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### RESEARCH ARTICLE

#### KNOWLEDGE, ATTITUDE, AND PRACTICE TOWARDS ASYMPTOMATIC HYPERURICEMIA AND GOUT AMONG FAMILY MEDICINE RESIDENTS IN KING SAUD MEDICAL CITY IN RIYADH, SAUDI ARABIA, 2023: A CROSS-SECTIONAL STUDY

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#### Abstract

**Introduction:** Asymptomatic Hyperuricemia is defined as blood serum urate concentration above 6mg/dl (357  $\mu$ mol/L) for women and above 7mg/dl (416  $\mu$ mol/L) for men. It is important to highlight that in Saudi Arabia, family medicine residents encounter multiple cases of AH and gout. Thus, it would be of significance to assess their knowledge, attitude, and practice regarding AH and gout.

**Methodology:** A cross-sectional hospital-based descriptive study. The study was conducted in King Saud Medical City Riyadh -in June 2023, among all family medicine residents training in King Saud Medical City Riyadh. Consecutive sampling was implemented. Full coverage of all family medicine residents training in King Saud Medical City Riyadh (n= 119).

**Results:** This study included a total of 117. 87(74.7%) have an experience of 1-3 years. About one quarter of participants (26.5%) attended continuing medical education (CME) on asymptomatic hyperuricemia (AH) or gout. 83(70.9%) have moderate knowledge, and 75(64.1%) have moderate practice, and 22(18.8%) have good practice. Participants' level of knowledge was found to be significantly associated with reading about asymptomatic hyperuricemia (AH) or gout in the last year and being aware with the guidelines on the management of both AH and gout ( $P < .05$ ). On the other hand, level of practice was found to be associated significantly with reading about asymptomatic hyperuricemia (AH) or gout in the last year only ( $P = .04$ ).

**Conclusions:** More than half of patients showed moderate level of knowledge and favorable attitude towards AH and gout. Majority of residents showed moderate level of practice towards management of AH and gout. Significant association was found between level of knowledge and attending continuous medical education sessions ( $P < .05$ ). Significant association was also found between level of practice and patients' level of knowledge ( $P < .05$ ).

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**Introduction:-**

Hyperuricemia is defined as an increased level of serum uric acid level in the blood. The excess uric acid can be either due to decreased excretion or overproduction. Uric acid is the final product of protein and purine metabolism in humans. It can precipitate the patient to have renal disease, cardiovascular disease, and metabolic syndrome [1-2]. 90% of the hyperuricemia cases were found to have a failure of excretion through the kidneys due to genetic components [1]. Meanwhile, 10% had excess overproduction [3]. Insufficient excretion with elevated uric acid crystals causes the precipitation of monosodium urate crystals, which can lead to kidney stones and gout [4]. Hyperuricemia prevalence has increased in recent years it's found to be reaching 20% for both genders, especially in developing countries [5]. Asymptomatic Hyperuricemia is defined as blood serum urate concentration above 6mg/dl (357  $\mu\text{mol/L}$ ) for women and above 7mg/dl (416  $\mu\text{mol/L}$ ) for men [6]. It is a form of hyperuricemia where there are no symptoms of gout. two third of hyperuricemia patients are estimated to be asymptomatic with no gout flare-up symptoms but are at risk for developing gout [7]. It's considered the first stage of advanced inflammatory gout [8]. Gout is an inflammatory arthritis deposition of monosodium urate (MSU) crystals in joints due to longstanding asymptomatic hyperuricemia [8]. The prevalence of gout globally has reached <1% to 6.8% with an incidence of 0.58-2.89 per 1,000 person-years [10]. there are many risk factors for gout including obesity, dietary factors, and chronic conditions [9]

