Assessing Public Awareness of Gout and the Health Implications of High Red Meat Consumption in Saudi Arabia; A Cross-Sectional Study

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ABSTRACT

Background: Gout is a prevalent form of inflammatory arthritis characterized by elevated uric acid levels, often influenced by dietary habits, particularly red meat consumption. Understanding public knowledge and awareness of gout and its dietary risk factors is essential for effective prevention and management strategies. **Objectives:** This study aims to assess the knowledge and awareness of the general population in Saudi Arabia regarding gout disease and the health implications of high red meat consumption. Materials and Methods: A cross-sectional survey was conducted among 818 participants across various regions of Saudi Arabia. Data were collected using a structured questionnaire covering demographics, knowledge of gout, awareness of red meat consumption risks, and information sources. Statistical analyses, including chi-square tests, were performed to identify associations between knowledge levels and sociodemographic variables. Results: Most participants were male (63.2%), aged between 18 and 30 years (42.5%), and held a diploma (51.5%). While 81.7% had heard of gout, only 30.7% recognized red meat consumption as a contributing factor. Notably, 70% incorrectly believed that eating meat reduces the risk of gout attacks. Significant associations were found between knowledge levels and gender, marital status (p=0.01), and region (p=0.01), with males, married individuals, and those from certain regions exhibiting poorer knowledge. **Conclusion:** Despite general awareness of gout, there is a substantial gap in understanding its dietary risk factors, particularly concerning red meat consumption, among the Saudi Arabian population. Targeted educational interventions are necessary to enhance public knowledge and promote dietary modifications to mitigate gout risk.

Keywords: Gout, Red Meat Consumption, Public Awareness, Dietary Risk Factors, Saudi Arabia.

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INTRODUCTION

Gout, an inflammatory arthritis resulting from raised uric acid levels in the bloodstream, poses a considerable public health issue worldwide, especially in areas with high purine-rich foods like red meat (Al-Worafi, 2024). Gout has long been acknowledged as one of the most prevalent chronic inflammatory joint disorders (Mikuls, 2022). It is generally recognized that men are significantly more prone than women to acquire gout, which is characterized by elevated blood uric acid levels (hyperuricemia), reaching values as high as 6.8 mg/dL (Winder *et al.*, 2021). Urate crystals occur due to elevated blood uric acid levels, heightening the risk of kidney stone formation (Mei *et al.*, 2022). Gout may intermittently present with tophi, which can ultimately lead to gouty arthritis (Oh and Moon, 2021).



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Gout is marked by intense joint pain, swelling, and consequences including kidney stones and cardiovascular risks, determined by genetic predisposition and dietary and lifestyle variables (Kuwabara *et al.*, 2023). In Saudi Arabia, dietary habits frequently involve a substantial consumption of red meat, perhaps leading to an increased incidence of lifestyle-related disorders, such as gout (Alhammadi *et al.*, 2024). Despite established correlations, public knowledge of the relationship between dietary practices, particularly red meat intake, and gout remains insufficiently investigated.

Although numerous researchers have examined the epidemiology and clinical management of gout (Al Kaabba *et al.*, 2021; Khormi *et al.*, 2023; Tawhari *et al.*, 2024), there is a paucity of information concerning the general population's comprehension of this ailment, especially regarding dietary practices. Current research frequently neglects cultural and regional dietary traditions, particularly those in Saudi Arabia, and their influence on public health outcomes (Alsulami *et al.*, 2023). This establishes a knowledge deficit on the correlation between awareness of gout and its risk factors and cultural dietary practices, particularly the regular eating of red meat.

This study is motivated by the growing prevalence of non-communicable diseases associated with lifestyle choices and food habits. Comprehending public attitudes toward gout and its dietary risk factors is essential for formulating successful methods to reduce its occurrence. This project aims to enhance the existing knowledge base by delivering culturally pertinent and practical insights, motivated by the lack of region-specific data, therefore facilitating better public health outcomes in Saudi Arabia.

MATERIALS AND METHODS

Study Design

The study is an observational cross-sectional survey that was conducted in the Kingdom of Saudi Arabia in 2023-2024.

Study Setting

This study was conducted in 7 regions of Saudi Arabia. The study will include the adult population who agreed to answer the electronic survey which was conducted between January 2023-May 2024.

Inclusion and Exclusion Criteria

All the adult males and females willing to participate and complete the questionnaire were included in the study. All non-Saudi individuals were excluded from this study.

Study Questionnaire

The questionnaire for this study was developed based on a prior literature review (Ashiq *et al.*, 2022; Kanwal *et al.*, 2018; Richette *et al.*, 2020; Spaetgens *et al.*, 2016). The initial portion required patients to express their consent and willingness to participate in the study. The second component recorded the subsequent demographic information: gender, age, educational attainment, and work status. The third phase gathered knowledge about gout. The fourth portion assessed the patients' overall awareness status towards gout.

