ATLANTIS PRESS

Advances in Social Science, Education and Humanities Research, volume 196

2nd International Conference on Social Science, Public Health and Education (SSPHE 2018)

Research on Complications of Gout and Prevention

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Abstract—Recent research progress on complications of gout was overviewed. Some suggestions for gout complications prevention was put forward. Method: analyzing, organizing document and abroad documents. Conclusion: although there are no direct mechanistic associations between gout and obesity, hyperlipidemia, atherosclerosis, hypertension, and retinopathy et al. sufficient evidence exists to evaluate some of these associations in patients with hyperuricemia and/or gout. More care should be paid for the prevention of gout complications.

Keywords—Gout, Hypertension, Retinopathy, Comorbidities

I. INTRODUCTION

Gout arthritis is an inflammatory process initiated by tissue deposition of monosodium urate (MSU)crystals. It is a characteristically intense acute inflammatory reaction[1]. However, inflammation can occur in any tissue in which MSU is deposited, as typified by tophaceous gout and by urate nephropathy due to renal medullary deposition of MSU crystals[2]. The increasing prevalence of gout worldwide indicates that there is an urgent need for improved efforts to identify and prevention the complications of gout, before the clinical manifestations of gout complication become apparent. Gout is known to be associated with several comorbidities, such as hypertension, cardiovascular disease, heart failure, renal failure, diabetes mellitus, obesity, hyperlipidemia and metabolic syndrome[3]. These complications of gout appear to be linked by a common pathogenetic pathway represented by the insulin resistance[4]. The presence of these comorbidities puts patient at an increased risk of cardiovascular mortality and morbidity resulting from myocardial infarction and peripheral vascular disease in the postoperative period[5].Medical comorbidities such as heart disease, hypertension, diabetes mellitus, heart failure, and sleep apnea are more common in patients with gout compared to those without gout[6,7]. The selection of the safer treatment in patients with gout and other comorbidities can be a challenge for the clinicians. Of the 205,152 Emergency Department visits for gout as the primary diagnosis in 2012, 7.7 % resulted in a hospital admission (Table I).

Those who were admitted to the hospital were more likely to be female, older, living in a metropolitan area, or have higher household income, have Medicare as primary payer, more likely to have comorbidities.

TABLE I. DEMOGRAPHIC CHARACTERISTICS FOR 2012 NEDS STUDY POPULATION[8]

	NEDS (all) N = 205,152	NEDS, not admitted N = 189,255	NEDS who were admitted N = 15,870	P value, not admitted vs. admitted
Coronary heart disease	13,548 (6.60)	9436 (4.99)	4,112 (25.91)	<0.0001
Hyperlipidemia	23,862 (2.94)	17,829 (9.42)	6,033 (38.02)	<0.0001
Renal failure	13,176 (6.42)	6,500 (3.43)	6,676 (42.07)	<0.0001
Heart failure	10,029 (4.89)	6,455 (3.41)	3,574 (22.52)	<0.0001
Hypertension	84,352 (41.12)	71,709 (37.88)	12,644 (79.67)	<0.0001
Diabetes	32,774 (15.98)	26,653 (9.42)	6,121 (38.02)	<0.0001
COPD	5,487 (2.67)	3,714 (1.96)	1,773 (11.17)	<0.0001
Osteoarthritis	6,755 (3.29)	4,253 (2.25)	2,502 (15.77)	<0.0001

[a.] NEDS: National Emergency Department Sample, SE:standard error, COPD:chronic obstructive pulmonary disease

II. COMPLICATIONS OF GOUT

A. Renal Disease

Children and infants may present chronically with stones or acutely with renal failure from crystal nephropathy, as a result of inherited deficiencies of the purine salvage enzymes hypoxanthine-guanine phosphoribosyl transferase and adenine phosphoribosyl transferase or of the catabolic enzyme xanthine dehydrogenase (XDH)[9]. Yu et al. demonstrated that gout independently increased the hazard of development of end-stage renal disease, and the magnitude of hazard in the gout-affected population was 57% higher than that in the general population. The risk was significant even among patients who had gout but not diabetes mellitus or hypertension[10].The appearance of new therapies could provide additional options for patients with gout that may allow for safer management of their disease. For example, febuxostat is a novel non-purine analog xanthine oxidase inhibitor with a similar efficacy compared to allopurinol, which may require fewer dose adjustments in patients with mild to moderate renal dysfunction[11].

