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Lifestyle factors and comorbidities in gout patients compared to the general population in Western Sweden: results from a questionnaire study

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Objective: This study aimed to identify lifestyle factors associated with gout in patients with prevalent gout compared to the general population.

Method: Adult patients with gout identified in primary and secondary care in Western Sweden between 2015 and 2017 were sent a questionnaire asking about demographics, lifestyle, and comorbidities. Five age- and gender-matched controls were identified in a random sample of 52 348 individuals aged 16–84 years who participated in the National Public Health survey in Sweden, year 2015. Logistic regression models were used to compare cases and controls with regard to lifestyle factors and comorbidities.

Results: Of the 1589 invited gout patients, 868 (55%) responded. After matching for age and gender, 728 were included in the analysis (82.4% male; mean $\pm$ sd age 69.3 ± 10.5 years for men and 71.8 ± 9.9 years for women with gout). Male and female gout patients were significantly more likely to be overweight or obese (men 79% vs 66%; women 78.5% vs 65.3%), to have binge-drinking behaviour (men 29.9% vs 11%; women 13.7% vs 2.9%), and to be ex-smokers, compared to controls. Moreover, male gout patients reported lower levels of physical activity, while diabetes and hypertension were more common in both genders with gout than in controls.

Conclusion: In this questionnaire study, gout patients reported significantly more obesity and binge-drinking behaviour and less physical activity than controls. This suggests that there are great unmet needs for the management of lifestyle factors, particularly regarding overweight/obesity and binge drinking, in patients with gout.

Gout is the most common inflammatory arthritis and much is known concerning its pathogenesis (1). Hyperuricaemia, i.e. increased levels of urate in the blood, is by far the strongest risk factor for the disease. To a large extent, the risk factors for gout coincide with those for hyperuricaemia (2). Non-modifiable risk factors are increasing age, male gender, and genes. However, only 15–20% of males and females with hyperuricaemia develop gout over 30 years of follow-up (3, 4). Well-known modifiable risk factors for both gout and hyperuricaemia are obesity, physical inactivity, and dietary factors, such as excessive intake of meat, seafood, alcohol, and sugar-sweetened drinks. These risk factors are highlighted in the European League Against Rheumatism (EULAR) guidelines for the management of gout from 2016 (5), where it is stated that every person with gout should receive advice on weight loss, if appropriate, avoidance of alcohol, and regular

exercise. Furthermore, smoking has been shown to decrease levels of serum urate and the risk of developing gout in men (6). A proposed mechanism that links smoking with a decreased risk of developing gout is that free radical components of cigarette smoke exert a rapid oxidative effect in the blood, which may lead to a depletion of antioxidants, including urate (6).

The overarching aim of this study was to provide up-to-date information on gout-related modifiable lifestyle factors to support better gout management. To do so, we examined the occurrence and the extent to which such lifestyle factors were cross-sectionally associated with prevalent gout compared to age- and gender-matched controls from the general Swedish population.

Method

All patients aged 18 years or older with at least one International Classification of Diseases, 10th revision (ICD-10) diagnosis of gout from January 2015 to February 2017 listed at any of 12 randomly selected primary healthcare centres (of approximately 200 existing centres) or the

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Rheumatology Department at Sahlgrenska University Hospital in the Western Sweden Health Care Region (WSHCR), were identified. They were sent a questionnaire, asking about demographics; lifestyle factors, such as smoking status, alcohol consumption, and physical activity [categorized into four groups: ≥ 5 h/week (reference), > 3 to < 5 h/week, > 1 to 3 h/week, and maximum 1 h/week]; body mass index (BMI; categorized into four levels: underweight < 19 , normal weight ≥ 19 to < 25 (reference), overweight ≥ 25 to < 30 , and obese ≥ 30 kg/m²); and comorbidities (diabetes and hypertension). All responders aged 18–84 years ($n = 728$) were matched to five control individuals by gender and age. Control individuals were selected from a random sample of 52 348 individuals aged 16–84 years who participated in the National Public Health Survey in Sweden, year 2015 (7), where questions regarding lifestyle were posed identically as in the questionnaire to the gout patients. This survey is a national study on health, lifestyle, and living conditions. Alcohol consumption was categorized as none and any with/without binge-drinking behaviour. Binge drinking was defined as consuming more than four (women) or five standard drinks (men) on any occasion.