There are multiple studies conducted to assess the knowledge and practice of primary care physicians regarding asymptomatic hyperuricemia and gout. In a study conducted in the United States with 838 participants, 11.8% stated that they are aware of current gout therapy guidelines. 84% of physicians would not aspirate joints as part of acute gout flare-up management, while 86.6% would order urate crystals level. 58.8% of the physicians suggested colchicine for acute therapy whereas 50.5% suggested starting NSAIDs and 45.0% would consider glucocorticoids. 84.6% of physicians would not initiate a urate-lowering therapy during an acute attack [10]. In the Republic of Croatia, a study conducted among 336 primary care physicians, 42.3% were not familiar with the European League Against Rheumatism (EULAR), whereas 67.2% made their approach to asymptomatic hyperuricemia based on their clinical experience [11]. A study conducted in Jeddah, Saudi Arabia, included 201 PHC physicians, only 32.8% showed knowledge about asymptomatic hyperuricemia and gout with 88.1% of physicians recommended correctly purine-free diet and lifestyle modifications, the majority showed a lack of knowledge and awareness regarding gout and asymptomatic hyperuricemia guidelines [12]. A cross-sectional study done in Bisha, Saudi Arabia 86.6% of the physicians showed good knowledge of asymptomatic hyperuricemia while 13.4% were lacking in knowledge and only 43.9% had good practices regarding asymptomatic hyperuricemia [13]. Meanwhile in Qassim, Saudi Arabia a study conducted with 133 primary healthcare physicians only 67.7% showed knowledge of the guidelines for managing AH or gout. 45.9% had good knowledge about the management of asymptomatic hyperuricemia and gout but had a poor level of practice with 23.3% [14] Therefore, improving the knowledge of family medicine residents is crucial in the fight against AH and gout. In addition, family medicine residents are well placed to tackle AH and gout by encouraging healthy dietary regimes and prescribing proper medications. Well educated family medicine residents can contribute to the reduction of severity of AH and gouty symptoms, hence improving the patient's quality of life and well-being.

It is important to highlight that in Saudi Arabia, family medicine residents encounter multiple cases of AH and gout. Thus, it would be of significance to assess their knowledge, attitude, and practice regarding AH and gout. Thus, the findings of this study are expected to pave the way for further improvements regarding handling cases of AH and gout, as well as enrich the evidence-based data on this topic.

**Methods and Materials:-****Study design:**

- A cross-sectional hospital-based descriptive study.

**Study settings and period: -**

The study was conducted in King Saud Medical City Riyadh - The study was conducted in June 2023.

**Study population: -**

All family medicine residents training in King Saud Medical City Riyadh

**Inclusion criteria: -**

All family medicine residents training in King Saud Medical City Riyadh at R1, R2, and R3.

**Exclusion criteria: -**

Family medicine residents who are unwilling to participate in the study.

**Sampling:****Sampling technique: -**

Consecutive sampling was implemented as all the population was included in this study.

**Sample size: -**

Full coverage of all family medicine residents training in King Saud Medical City Riyadh (n= 119)

**Data Collection Tools:**

Data was collected through self-administrated questionnaire which include 4 parts. There are four sections of the questionnaire: First, sociodemographic characteristics include age, gender, current level (R1-R2-R3), and years of clinical experience. (7 questions) The second section question assessed family medicine residents' knowledge regarding asymptomatic hyperuricemia and gout. (5 questions) The third section was to evaluate the attitude of family medicine residents of asymptomatic hyperuricemia and gout. (7 questions) The last section evaluated the practice of family medicine residents of asymptomatic hyperuricemia and gout. (8 questions)

**Data analysis:**

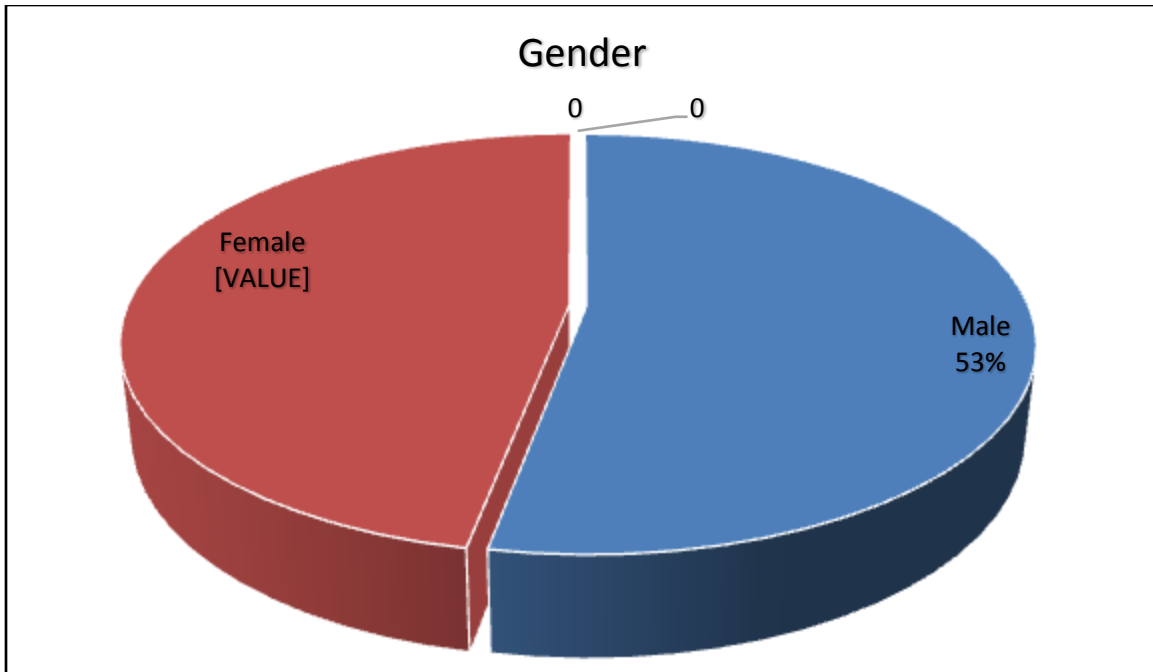
Data was initially entered and cleaned using Microsoft excel, then analyzed using Statistical Package for Social Sciences (SPSS) v.26, descriptive statistics were used and categorical data presented in form of frequencies (n) and percentages (%). Chi-square test was used to assess correlations between variables.