B. Hypertension

Recent evidence showed that hyperuricemia may play a pathogenic role in hypertension[12]. Gancheva's analysis showed that tophaceous gout determines a numerically higher

risk for carotid arteries' changes rather than arterial hypertension. Epidemiological surveys have supported the strong association of gout and hyperuricemia with hypertension[13]. Furthermore, there are data to suggest that hyperuricemia initiates the development of hypertension and renovascular disease and that lowering of serum urate may help in the treatment of hypertension[14].

C. Chronic kidney disease (CKD)

CKD is one of the major comorbidities in patients with gout and hyperuricemia. Hyperuricemia is a risk factor for the onset of chronic kidney disease (CKD) and is significantly associated with the progression of CKD[15]. Hosoya et al. evaluate the efficacy and safety of topiroxostat in hyperuricemic stage 3 chronic kidney disease patients with or without gout. The study design was a 22-week, randomized, multicenter, double-blind study. The results of this study demonstrated that topiroxostat 160 mg effectively reduced the serum urate level in the hyperuricemic stage 3 chronic kidney disease patients with or without gout[16].

D. Atherosclerotic Disease

Hyperuricemia and gout significantly increased the risk of cardiovascular disease. Epidemiological studies have found higher than expected levels of atherosclerotic disease in gout patients when compared with the general population. In particular, gout is associated with increased incidence of coronary heart disease and stroke[17].The association between gout, atherosclerosis, and vascular disease has been noted in medical literature since the end of the 19th century, evidence exists for a relationship between gouty arthritis and coronary artery disease independent of traditional risk factors[18].

E. Retinopathy

The most common ocular abnormality described in patientswith gout is a red eye, usually bilateral, caused by conjunctiva and episcleral hyperemic vessels[19].Several studies have noted associations with inflammatory reactions such as conjunctivitis and anterior uveitis. There have also been reports of gouty crystal deposits in the cornea, sclera, and iris. Other associations between gout and elevated intraocular pressure, blurred disc margins, and possibly posterior uveitis have also been published in a case report[20]. Retinopathy may be associated with chronically uncontrolled gout and patients with visual complaints should undergo a dilated examination in addition to the typical anterior segment slit-lamp exam[21]. Fatma et al. Presented that bilateral uveitis, increased intraocular pressure and blurred disc margins may unravel strange ocular complications of the disease and arise awareness of gout while prescribing diuretics and cyclosporine in patients with uveitis and increased intraocular pressure[22].

III. Prevention of Gout Complications

Rapidly progressive technology and disease-specific genetic discoveries have the potential to make personalised medicine a reality in many aspects of gout management, including risk assessment of disease progression, personalised lifestyle advice, selection and dosing of urate-lowering therapy, and prevention of serious medication adverse effects[23]. Howren et al. show that becoming engaged in gout management is a dynamic process whereby patients with gout experience factors that interfere with gout management, process their disease and its management, and develop the practical and perceptual skills necessary to manage their gout[24]. Singh et al. assessed the impact of gout on comorbidity. Gout and its treatment affect patient comorbidities and their management and daily living in several ways. Most of the highly ranked related themes led to body failure and/or negatively affecting patient's social role by limiting identity-relevant performances with a progressive loss of self [25].

It is important that reiteration of initial advice can also be given with regard to counselling against alcohol excess and appropriate reduction where necessary. Furthermore, monitoring the response to medications and monitoring biochemistry, including serum urate, is of vital importance[26].Some specific methods for gout complications prevention: (1)Drink more water instead of beer and other alcoholic drinks; and eat less high-fat food because of high-fat. (2)Fatty acids can reduce the excretion of uric acid from the body. (3) Restrict the intake of high purine foods, such as in animals viscera, hairtail, sardines, anchovies, shellfish, and bean products. (4) Drugs for increasing serum uric acid levels: diuretics, aspirin and cyclosporine; (5)Increase aerobic exercise to promote the excretion of uric acid (6) After the application of non-drug methods, the serum uric acid still remained more than 8 mg/dl or 480 micromol/L should be treated with drugs[27].

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