Accurate answers were given a 1 score, and (inaccurate/ I don't know/missing) answers were given a 0 score. Participants were classified into 3 categories: Scores below 8 of 24 were considered as poor knowledge, while scores 8-15 were considered moderate knowledge, and scores 16-24 as good knowledge. Additionally, the relation between the demographic data of participants, and their level of knowledge was determined at a significant level.

Questionnaire reliability and piloting

A preliminary investigation was conducted by the researcher on a sample of 15 individuals who met the established criteria to evaluate their understanding of the survey instrument and confirm its correspondence with the target construct being measured. The participants confirmed the content and face validity of the questionnaire. The Cronbach's α value of 0.81 for the questionnaire demonstrated its reliability. Cronbach's α was computed to evaluate the reliability of the data concerning gout patients' perceptions of their condition and treatments in Saudi Arabia (Amirrudin *et al.*, 2021).

Statistical Analysis

The data collected was analyzed using SPSS[®] software (Statistical product and services solutions) for Windows[®] 28. Data was cleaned and entered into SPSS and analyzed for frequency, Association between knowledge score and demographics was analyzed by using a Chi-square or *t*-test for significance. For all statistical tests, the level of significance was fixed at p less than or equal to 0.05.

RESULTS

Demographic Characteristics of the participants

In Table 1, the study surveyed 818 participants, predominantly male (63.2%), with females comprising 36.8%. The majority were aged between 18 and 30 years (42.5%), followed by 41-50 years (18.3%), 31-40 years (16.7%), over 50 years (11.1%), and under 18 years (11.2%). Marital status was nearly evenly split, with 51.6% married and 48.4% single. Educational attainment varied: 51.5% held a diploma, 23.3% completed high school, 18.7% attended middle school, 3.8% earned a bachelor's degree, and 2.7% pursued postgraduate studies. Regarding employment, 46.0% were unemployed, 36.6% were students, and 17.4% were employed. Geographically, participants were primarily from Al-Ahsa (50.5%), with others from Hafr-Al-Batin (22.0%), Dammam (11.9%), Al Qatif (11.4%), Jubail (3.7%), Buqayq (0.4%), and Khafji (0.2%).

Knowledge about the Gout disease

The survey revealed that 81.7% of participants had heard of gout, and 67.8% recognized it as a serious health condition. However, only 18.7% knew medications for acute or chronic gout, and 20.9% knew that painkillers are used to treat acute gout symptoms. Regarding risk factors, 72.0% acknowledged that older adults are more likely to develop gout, but only 30.7% believed that red meat consumption causes the condition. Regarding symptoms, 62.6% identified severe joint pain, and 69.7% recognized redness and swelling of the joints as manifestations of gout. Additionally, 34.8% reported having relatives or friends with gout, and 54.6% were aware of its symptoms. These findings indicate a general awareness of gout's existence and its symptoms among the population, but a limited understanding of its causes, risk factors, and treatment options. The results are explained in Table 2.

Knowledge about meat consumption

The survey indicates that while 60.0% of participants consume red meat, only 30.7% are aware of its potential health risks. Notably, 67.8% recognize a relationship between gout and high meat intake, yet just 30.6% believe in a direct link between high meat consumption and gout. Additionally, 70.0% incorrectly think that eating meat reduces the risk of gout attacks. Awareness of red meat's impact on health is limited, with only 29.8% knowing it increases uric acid and 28.3% aware of its role in raising cholesterol levels. These findings highlight a significant gap in understanding the health implications of red meat consumption, particularly its association with gout and other conditions. These results are discussed in Table 3.

Table 1: Sociodemographic of the participants (n=818).

Variables	n (%)
Gender	
Male	517 (63.2)
Female	301 (36.8)
Age (Years)	
>18	92 (11.2)
18-30	348 (42.5)
31-40	137 (16.7)
41-50	150 (18.3)
<50	91 (11.1)
Marital Status	
Single	396 (48.4)
Married	422 (51.6)
Education	
Middle School	153 (18.7)
High School	191 (23.3)
Diploma	421 (51.5)
Bachelors	31 (3.8)
Postgraduate studies	22 (2.7)
Profession	
Student	300 (36.6)
Unemployed	376 (46.0)
Employed	142 (17.4)
Region	
Al-Ahsa	413 (50.5)
Jubail	30 (3.7)
Hafar-Al-Batin	180 (22.0)
Dammam	97 (11.9)
Buqayq	3 (0.4)
Al Qatif	93 (11.4)
Khafji	2 (0.2)

Awareness about Gout disease

Among 818 participants, the majority of the participants have moderate awareness regarding gout disease (75%), 18% have poor awareness and only 7% have good awareness about the disease. The results are explained in Figure 1.