**Results:-**

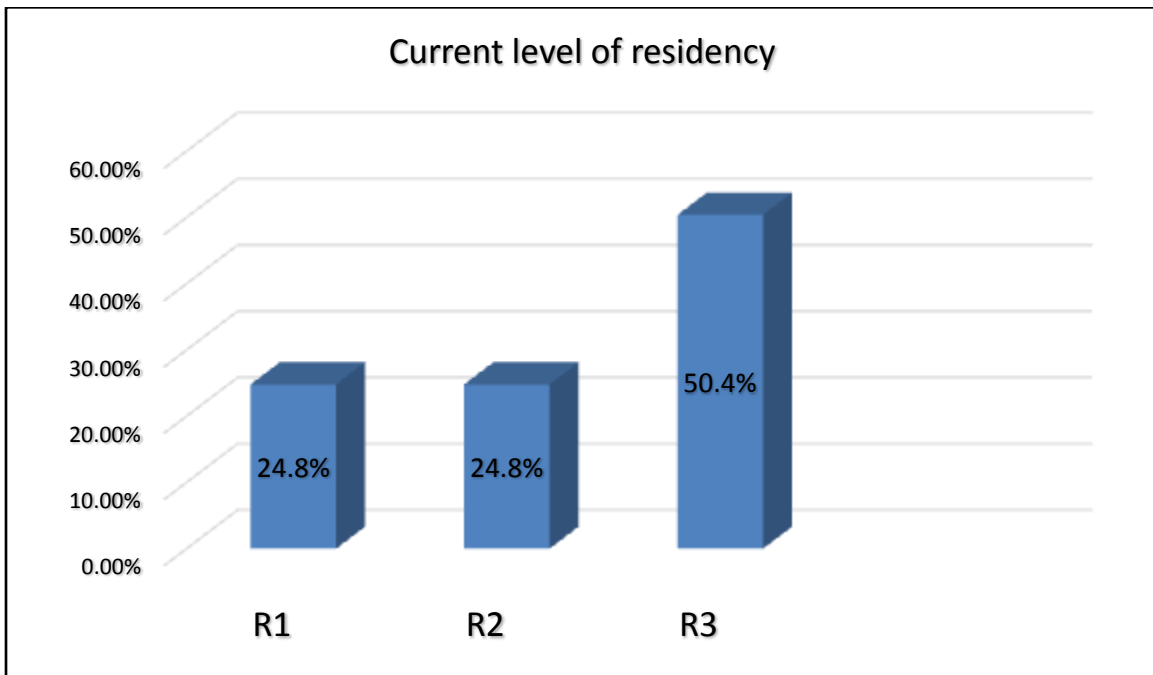
This study included a total of 117 family medicine residents in medical city in Riyadh. The most common age of participants (31.6%) was 28 years, followed by 27 years (28.2%). Regarding gender of respondents, 62(53%) were males, while 55(47%) were females. Majority of them 59(50.4%) were at R3 level of residency. 87(74.7%) have an experience of 1-3 years. About one quarter of participants (26.5%) attended continuing medical education (CME) on asymptomatic hyperuricemia (AH) or gout. (54.7%) red about asymptomatic hyperuricemia (AH) or gout in the last year. (39.3%) aware of guidelines on the management of asymptomatic hyperuricemia (AH) or gout.

