patients with infection will significantly prolonged wound closure time compared with those without infection. Investigation of infection in ulceration over tophi will improve our understanding of this critical issue.

Objectives: To describe the microbiological profile in ulceration over tophi, antibiotic susceptibility patterns of causative agents, and to study the prediction of infection in ulceration over tophi among patients with gout.

Methods: Patients with ulceration over tophi were prospectively enrolled. The clinical characteristics were recorded and microbiological specimens were taken on admission. Specimens were cultured for aerobic and anaerobic bacteria, and antibiotic susceptibility testing was performed for the culture isolates. Patients were divided into 2 groups according to having infectious ulceration or not and the potential risk factors for infectious ulceration over tophi were examined using univariate and multivariate logistic regression analyses.

Results: A total of 82 patients were included for analysis. 46 pathogens were isolated from 39 (47.6%) patients, among which the top 3 were *Staphylococcus aureus* (43.5%), *Pseudomonas aeruginosa* (17.4%) and *Enterococcus faecalis* (13.0%). Overall, the Gram-positive bacilli were more sensitive to gentamicin (81.5%), amikacin (88.9%), trimethoprim/sulfamethoxazole (92.6%), nitrofurantoin (96.3%), linezolid (100.0%), teicoplanin (100.0%) and vancomycin (100.0%) whereas penicillin, oxacillin and ampicillin were 66.7% to 77.8% resistant. The Gram-negative bacilli were more sensitive to amikacin (84.2%), cefoperazone/sulbactam (84.2%) and meropenem (89.5%) whereas ampicillin, amoxicillin/clavulanate, cefotaxime, cefazolin, piperacillin, trimethoprim/sulfamethoxazole and tetracycline were 68.4% to 100% resistant. Patients with infection had a higher rate of smoking history and type 2 diabetes, with higher levels of erythrocyte sedimentation rate, C-reactive protein and leucocyte, and lower level of albumin. In stepwise logistic regression analysis, type 2 diabetes (adjusted OR 5.064; 95% CI = 1.430 to 17.928) and albumin level (adjusted OR 0.855; 95% CI = 0.782 to 0.935) were independent predictors of infection in ulceration over tophi.

Conclusion: Infection is common in ulceration over tophi. Different antibiotic susceptibility patterns were observed in Gram-positive bacilli and Gram-negative bacilli. Type 2 diabetes and low albumin level were associated with an increased risk of infection in ulceration over tophi. The data in this study will be beneficial for tailoring infection control measures in a way that improves outcomes of ulceration over tophi.

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Table 1. Bacteria isolated from initial ulceration specimens taken on the first admission.

Bacteria	Number* (n = 46)	Proportion (%)
Gram-positive bacilli	27	58.7
<i>Staphylococcus aureus</i>	20	43.5
<i>Enterococcus faecalis</i>	6	13.0
<i>Streptococcus mutans</i>	1	2.2
Gram-negative bacilli	19	41.3
<i>Pseudomonas aeruginosa</i>	8	17.4
<i>Klebsiella pneumoniae</i>	4	8.7
<i>Enterobacter cloacae</i>	3	6.5
<i>Escherichia coli</i>	2	4.3
<i>Acinetobacter baumannii</i>	2	4.3

* Number of ulceration

Disclosure of Interests: : None declared

DOI: 10.1136/annrheumdis-2020-eular.968

THU0427

SHOULD FEBUXOSTAT-RESISTANCE BE ADDED TO CRITERIA FOR REFRACTORY GOUT? A PRELIMINARY STUDY

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Background: Refractory gout manifests as recurrent flares, chronic arthritis and progressive tophaceous deposits. Febuxostat is a widely-used potent serum urate-lowering reagent, but some gout patients cannot achieve target serum uric acid (sUA) after they used this reagent.

Objectives: To determine whether febuxostat-resistance should be a criterion for refractory gout, characteristics of gout patients who were resistance to febuxostat or allopurinol were compared.