Conditional logistic regression was used to estimate odds ratios (ORs) for lifestyle factors and comorbidities. In the multivariate analyses, BMI, smoking status, binge drinking, and physical activity were all included to adjust for potential confounding. There were no statistically significant interactions between alcohol intake and BMI ($p > 0.10$).

The Regional Ethics Review board in Gothenburg, Sweden, approved the study (Dnr 519-16). The study was carried out in accordance with the Declaration of Helsinki.

Results

Of the 1589 invited gout patients, 868 (55%) responded. After matching for age and gender, 728 were included in the analysis, 82.4% of whom were male. Non-responders were slightly younger and women were less likely to respond. The mean $\pm$ sd age was 69.3 ± 10.5 years for men and 71.8 ± 9.9 years for women with gout. The mean disease duration for gout was 11.6 ± 10.5 years for men and 7.9 ± 7.8 years for women. In men, overweight/obesity (52.1%/26.9% vs 47.8%/18.2%), binge-drinking behaviour (29.9% vs 11.0%), and being an ex-smoker (51.4% vs 35.2%) were more common in gout patients, whereas being a current smoker was rare. In multivariate analyses, male gout patients were more likely to be overweight [OR 1.67, 95% confidence interval (CI) 1.31–2.14] or obese (OR 2.20, 95% CI 1.64–2.94), and to have lower levels of physical activity and binge-drinking behaviour (OR 3.04, 95% CI 2.11–4.40) compared to male controls (Table 1). Furthermore, male gout patients were more likely to be ex-smokers (OR 1.75, 95% CI 1.43–2.15) compared to controls.

In women, the results were similar, with overweight/obesity (37.1%/41.4% vs 35.7%/19.6%), binge-drinking behaviour (13.7% vs 2.9%), and being an ex-smoker (41.3% vs 28.7%) being more common in gout patients, whereas being a current smoker was rare. In multivariate analyses, female gout patients were more likely to be overweight (OR 1.87, 95% CI 1.05–3.33) or obese (OR 3.62, 95% CI 1.96–6.72), and to engage in binge-drinking behaviour (OR 3.88, 95% CI 1.54–9.74) compared to female controls (Table 1). Also, in multivariate analysis, female gout patients were more likely to be ex-smokers (OR 1.77, 95% CI 1.09–2.87) compared to controls. In univariate analyses, comorbidities such as diabetes and hypertension were significantly more common in gout patients compared to controls among both genders.

Discussion

In the present study, we showed that overweight/obesity, being an ex-smoker, and binge-drinking behaviour were more common in patients with gout compared to controls, in both men and women, with overweight/obesity being the most frequent factor in prevalent gout. Furthermore, diabetes and hypertension were significantly more common in gout patients than in controls, in both men and women. Only male gout patients displayed lower levels of physical activity compared to controls.

Prophylactic treatment of gout is insufficient in many parts of the world, including the WSHCR (8). Our data suggest that non-pharmacological management in patients with prevalent gout should primarily be focused on reducing overweight, in particular obesity in women, and unhealthy alcohol consumption. Weight loss has been shown to decrease both urate levels and the number of gout attacks over time (9) and would also be of benefit for several gout-associated comorbidities. Gout is strongly associated with alcohol, not only in its pathogenesis but also in the societal view of the disease. In the WSHCR, alcoholism diagnosed by the healthcare system is already more common in gout patients than in non-gout controls at the first gout diagnosis (10). In the current study, alcohol intake or abstinence did not differ between gout patients or controls, but binge-drinking behaviour was overrepresented in gout patients. This is in line with other studies showing that both gout attacks (11) and the risk of major coronary events increase during the days following alcohol intake (12).