Association between Knowledge Scores and Demographic Characteristics

The analysis of knowledge scores across various sociodemographic variables revealed significant associations with marital status and region. Male individuals exhibited poorer knowledge than females (p=0.01). Married individuals exhibited higher levels of poor knowledge compared to single participants (p=0.01). Additionally, knowledge levels varied significantly by region, with participants from Al-Ahsa demonstrating better knowledge scores than those from other areas (p=0.01). The results are explained in Table 4.

DISCUSSION

This study assessed the knowledge and awareness of gout disease and the health implications of high red meat consumption among the general population in Saudi Arabia. The findings indicate that while a majority of participants (81.7%) have heard of gout, there is a significant gap in understanding its causes, risk factors, and treatment options. Notably, only 30.7% of respondents are

Table 2: Knowledge regarding gout disease among participants.

Parameters	Yes	No
Have you ever heard of gout?	668 (81.7)	111 (13.3)
Do you think gout is a serious health condition?	555 (67.8)	263 (32.2)
Do you believe that gout can lead to other health complications?	549 (67.1)	269 (32.9)
Do you know the medicine for acute or chronic gout?	153 (18.7)	665 (81.3)
Did you know painkillers are used to treat symptoms of acute gout?	171 (20.9)	647 (79.1)
Have any of your relatives/friends had gout?	285 (34.8)	533 (65.2)
Do older adults are more likely to develop gout?	589 (72.0)	229 (28.0)
Are you aware of the symptoms of the gout?	447 (54.6)	371 (45.4)
Do you think the consumption of red meat causes gout?	251 (30.7)	567 (69.3)
Does gout cause severe pain in the joints?	512 (62.6)	306 (37.4)
Does gout cause redness and swelling of the joints?	570 (69.7)	248 (30.3)

aware of the potential health risks associated with high red meat consumption, and a mere 30.6% believe there is a link between high meat consumption and gout. Additionally, 70% incorrectly think that eating meat reduces the risk of gout attacks. These results highlight a substantial deficiency in public knowledge regarding the dietary factors contributing to gout and its associated health complications.

The limited awareness of the relationship between red meat consumption and gout observed in this study aligns with previous research conducted in Saudi Arabia (Al-Worafi, 2024; Wang *et al.*, 2024). For instance, a study assessing the perception and awareness of gout risk factors among the general population in Jazan City found that while awareness regarding certain risk factors like meat consumption was good, there was a lack of

 Table 3: Knowledge about meat consumption among participants.

Parameters	Yes	No
Is there any relationship between gout and high meat?	555 (67.8)	263 (32.2)
Do you consume red meat?	491 (60.0)	327 (40.0)
Are you aware of the potential health risks of high red meat consumption?	251 (30.7)	567 (69.3)
Do you believe there is a link between high meat consumption and gout?	250 (30.6)	568 (69.4)
Eating meat reduces the risk of gout attacks?	573 (70.0)	245 (30.0)
Do you know that red meat increases uric acid?	243 (29.8)	575 (70.2)
Do you know that red meat increases cholesterol?	231 (28.3)	587 (71.7)

awareness about other factors such as seafood consumption and sugar-sweetened soft drinks (Zogel *et al.*, 2024).

Similarly, research conducted in Riyadh city reported that 73.2% of participants had a good level of awareness about gout disease, yet specific knowledge about dietary risk factors was not thoroughly assessed (Al Kaabba *et al.*, 2021). These studies corroborate our findings, indicating a general awareness of gout but an insufficient understanding of its dietary risk factors.

Comparing our results with international studies reveals a consistent pattern of limited public knowledge regarding gout and its dietary associations. A study conducted in Qatar reported that only 33% of participants disagreed that increased consumption of red meat and seafood helps in decreasing gout attacks, indicating a lack of awareness about the role of these foods in gout development (Amiri *et al.*, 2023). Furthermore, a global study on the burden of gout highlighted that high Body Mass Index (BMI) was the leading risk factor for gout, emphasizing the role of diet and lifestyle in its prevalence (Al Kaabba *et al.*, 2021). These findings are consistent with our study, underscoring the need for enhanced public education on the dietary factors contributing to gout.

The study revealed that male participants exhibited poorer knowledge about gout disease compared to female participants, with a statistically significant difference (p=0.01). This suggests a gender disparity in awareness and understanding of gout within the surveyed population. The observed gender disparity aligns with findings from other studies. For instance, research conducted in the United States indicated that women are more likely than men to seek health information and engage in preventive health behaviors, leading to greater health literacy (Bergsten *et al.*, 2023). Additionally, a study in the United Kingdom found that



Figure 1: Awareness of Gout disease among the general population of Hafr Al Batin, Saudi Arabia.