**Table (1):-** Age of participants in years, (N= 117).

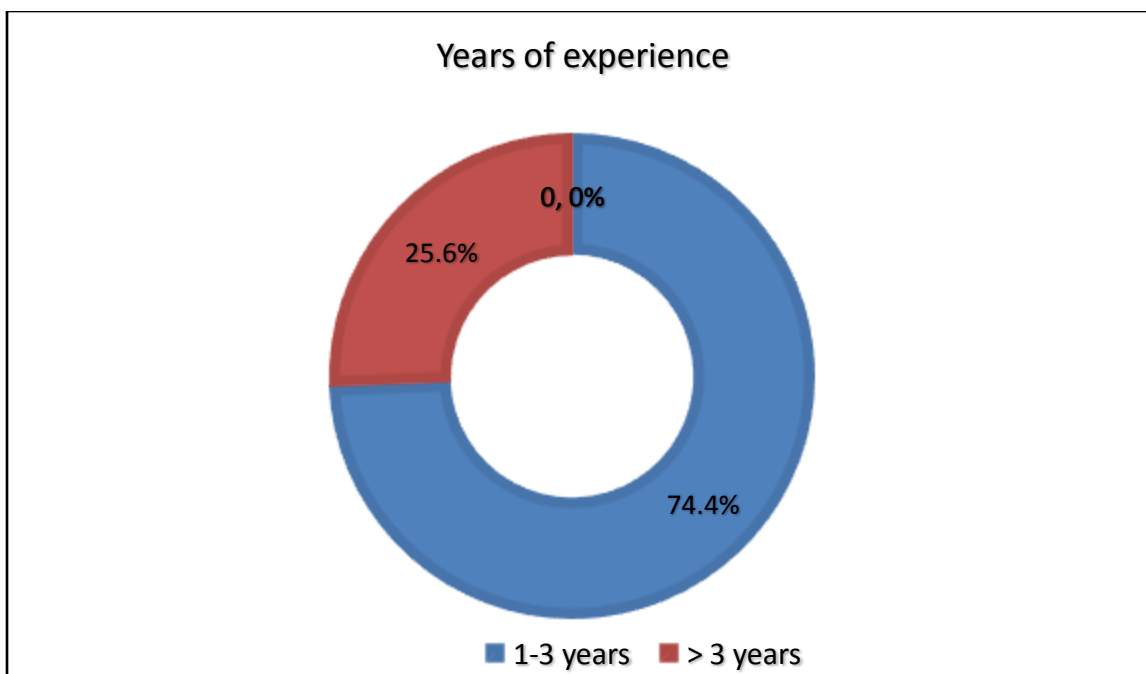
Age in years	Frequency	Percentage
25 years	4	3.4
26 years	14	12.0
27 years	33	28.2
28 years	37	31.6
29 years	19	16.2
30 years	6	5.1
31 years	1	.9
32 years	1	.9



**Figure (1):-** Shows gender of participants, (N= 117).



**Figure (2):-** Shows current level of residency of respondents, (N= 117).



**Figure (3):-** Years of experience of participants, (N= 117).

**Table (2):-** Basic characteristic of participants, (N=117).

Statement	Answer	Frequency	Percentage
1. Attended continuing medical education (CME) on asymptomatic hyperuricemia (AH) or gout	Yes	31	26.5
	No	86	73.5
2. Read about asymptomatic hyperuricemia (AH) or gout in the last year	Yes	64	54.7
	No	53	45.3
3. Aware of guidelines on the management of asymptomatic hyperuricemia (AH) or gout	Yes	46	39.3
	No	71	60.7

(61.5%) agreed that the correct values regarding asymptomatic hyperuricemia (AH) is serum uric acid level > 7 mg/dl in males, and > 6 in females. (60.7%) think that uric acid precipitation causes an inflammatory response. (70.9%) disagreed that asymptomatic hyperuricemia (AH) always progresses to gouty arthritis. (71.9%) disagreed that asymptomatic hyperuricemia (AH) always needs treatment. Regarding pathogenesis of Asymptomatic hyperuricemia, increase production of urate represented (42.7%), decrease in renal excretion of urate (36.8%), and dietary source (19.70) (Table 3).

**Table (3):-** Knowledge regarding asymptomatic hyperuricemia and gout among family medicine residents in medical city in Riyadh, (N= 117).