Methods: This study was performed from December 2015 to December 2019. Medical records of gout patients who met the 2015 gout classification criteria [1] and undertook febuxostat (febuxostat group) or allopurinol (allopurinol group) urate-lowering therapy (ULT) were assessed. Dose of ULT was adjusted till sUA was below 6mg/dL and 5mg/dL for patients with urate deposition. We screened gout patients who had contraindication or history of failure to normalize sUA for ≥ 3 months of treatment with the maximum medically appropriate febuxostat (febuxostat-resistance) or allopurinol (allopurinol-resistance) dose as defined by physicians. Furthermore, these screened patients met the traditional criteria of refractory gout except therapeutic reaction [2]. Demography and clinical characteristics were recorded. Features between febuxostat-resistance and allopurinol-resistance patients were compared.

Results: (1) Of 683 gout patients who were included, 516 and 167 of them used febuxostat or allopurinol. (2) Age (41.92±11.58 vs. 42.26±9.41 years), Male gender (97.50% vs. 97.01%), duration of gout (5.78±4.74 vs. 5.05±4.72 years) and sUA (6.30±2.50 vs. 6.67±2.14mg/dL) were similar between febuxostat group and allopurinol group (P>0.05). (3) Dose of febuxostat or allopurinol were 47.28mg/day and 178.24mg/day. (4) Sixteen patients were febuxostat-resistance, while 6 patients were allopurinol-resistance. Prevalence rates of treatment resistance were comparable between groups (3.10% vs. 3.59%, P>0.05). (5) Some parameters were different between resistance patients and non-resistance patients in both groups (Table 1, P<0.05). However, characteristics of febuxostat-resistance and allopurinol-resistance patients were similar (P>0.05).

Table 1 Characteristics of gout patients in febuxostat group and allopurinol group

Parameters	Febuxostat Group		Allopurinol Group	
	Non-resistance (n=500)	Resistance (n=16)	Non-resistance (n=161)	Resistance (n=6)
Age (year)	41.93±11.65	41.67±9.58	42.22±13.33	44.50±16.98
Male Gender (%)	97.40	100.00	96.89	100.00
BMI (kg/m ²)	25.44±3.46	26.22±3.47	25.86±3.97	25.60±6.42
Duration of gout (years)	5.75±4.76	7.00±3.97	4.96±4.73	7.75±2.62
Flares in previous 18 months (times)	1.31±0.44	3.67±0.70	1.13±0.24	3.25±0.50
Presence of Tophi (%)	23.80	100.00	14.90	100.00
Presence of Complication (%)	35.8	100.00	31.06	100.00
sUA (mg/dL)	6.21±2.47	9.13±1.24	6.42±2.32	10.15±3.55
SCr (μmol/L)	100.67±15.03	163.96±29.41	96.93±22.91	133.75±31.60
ESR (mm/L)	24.59±19.28	42.83±21.13	27.49±24.10	56.50±28.12
CRP (mg/L)	18.92±18.59	28.81±23.85	23.12±22.63	32.28±23.64

*P<0.05 compared with non-resistance patients in the same group.

BMI body mass index, sUA serum uric acid, SCr serum creatinine, ESR erythrocyte sedimentation rate, CRP C-reactive protein

Conclusion: Febuxostat-resistance is a potential criterion for refractory gout, because febuxostat-resistance patients shares similar characteristics of patients with refractory gout.

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Acknowledgments: None.

Disclosure of Interests: : None declared

DOI: 10.1136/annrheumdis-2020-eular.1270

THU0429

THE ASSOCIATION OF SERUM VITAMIN A, VITAMIN E, AND FOLATE WITH HYPERURICEMIA: AN ANALYSIS OF POPULATION-BASED NATIONALLY REPRESENTATIVE DATA

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Background: Hyperuricemia is an important risk factor for gout as well as hypertension, type 2 diabetes and renal impairment. Although previous studies investigated the association of questionnaire-based micronutrient intake with serum uric acid levels, limited data on serum micronutrients levels in relation to the risk of hyperuricemia especially in Asian population.