Although a smaller proportion of patients had never smoked, it is reassuring to see that gout patients have quit smoking to a larger degree compared to controls and that the frequency of current smokers is relatively low in patients with gout. One could argue that this may have contributed to their developing gout by increasing urate levels, but it may just reflect the trend in Sweden as a whole, where daily smoking has decreased from 14% of the population aged 16–84 years in 2006 to 7% in 2020 (13). In addition, it is likely to be an effect of successful risk

Table 1. Prevalence of lifestyle factors and comorbidities between gout patients and controls matched for gender and age.

	Males					Females				
	Cases	Controls	Univariate OR	95% CI	Adj. OR*	95% CI	Univariate OR	95% CI	Adj. OR*	95% CI
Age (years)	(n = 600) 69.3 ± 10.5	(n = 3040) 69.3 ± 10.5	n/a		n/a				n/a	
Disease duration (years)	11.6 ± 10.5	—	n/a		n/a		n/a		n/a	
BMI (kg/m ²)	28.7 ± 10.7	26.9 ± 4.3	n/a		n/a		n/a		n/a	
Underweight (< 19)	0	0.8	n/a		n/a		n/a		n/a	
Normal weight (≥ 19 to < 25)	21.0	33.2	Ref	1	Ref	1	Ref	1	Ref	1
Overweight (≥ 25 to < 30)	52.1	47.8	1.75	1.38–2.21	1.67	1.31–2.14	2.07	1.21–3.52	1.87	1.05–3.33
Obese (≥ 30)	26.9	18.2	2.38	1.81–3.13	2.20	1.64–2.94	4.11	2.40–7.04	3.62	1.96–6.72
Comorbidities										
Hypertension	65.4	41.1	4.69	3.85–5.71	n/a		7.36	4.49–12.06	n/a	
Diabetes	22.3	15.4	3.61	3.06–4.27	n/a		6.02	3.98–9.09	n/a	
Smoking										
Never	43.2	56.2	Ref	1	Ref	1	Ref	1	Ref	1
Ex	51.4	35.2	1.94	1.61–2.33	1.75	1.43–2.15	1.68	1.11–2.55	1.77	1.09–2.87
Current	5.5	8.6	0.82	0.55–1.21	0.69	0.45–1.05	0.75	0.30–1.86	1.04	0.40–2.74
Physical activity (h/week)										
≥ 5	22.4	31.6	Ref	1	Ref	1	Ref	1	Ref	1
> 3 to < 5	22.0	27.8	1.13	0.87–1.47	1.14	0.85–1.52	0.82	0.45–1.49	0.81	0.40–1.62
> 1 to 3	30.9	30.1	1.46	1.14–1.86	1.48	1.13–1.94	0.93	0.53–1.63	0.96	0.50–1.85
Max. 1	24.7	16.5	2.06	1.58–2.70	1.97	1.46–2.67	1.62	0.92–2.86	1.44	0.73–2.82
Alcohol										
Never	11.4	13.0	Ref	1	Ref	1	Ref	1	Ref	1
Yes, without binge drinking	58.7	76.0	0.90	0.67–1.20	0.88	0.64–1.22	0.65	0.41–1.03	0.70	0.41–1.19
Yes, with binge drinking	29.9	11.0	3.32	2.39–4.62	3.04	2.11–4.40	4.28	1.92–9.53	3.88	1.54–9.74

Data are shown as mean ± sd or percentages.

Conditional logistic regression was used to estimate the odds ratio.

Adj., adjusted; BMI, body mass index; CI, confidence interval; n/a, not applicable; OR, odds ratio; Ref, reference.

*Multivariate analyses included BMI, alcohol consumption (binge drinking), smoking status, and physical activity per week.

factor intervention, owing to the high occurrence of comorbidities in gout patients.

The following strengths of the study were identified. This study included a large number of gout patients from a primary care setting ($n = 654$; 90%), ensuring its relevance to the majority of patients with gout, who are primarily managed in primary care. The patients were identified through medical records in primary and secondary care in the WSHCR, and the validity of these gout diagnosis has been examined by us previously and been found to be satisfactory (14, 15). There were certain limitations to this study. First, the response rate to the postal questionnaire was 55%, non-responders were slightly younger, and women responded to a lower degree, making the cohort less representative of the gout population as a whole. Secondly, the response rate to the postal questionnaire of the control population in 2015, the National Public Health Survey in Sweden, was 55%, and young men were less willing to respond. Thirdly, socially desired answers are likely to occur in gout patients, e.g. underreporting of alcohol consumption; however, this applies to the control subjects as well. Finally, this is a cross-sectional study, which limits the ability to determine temporal links between outcome and exposure.