Statement	Answer	Frequency	Percentage
1. Which of the following values is correct regarding asymptomatic hyperuricemia (AH)?	Serum uric acid level > 7 mg/dl in males, and > 6 in females.	72	61.5
	Serum uric acid is > 6 mg/dl in both males and females.	26	22.2
	Serum uric acid is > 6 mg/dl in males, and > 7 in females.	19	16.2
2. Uric acid precipitation causes an inflammatory response	True	71	60.7
	False	36	30.8

	I don't know	10	8.5
3. Asymptomatic hyperuricemia (AH) always progresses to gouty arthritis	True	17	14.5
	False	83	70.9
	I don't know	17	14.5
4. Asymptomatic hyperuricemia (AH) always needs treatment	True	13	11.1
	False	84	71.8
	I don't know	20	17.1
5. Which of the following is correct regarding the pathogenesis of asymptomatic hyperuricemia (AH)?	Increase production of urate	50	42.7
	Decrease in renal excretion of urate	43	36.8
	Dietary source	23	19.7
	Increase renal excretion of urate	1	.9

Half of family residents in the study (52.1%) were not sure about their satisfaction towards their approach to care of patients with asymptomatic hyperuricemia. (41.9%) not sure about their satisfaction to care of patients with gout. (38.5) agree that they are satisfied with their success in changing life style of patients with AH/gout. (41%) agreed that they are familiar with evidence-based recommendations for the management of AH / Gout. (43.6%) agreed that they apply evidence-based recommendations and guidelines for the management of AH / Gout in everyday practice. (47%) agreed that their approach patients with AH / Gout mostly based on their clinical experience. (17.1%) fully agreed that they believe guidelines for management of patients with AH / Gout would be of great assistance in the everyday practice (Table 4).

**Table (4):-** Attitude towards asymptomatic hyperuricemia and gout among family medicine residents in medical city in Riyadh, (N= 117).

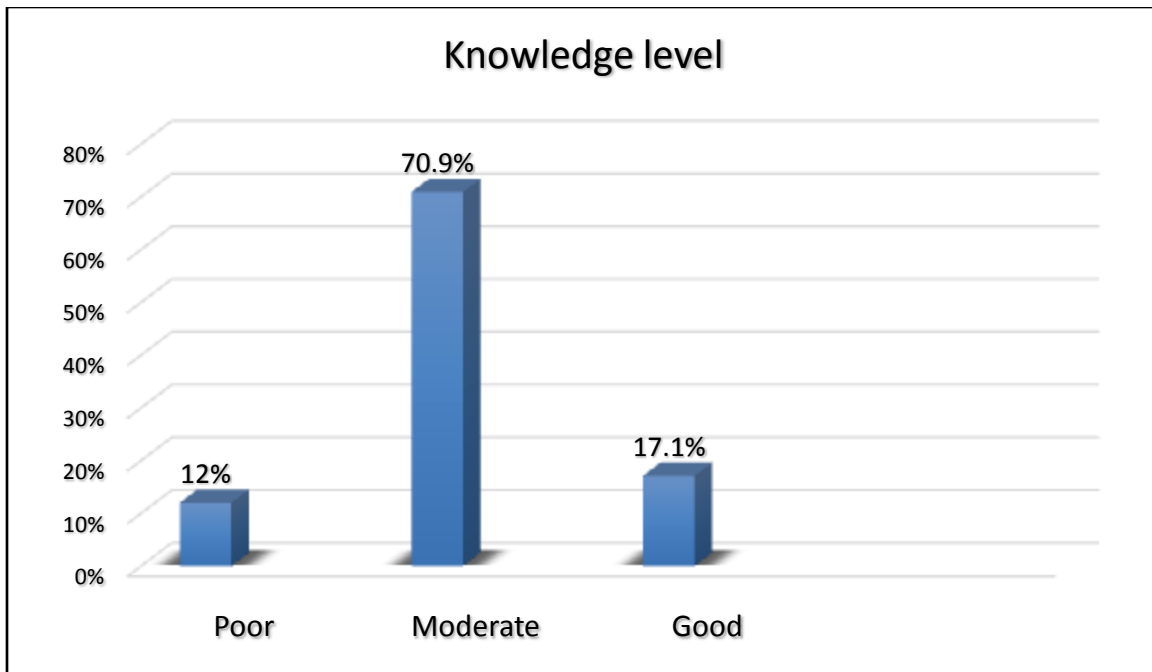
Statement	Fully disagree		Disagree		Unsure		Agree		Fully agree	
	N	%	N	%	N	%	N	%	N	%
1. I am satisfied with my approach to care of patients with asymptomatic hyperuricemia	5	4.3	11	9.4	61	52.1	34	29.1	6	5.1
2. I am satisfied with my approach to care of patients with gout	5	4.3	10	8.5	49	41.9	47	40.2	6	5.1
3. I am satisfied with my success in changing lifestyle of patients with AH / Gout	4	3.4	7	6	53	45.3	45	38.5	8	6.8
4. I am familiar with evidence-based recommendations for the management of AH / Gout	5	4.3	11	9.4	46	39.3	48	41	7	6
5. I apply evidence-based recommendations and guidelines for the management of AH / Gout in everyday practice	3	2.6	11	9.4	44	37.6	51	43.6	8	6.8
6. I approach patients with AH / Gout mostly based on my clinical experience	2	1.7	15	12.8	37	31.6	55	47	8	6.8
7. I believe that guidelines for management of patients with AH / Gout would be of great assistance in my everyday practice	2	1.7	8	6.8	36	30.8	51	43.6	20	17.1