Objectives: This study aimed to evaluate the association of serum vitamin A, vitamin E and folate level with hyperuricemia in the Korean general population.

Methods: The present study included 6023 participants (2722 men and 3301 women) aged ≥ 19 years with available data on serum vitamin A, vitamin E, folate and serum uric acid. General characteristics of participants were compared using the Chi-square test and Student's t test. The association between serum vitamin A, E and folate and serum uric acid levels were evaluated using general linear regression model. Multivariate logistic regression analyses were performed to estimate the effects of these micronutrients on hyperuricemia.

Results: Serum uric acid levels were increased from the lowest quintile of vitamin A levels to the highest quintile after adjustment for covariates ($P_{\text{trend}} < 0.001$ in both sexes). In addition, dose-dependent relationship was observed between vitamin A levels and the risk of hyperuricemia in fully-adjusted analyses ($P_{\text{trend}} < 0.001$ in both sexes). However, neither serum vitamin E nor serum folate was associated with hyperuricemia across analyses models.

Conclusion: This study suggested that vitamin A could be a risk factor of hyperuricemia and further studies are warranted to elucidate underlying mechanism of the observed findings.

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Disclosure of Interests: : None declared

DOI: 10.1136/annrheumdis-2020-eular.5848

THU0430 RENAL URATE DEPOSITION: SUMMARY OF PUBLISHED EVIDENCE

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Background: Gout is the most common inflammatory arthropathy in U.S. adults. Although the severity of this debilitating disease is often defined by the presence of tophi in the joints, systemic deposition of urate in major organ systems including the renal parenchyma is not as well established. Urate is primarily cleared through the kidneys and patients with gout often have concomitant renal disease along with other comorbidities such as diabetes, coronary artery disease, and hypertension; however, a causal role between these entities has not yet been carefully established. We hypothesize that urate deposits serve as a trigger in the inflammatory nidus to propagate subclinical tissue damage that results in the chronicity of the disease. This could potentially explain its independent role in the development and progression of chronic kidney disease in gout patients.

Objectives: To review the published literature for evidence of urate deposition in the renal parenchyma in patients with gout and summarize the histopathology and imaging findings.

Methods: PubMed (from 1940 to 2020) was used to identify reports of autopsy, pathology and radiology imaging demonstrating urate deposition within the native renal parenchyma in patients with gout. Key words included: gout nephropathy, chronic urate nephropathy, renal tophi, gouty kidney, autopsy findings in gout, and renal imaging in gout. The reference lists from these publications were also used to identify additional articles. Literature referencing urate nephrolithiasis and renal transplants were excluded from the study.

Results: There were 25 articles documenting renal parenchymal urate deposition in gout patients confirmed by autopsy, biopsy and/or radiology imaging in native kidneys. Among the 19 articles examining urate deposition by autopsy and/or biopsy, 100% found urate deposition in the collecting ducts and adjacent medullary interstitium. Based on these findings, the most commonly proposed mechanism for urate deposition is urate crystal precipitation in the collecting ducts with eventual desquamation of the collecting duct walls from inflammation and/or tubular obstruction with subsequent extrusion of crystals into the medullary interstitium. 89% of reports documented inflammatory cells and/or tubulointerstitial fibrosis adjacent to the renal urate deposits. 68% reported cortical thinning or scarring. In addition, 74% of included publications reported renal vascular pathology including arteriosclerosis, glomerulosclerosis and nephrosclerosis. There were 6 imaging articles that all reported abnormal renal ultrasound findings with hyperechogenic renal medullas that were attributed to urate deposition.

Conclusion: There is a growing body of literature documenting urate deposition in the renal parenchyma in gout patients based on autopsy, pathology and imaging findings. Inflammation and fibrosis adjacent to regions of urate deposition and vascular changes were common. Given the strong association of gout with renal disease, there is a critical need to elucidate the mechanism by which urate impairs the renal tissue. Thus dedicated investigation is key to determine the prevalence and clinical significance of urate deposition in the kidneys of gout patients.

