016 suggests that a sUA of less than 6 mg/dl should be maintained lifelong[7], while ACR 2012 does not address this issue[21]. TRA 2012 suggests the use of ULT lifelong; however, ULT may be reduced or stopped if the sUA is reached, there is no gout flare, and there is no tophi for many years[9]. The main cause of hyperuricemia is renal and digestive underexcretion, which is associated with genetic and environmental factors, with excessive purine intake and endogenous overproduction included as additional factors[25]. Approximately 40% to 80% of patients with gout relapsed after a mean duration of ULT discontinuation that ranged from 16 to 56 months[26]. Thus, ULT treatment to maintain sUA lower than the solubility threshold should be lifelong. Not surprisingly, duration of ULA for gout was variable in the present study.

Lifestyle modification is one of the most important strategies for managing hyperuricemia and gout, and it is recommended in all guidelines[6,7,9,21]. Of the 607 respondents, only 271 (44.6%) gave some advice to patients with gout. Moreover, there was a high proportion of physicians who gave improper advice (e.g., avoid vegetables and poultry).

Management of hyperuricemia and gout was suboptimal among Thai physicians, with significant variation among specialties. Rheumatologists were more likely to optimally manage than other specialties. The duration and frequency of attending scientific meetings were not significantly different between physician with optimal and suboptimal management in each subgroup of physician1 and internal medicine physician analysis. The reported suboptimal management may be due to inexperience in hyperuricemia and gout management and inadequate knowledge gain from curriculum training program. Assessment by medical graduates in Australia reported that they had adequate teaching to manage gout only 37% for chronic gout and 50% for acute gout[10]. Adequate teaching and emphasizing the important point of hyperuricemia and gout management or treat-to-target strategy[22] may improve quality of care by Thai physicians. Moreover, consensus is needed regarding recommendations and guidelines because there is currently too much variability (e.g., maximal dose of allopurinol in patients with renal impairment). Variation among guidelines from country to country

may reflect differences in practice and resource availability. An updated Thai recommendation is needed because there is new evidence and some issues are not addressed in the current recommendation[9].

There were several limitations in the present study. The authors planned to invite all Thai physicians practicing in Thailand to participate in this survey; however, only 10% of Thai physicians were invited due to difficulties gaining access to physician contact information. Moreover, there was low response rate from the physicians that were sent questionnaires. Therefore, the results of this survey may not be generalizable to all Thai physicians. In addition, the answers on the survey may not reflect with certainty the decisions that would be made in clinical practice. Furthermore, this survey was conducted between 2011 and 2012, so the results might be different from current practice. However, most of the current recommendations of gout and hyperuricemia management are unchanged[6,7], and the issues of suboptimal management are consistent with previous reports[10-17]. This survey was designed to assess a variety of issues relating to suboptimal management, including searching comorbidities and medications associated with hyperuricemia and gout, and giving lifestyle modification-related advice. Except for Owens et al[17], most previous studies did not assess these important factors.

Conclusion

The results of the present study revealed suboptimal management of hyperuricemia and gout, especially high-dose regimen of colchicine for acute gout, the sUA target and ULT duration, among Thai physicians. Improved condition-specific training and updated management guidelines are needed to improve the care and outcomes of hyperuricemia and gout patients in Thailand.

What is already known on this topic?

International studies reported gout was often misdiagnosed and its management was often inappropriate.

What this study adds?

Management of hyperuricemia and gout was suboptimal among Thai physicians, with significant variation among specialties. The critical suboptimal management was using high dose colchicine for acute gouty arthritis (28%), improperly setting the target of serum uric acid (37%), and not advising lifestyle modification for hyperuricemia and gout (55%).

Acknowledgement

The authors gratefully acknowledge the physicians that agreed to participate in the present study.

Conflicts of interest

The authors declare no conflict of interest.