(53.8%) prefer joint aspiration in the acute setting of the first gouty attack. (61.5%) think that NSAIDs are effective during acute management. (62.4%) think that urate lowering therapy (ULT) should be started upon recurrent flares. (46.2%) answered that the target serum uric acid after starting (ULT) is < 6 mg/dl. (38.5%) think that anti-inflammatory prophylaxis can be continued for 3-6 months. (91.5%) think that Allopurinol is recommended over other urate lowering therapies (ULTs). (51.3%) will increase the dose of Allopurinol if serum uric acid cannot be achieved by allopurinol. In case of inability of Allopurinol to achieve serum uric acid (79.5%) will view modification of diet and lifestyle as important and discuss it with patients at the clinic (Table 5).

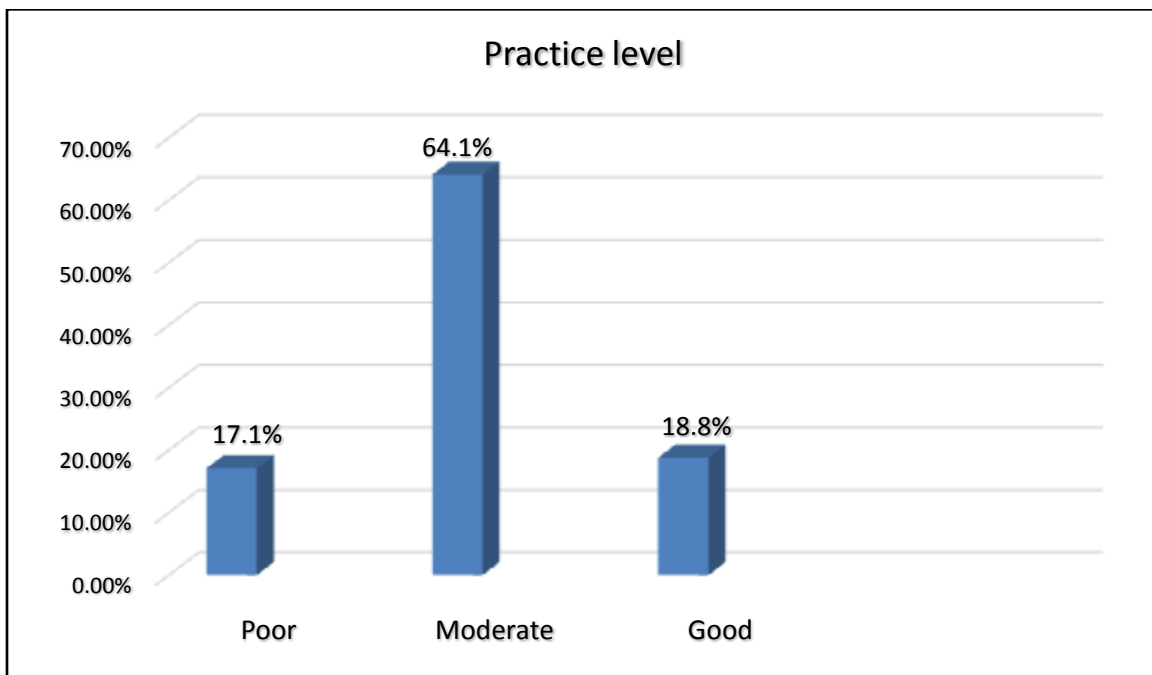
**Table (5):-** Practice towards asymptomatic hyperuricemia and gout among family medicine residents in medical city in Riyadh, (N= 117).