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Disclosure of Interests: : Puja Khanna Grant/research support from: Dyve, Selecta, Sobi, Consultant of: Sobi, Horizon, Brad Marder Employee of: Horizon Therapeutics, Brian LaMoreaux Shareholder of: Horizon Therapeutics, Employee of: Horizon Therapeutics, Ada Kumar Shareholder of: Horizon Therapeutics, Employee of: Horizon Therapeutics

DOI: 10.1136/annrheumdis-2020-eular.1761

THU0431 PEGLOTICASE RESPONSE RATE IN UNCONTROLLED GOUT PATIENTS CO-TREATED WITH METHOTREXATE: EXPERIENCE IN A COMMUNITY RHEUMATOLOGY PRACTICE

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Background: Pegloticase is an infused biologic approved to treat uncontrolled gout. The drug is highly effective, but patients can develop anti-drug antibodies that interfere with efficacy.¹ Randomized clinical trials have shown that 42% of patients treated with bi-weekly pegloticase had a serum uric acid (sUA) below 6.0mg/dl at 3 and 6 months.² Mild-to-moderate immunomodulation has been shown to lower the prevalence of anti-drug antibody formation in patients with other autoimmune diseases (rheumatoid arthritis, Crohn's disease, juvenile idiopathic arthritis).³ Cases published in the literature suggest that low-to-moderate doses of methotrexate^{4,5} or azathioprine⁶ may also attenuate anti-pegloticase antibody formation in uncontrolled gout patients. Therefore, immunomodulation may allow patients to remain on pegloticase therapy longer and achieve a more complete therapeutic response.

Objectives: To examine pegloticase treatment response in patients co-treated with methotrexate.

Methods: This retrospective chart review included patients from a single community rheumatology practice who began pegloticase (8mg every 2 weeks) therapy between January 2017 and September 2019 and were co-treated with methotrexate. Unless contraindicated, methotrexate co-treatment with pegloticase is now standard in this practice and all patients undergo close monitoring of laboratory parameters including serum uric acid level (sUA), blood counts, and liver function tests (LFTs). To maximize the number of cases, patients administered methotrexate in any form were included. Collected data included demographic information, laboratory values, methotrexate treatment parameters (timing with respect to pegloticase therapy, dose, route), pegloticase response parameters (number of infusions, duration of therapy), and adverse events. Main outcome measures included the number of pegloticase infusions administered (responder defined as ≥ 12 infusions administered) and therapy duration.

Results: Ten patients (9 male) were included. All patients had visible tophi and average patient age was 52.3 ± 13.5 years. Nine patients began subcutaneous methotrexate (25mg weekly) an average of 19.9 ± 7.0 days (range: 14 to 35 days) before the first pegloticase infusion. The remaining patient began oral methotrexate (12.5mg weekly) 14 days after the first pegloticase infusion. Eight of 10 patients (80%) were considered responders, receiving an average of 15.5 ± 3.8 pegloticase infusions (range: 12-21 infusions) over 31.8 ± 9.5 weeks (range: 22.1 to 48.3 weeks). In these 8 responders, mean sUA was 0.2 ± 0.0 mg/dL immediately prior to the last pegloticase infusion. All 10 patients had an initial, rapid decrease in sUA, but two patients discontinued treatment before infusion 12. One patient had increased sUA with a mild infusion reaction, and one patient was lost to follow-up after infusion 5. No new safety concerns emerged. A gout flare occurred in 1 patient and was treated with prednisone. LFT and blood cell parameters were stable over the study period, except in two patients. One had a mild, transient LFT elevation that resolved without treatment, one had an LFT elevation and pancytopenia that improved with methotrexate discontinuation and transfusion, respectively. This patient remained on pegloticase and continued as a responder.

Conclusion: This case series suggests that methotrexate, when used as a co-therapy with pegloticase, allows more patients to complete therapy and to achieve the full therapeutic response. No new safety concerns emerged.

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