References

1. Lohsoonthorn V, Dhanamun B, Williams MA. Prevalence of hyperuricemia and its relationship with metabolic syndrome in Thai adults receiving annual health exams. Arch Med Res 2006;37:883-9.
2. Uaratanawong S, Suraamornkul S, Angkeaw S, Uaratanawong R. Prevalence of hyperuricemia in Bangkok population. Clin Rheumatol 2011;30:887-93.
3. Chiowchanwisawakit P, Taweesuk A, Katchamart W, Srinonprasert V. Prevalence and risk factors of symptomatic hyperuricemia; quality of care of patients with hyperuricemia in a university hospital. J Med Assoc Thai 2013;96 Suppl 2:S178-86.
4. Doherty M, Jansen TL, Nuki G, Pascual E, Perez-Ruiz F, Punzi L, et al. Gout: why is this curable disease so seldom cured? Ann Rheum Dis 2012;71:1765-70.
5. Athisakul S, Wangkaew S, Louthrenoo W. Inappropriate prescription of allopurinol in a teaching hospital. J Med Assoc Thai 2007;90:889-94.
6. Zhang W, Doherty M, Bardin T, Pascual E, Barskova V, Conaghan P, et al. EULAR evidence based recommendations for gout. Part II: Management. Report of a task force of the EULAR Standing Committee for International Clinical Studies Including Therapeutics (ESCISIT). Ann Rheum Dis 2006;65:1312-24.
7. Richette P, Doherty M, Pascual E, Barskova V, Becce F, Castaneda-Sanabria J, et al. 2016 updated EULAR evidence-based recommendations for the management of gout. Ann Rheum Dis 2017;76:29-42.
8. Khanna D, Khanna PP, Fitzgerald JD, Singh MK, Bae S, Neogi T, et al. 2012 American College of Rheumatology guidelines for management of gout. Part 2: therapy and antiinflammatory prophylaxis of acute gouty arthritis. Arthritis Care Res (Hoboken) 2012;64:1447-61.
9. Thai Rheumatism Association. Guideline for management of gout (in Thai) [Internet]. 2012 [cited 2019 Feb 1]. Available from: http://www.thairheumatology.org/wp-content/uploads/2016/08/Guideline-for-Management-of-Gout.pdf.
10. Terrill M, Riordan J. A survey on the beliefs and knowledge of gout management in new medical graduates - New South Wales, Australia. Int J Rheum Dis 2018;21:517-22.
11. Terrill M, Riordan J. A survey of the assessment and management of gout in general practitioners and medical officers within the Illawarra Network, Australia. Int J Rheum Dis 2017;20:990-5.
12. Yeap SS, Goh EM, Gun SC. A survey on the management of gout in Malaysia. Int J Rheum Dis

2009;12:329-35.
13. Reinders MK, Jansen TL. Survey on management of gout among Dutch rheumatologists. Ann Rheum Dis 2008;67:1049.
14. Doherty M, Bardin T, Pascual E. International survey on the diagnosis and management of gout. Ann Rheum Dis 2007;66:1685-6.
15. Schlesinger N, Moore DF, Sun JD, Schumacher HR Jr. A survey of current evaluation and treatment of gout. J Rheumatol 2006;33:2050-2.
16. Fang W, Zeng X, Li M, Chen LX, Schumacher HR Jr, Zhang F. The management of gout at an academic healthcare center in Beijing: a physician survey. J Rheumatol 2006;33:2041-9.
17. Owens D, Whelan B, McCarthy G. A survey of the management of gout in primary care. Ir Med J 2008; 101:147-9.
18. Zhang W, Doherty M, Pascual E, Bardin T, Barskova V, Conaghan P, et al. EULAR evidence based recommendations for gout. Part I: Diagnosis. Report of a task force of the Standing Committee for International Clinical Studies Including Therapeutics (ESCISIT). Ann Rheum Dis 2006;65:1301-11.
19. Ahern MJ, Reid C, Gordon TP, McCredie M, Brooks PM, Jones M. Does colchicine work? The results of the first controlled study in acute gout. Aust N Z J Med 1987;17:301-4.
20. Terkeltaub RA, Furst DE, Bennett K, Kook KA, Crockett RS, Davis MW. High versus low dosing of oral colchicine for early acute gout flare: Twenty-four-hour outcome of the first multicenter, randomized, double-blind, placebo-controlled, parallel-group, dose-comparison colchicine study. Arthritis Rheum 2010;62:1060-8.
21. Khanna D, Fitzgerald JD, Khanna PP, Bae S, Singh MK, Neogi T, et al. 2012 American College of Rheumatology guidelines for management of gout. Part 1: systematic nonpharmacologic and pharmacologic therapeutic approaches to hyperuricemia. Arthritis Care Res (Hoboken) 2012;64:1431-46.
22. Kiltz U, Smolen J, Bardin T, Cohen SA, Dalbeth N, Doherty M, et al. Treat-to-target (T2T) recommendations for gout. Ann Rheum Dis 2017;76:632-8.
23. Edwards NL. Quality of care in patients with gout: why is management suboptimal and what can be done about it? Curr Rheumatol Rep 2011;13:154-9.
24. Stamp LK, O'Donnell JL, Zhang M, James J, Frampton C, Barclay ML, et al. Using allopurinol above the dose based on creatinine clearance is effective and safe in patients with chronic gout, including those with renal impairment. Arthritis Rheum 2011;63:412-21.
25. Pascart T, Liote F. Gout: state of the art after a decade of developments. Rheumatology (Oxford) 2019;58: 27-44.
26. Beslon V, Moreau P, Maruani A, Maisonneuve H, Giraudeau B, Fournier JP. Effects of discontinuation of urate-lowering therapy: A systematic review. J Gen Intern Med 2018;33:358-66.