Statement	Answer	N	%
1. Which of the following would you prefer to perform in the acute	Joint aspiration	63	53.8

setting of the first gouty attack?	Serum urate level	24	20.5
	Urate lowering therapy	15	12.8
	None of the above	15	12.8
2. Which of the following are effective during acute management?	Colchicine	39	33.3
	Steroids	6	5.1
	NSAIDs	72	61.5
3. Urate lowering therapy (ULT) should be started upon which of the following?	Recurrent flares	73	62.4
	Asymptomatic hyperuricemia	19	16.2
	Tophi	13	11.1
	Radiographic findings	12	10.3
4. The target serum uric acid after starting (ULT) is?	< 10 mg/dl	34	29.1
	< 8 mg/dl	16	13.7
	< 6 mg/dl	54	46.2
	< 3 mg/dl	13	11.1
5. Anti-inflammatory prophylaxis can be continued for how long?	1 month	35	29.9
	< 2 months	14	12.0
	3-6 month	45	38.5
	No prophylaxis	23	19.7
6. Which one of the following urate-lowering therapies (ULTs) are recommended over others?	Allopurinol	107	91.5
	Febuxostat	3	2.6
	Probenecid	6	5.1
	Benzbromarone	1	.9
7. Which of the following should be done if serum uric acid cannot be achieved by allopurinol?	Increase the dose of allopurinol	60	51.3
	Switch to febuxostat	23	19.7
	Add uricosuric acid	13	11.1
	Wait	21	17.9
8. Which of the following, regarding the modification of diet and lifestyle in case of gout/hyperuricemia, do you practice at your clinic?	I view it as important and I discuss it with patients at the clinic	93	79.5
	I view it as important but I don't have time to discuss it with patients at the clinic	20	17.1
	It is not part of my medical consultation	4	3.4



**Figure (4):-** Overall knowledge level of participants, (N= 117).



**Figure (5):-** Overall practice level of participants, (N= 117).

14(12%) have a poor level of knowledge towards asymptomatic hyperuricemia and gout, 83(70.9%) have moderate knowledge, and 20(17.1%) have good knowledge. 20(17.1%) have poor practice. 75(64.1%) have moderate practice, and 22(18.8%) have good practice.

**Table (6):-** Association between participants' level of knowledge regarding asymptomatic hyperuricemia and gout and their sociodemographic characteristics, (N= 117).

Characteristics	Subgroups	Poor	Moderate	Good	P value
Gender	Male	6	43	13	.4



	Female	8	40	7	
Current level of residency	R1	5	21	3	.3
	R2	2	24	3	
	R3	7	38	14	
Years of experience	1-3 years	9	63	15	.7
	> 3 years	5	20	5	
Attended continuing medical education (CME) on asymptomatic hyperuricemia (AH) or gout	Yes	6	18	7	.2
	No	8	65	13	
Read about asymptomatic hyperuricemia (AH) or gout in the last year	Yes	7	41	16	.04
	No	7	42	4	
Aware of guidelines on the management of asymptomatic hyperuricemia (AH) or gout	Yes	5	26	15	.002
	No	9	57	5	

**Table (7):-** Association between participants' level of practice regarding asymptomatic hyperuricemia and gout and their sociodemographic characteristics, (N= 117).

Characteristics	Subgroups	Poor	Moderate	Good	P value
Gender	Male	7	43	12	.2
	Female	13	32	10	
Current level of residency	R1	3	19	7	.5
	R2	6	20	3	
	R3	11	36	12	
Years of experience	1-3 years	11	59	17	.09
	> 3 years	9	16	5	
Attended continuing medical education (CME) on asymptomatic hyperuricemia (AH) or gout	Yes	8	18	5	.3
	No	12	57	17	
Read about asymptomatic hyperuricemia (AH) or gout in the last year	Yes	6	44	14	.04
	No	14	31	8	
Aware of guidelines on the management of asymptomatic hyperuricemia (AH) or gout	Yes	6	30	10	.6
	No	14	45	12	

Participants' level of knowledge was found to be significantly associated with reading about asymptomatic hyperuricemia (AH) or gout in the last year and being aware with the guidelines on the management of both AH and gout ( $P < .05$ ) (Table 6). On the other hand, level of practice was found to be associated significantly with reading about asymptomatic hyperuricemia (AH) or gout in the last year only ( $P = .04$ ) (Table 7).

### Discussion:-

Hyperuricemia and gout indicate an increased risk of diabetes mellitus or metabolic syndrome and may lead to hypertension and cardiovascular diseases [22,23], therefore these patients need to be approached with optimum and adequate care. Better understanding of the pathophysiology, etiology, related conditions and prognostic risks of hyperuricemia and gout may raise awareness about the importance of identifying and monitoring patients with hyperuricemia in primary care, and hence ensure the deliver and provision of best medical care. The aim of this study is to assess the level of knowledge, attitude and practice towards asymptomatic hyperuricemia and gout among family medicine residents in King Saud Medical city in Riyadh.

117 family medicine residents were enrolled in this study. Half of them 59(50.4%) were at R3 level of residency, and the majority 87(74.7%) have an experience of 1-3 years. It was noticed in a previous study that physicians with more years of experience in AH and gout management had better understanding and higher level of practice [12].