Conclusion

In this questionnaire study, we found that gout patients reported significantly more overweight and obesity and binge-drinking behaviour and less physical activity compared to age- and gender-matched controls. This highlights that the management of lifestyle factors, in particular weight reduction (especially addressing obesity in women) and alcohol drinking behaviour, needs to be enhanced in both men and women with gout to improve gout care and patient outcome.

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Disclosure statement

No potential conflict of interest was reported by the authors.

References

1. Dalbeth N, Gosling AL, Gaffo A, Abhishek A. Gout. *Lancet* 2021;397:1843–55.
2. Zhu Y, Pandya BJ, Choi HK. Comorbidities of gout and hyperuricemia in the US general population: NHANES 2007–2008. *Am J Med* 2012;125:679–87. e1.
3. Kapetanovic MC, Nilsson P, Turesson C, Englund M, Dalbeth N, Jacobsson L. The risk of clinically diagnosed gout by serum urate levels: results from 30 years follow-up of the Malmö Preventive Project cohort in southern Sweden. *Arthritis Res Ther* 2018;20:1–10.
4. Campion EW, Glynn RJ, DeLabry LO. Asymptomatic hyperuricemia. Risks and consequences in the Normative Aging Study. *Am J Med* 1987;82:421–6.
5. 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.
6. Fanning N, Merriman TR, Dalbeth N, Stamp LK. An association of smoking with serum urate and gout: A health paradox. *Semin Arthritis Rheum* 2018;47:825–42.
7. Swedish National Data Service. Nationella folkhälsoenkäten. Available from: <https://snd.gu.se/sv/catalogue/study/ext0195#dataset2016>. Accessed 14 February 2022.
8. Dehlin M, Ekstrom EH, Petzold M, Stromberg U, Telg G, Jacobsson LT. Factors associated with initiation and persistence of urate-lowering therapy. *Arthritis Res Ther* 2017;19:6.
9. Nielsen SM, Bartels EM, Henriksen M, Waehrens EE, Gudbergson H, Bliddal H, et al. Weight loss for overweight and obese individuals with gout: a systematic review of longitudinal studies. *Ann Rheum Dis* 2017;76:1870–82.
10. Drivelegka P, Sigurdardottir V, Svard A, Jacobsson LTH, Dehlin M. Comorbidity in gout at the time of first diagnosis: sex differences that may have implications for dosing of urate lowering therapy. *Arthritis Res Ther* 2018;20:108.
11. Neogi T, Chen C, Niu J, Chaisson C, Hunter DJ, Zhang Y. Alcohol quantity and type on risk of recurrent gout attacks: an internet-based case-crossover study. *Am J Med* 2014;127:311–8.
12. Boban M, Stockley C, Teissedre PL, Restani P, Fradera U, Stein-Hammer C, et al. Drinking pattern of wine and effects on human health: why should we drink moderately and with meals? *Food Funct* 2016;7:2937–42.
13. Public Health Agency of Sweden. Nationella folkhälsoenkäten 2020. Available from: <https://www.folkhalsomyndigheten.se/folkhalsorapportering-statistik/tolkad-rapportering/folkhalsans-utveckling/resultat/levnadsvanor/tobaksrokning-daglig/>. Accessed 14 February 2022.
14. Dehlin M, Stasinopoulou K, Jacobsson L. Validity of gout diagnosis in Swedish primary and secondary care – a validation study. *BMC Musculoskelet Disord* 2015;16:149.
15. Dehlin M, Landgren AJ, Bergsten U, Jacobsson LT. The validity of gout diagnosis in primary care: results from a patient survey. *J Rheumatol* 2019;46:1531–4.