Variables		Knowledge Scores	<i>p</i> -value		
		Poor Knowledge	Moderate Knowledge	Good Knowledge	
Gender					0.01
Male	517 (63.2)	81 (9.9)	397 (48.5)	39 (4.8)	
Female	301 (36.8)	65 (7.9)	213 (26.0)	23 (2.8)	
Age (Years)					0.08
>18	92 (11.2)	13 (1.6)	63 (7.7)	16 (2.0)	
18-30	348 (42.5)	50 (6.1)	266 (32.5)	32 (3.9)	
31-40	137 (16.7)	29 (3.5)	104 (12.7)	4 (0.5)	
41-50	150 (18.3)	33 (4.0)	113 (13.8)	4 (0.5)	
<50	91 (11.1)	21 (2.6)	64 (7.8)	6 (0.7)	
Marital Status					0.01
Single	396 (48.4)	52 (6.4)	302 (36.9)	42 (5.1)	
Married	422 (51.6)	94 (11.5)	308 (37.7)	20 (2.4)	
Education					0.5
Middle School	153 (18.7)	28 (3.4)	112 (13.7)	13 (1.6)	
High School	191 (23.3)	27 (3.3)	151 (18.5)	13 (1.6)	
Diploma	421 (51.5)	76 (9.3)	313 (38.3)	32 (7.6)	
Bachelors	31 (3.8)	8 (1.0)	21 (2.6)	2 (0.2)	
Postgraduate studies	22 (2.7)	7 (0.9)	13 (1.6)	2 (0.2)	
Profession					0.1
Student	300 (36.6)	46 (5.6)	225 (27.5)	29 (9.7)	
Unemployed	376 (46.0)	78 (9.5)	277 (33.9)	21 (2.6)	
Employed	142 (17.4)	22 (2.7)	108 (13.2)	12 (1.5)	
Region					0.01
Al-Ahsa	413 (50.5)	66 (8.1)	302 (36.9)	45 (5.5)	
Jubail	30 (3.7)	9 (1.1)	20 (2.4)	1 (0.1)	
Hafar-Al-Batin	180 (22.0)	42 (5.1)	133 916.3)	5 (0.6)	
Dammam	97 (11.9)	14 (1.7)	74 (9.0)	9 (1.1)	
Buqayq	3 (0.4)	0 (0)	3 (0.4)	0 (0)	
Al Qatif	93 (11.4)	15 (1.8)	76 (9.3)	2 (0.2)	
Khafji	2 (0.2)	0 (0)	2 (0.2)	0 (0)	

Table 4: Association between knowledge scores and Socio-demographic characteristics of the participants.

men are less likely to consult healthcare professionals for health issues, which may contribute to lower awareness and knowledge about specific diseases like gout (Te Kampe *et al.*, 2021). While some studies have reported no significant gender differences in gout knowledge, others have identified disparities. For example, a study in New Zealand found no significant difference in illness perceptions of gout between men and women (Te Kampe *et al.*, 2021). In contrast, research in Sweden reported that women with gout experienced more severe symptoms and had different illness perceptions compared to men, suggesting variations in disease awareness and management between genders (McCormick *et al.*, 2022). These contrasting findings highlight the need for further research to understand the underlying factors contributing to gender differences in gout knowledge.

Our study also exhibited poor knowledge in married individuals (p=0.01). A study in China found that single individuals were more likely to engage in health-promoting behaviors and had higher health knowledge compared to their married counterparts. (Liu *et al.*, 2021). Conversely, it is reported that married individuals had better health outcomes, attributed to spousal support and shared health behaviors, suggesting that the relationship between

marital status and health knowledge may vary across different contexts (Wilson and Novak, 2022).

A notable strength of this study is its focus on a culturally specific population, providing insights into the knowledge and awareness of gout and dietary habits within Saudi Arabia. The inclusion of a diverse sample across various regions enhances the generalizability of the findings. However, the study has limitations, including its reliance on self-reported data, which may be subject to recall bias. Additionally, the cross-sectional design limits the ability to establish causality between knowledge levels and dietary behaviors. Future research could benefit from longitudinal studies to assess changes in awareness and behavior over time.

CONCLUSION

The findings of this study highlight a significant gap in public knowledge regarding the relationship between high red meat consumption and gout among the general population in Saudi Arabia. Despite a general awareness of gout, there is a lack of understanding of its dietary risk factors, particularly concerning red meat intake. These results underscore the need for targeted public health interventions and educational campaigns to raise awareness about the dietary contributors to gout and promote healthier eating habits within the population.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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