Assessment of knowledge revealed that the majority 83(70.9%) have moderate level of knowledge. In contrast with these findings, a study conducted in 2021, reported that nearly all (86.6%) physicians possessed a good knowledge of

managing AH at the primary health centers in the Bisha Province [13]. This could be attributed to variations in participants awareness of the updated guidelines and their level of attendance or motivation towards attending educational sessions and workshops.

(61.5%) were aware of the correct values regarding asymptomatic hyperuricemia (AH) - serum uric acid level  $> 7$  mg/dl in males, and  $> 6$  in females, and the majority (60.7%) believe that uric acid precipitation ensues an inflammatory response. However, (70.9%) disagreed that asymptomatic hyperuricemia (AH) always progresses to gouty arthritis.

On the other hand, participants showed favorable attitude towards dealing with AH and gout patients. (17.1%) believe that guidelines for management of patients with AH / Gout would be of great assistance in the everyday practice. However, half of family residents in the study were not sure about their satisfaction towards their approach to care of patients with asymptomatic hyperuricemia or gout, which gives an insight to their desire for improving their approach through further learning via attending workshops and conferences, as well as checking for updated guidelines every now and then.

Considering practice assessment, more than half 75(64.1%) of the participants showed a moderate level of practice. This could be attributed to the significant association found between level of practice and level of knowledge towards management of both AH and gout ( $P < .05$ ). It was reported in a previous study that scarce knowledge and awareness about guidelines were the most frequently self-reported barriers to adequate practice in AH and gout management [14].

(53.8%) prefer joint aspiration in the acute setting of the first gouty attack. (61.5%) think that NSAIDs are effective during acute management. However, a study reported that the lack of education leaves many physicians perceiving gout as an inflammatory disease and offering patients painkillers only, when necessary, rather than long-term medication [24]. Additionally, this issue is aggravated by the fact that gout is mostly managed in primary care level and that rates of compliance with urate lowering therapies are 50% or less, worse than most other chronic illnesses [25].

(62.4%) think that urate lowering therapy (ULT) should be started upon recurrent flares. In the management of patients with this condition, physicians should be knowledgeable of medications that may raise urate levels [26]. A healthy diet with a reduced intake of purine rich foods may reduce urate levels. However, it was found that the outcomes are modest and limited, since most patients with hyperuricemia have genetically determined low urate excretion [27].

Correlation testing revealed that participants' level of knowledge was found to be significantly associated with reading about asymptomatic hyperuricemia (AH) or gout in the last year and being aware of the guidelines on the management of both AH and gout ( $P < .05$ ). In this study, about one quarter of participants (26.5%) attended continuing medical education (CME) on asymptomatic hyperuricemia (AH) or gout, while (54.7%) read about asymptomatic hyperuricemia (AH) or gout in the last year, and (39.3%) aware of guidelines on the management of asymptomatic hyperuricemia (AH) or gout. Further education and awareness regarding the causes and risks of AH and gout among family residents in the Bisha Province is needed.

Limited number of Saudi studies were published in this scope; hence this study is considered a valuable base for evidence. Another strength of this study is that it included participants from variable demographical background and socio-economic status, which would aid the authorities in dealing with the issue from all aspects. Furthermore, this study is to pave the way as the base for further studies in this aspect. The study was not without limitations. The fact that it was done within a specific setting may have determined a highly selected group of cases. It may therefore be difficult to generalize the findings to the total community of family medicine residents in the kingdom. In addition, larger numbers of respondents would have improved the statistical significance of the results.

## Conclusion:-

More than half of patients showed moderate level of knowledge and favorable attitude towards AH and gout. Majority of residents showed moderate level of practice towards management of AH and gout. Significant association was found between level of knowledge and attending continuous medical education sessions ( $P < .05$ ). Significant association was also found between level of practice and patients' level of knowledge ( $P < .05$ ).

**Declarations****Ethics approval and consent to participate:**

Ethical approval was obtained from the Institutional Review Board (IRB). The purpose of the study was verbally explained in details before administering questionnaires and only participants voluntarily willing to take part were included. The participants were assured of the confidentiality and anonymity of the information they provide. No financial benefit was offered to participants

**Competing interest:**

The authors declare that they have no competing interests.

**Acknowledgements:-**

N/A

**Consent for publication:**

No personal data were collected from the participants.

**Availability of data and materials:**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. The data are not publicly available due to issues of privacy.

**Funding:**

This study received no funding.

**Authors' contributions:**

1. Idea conception and study design:
2. Questionnaire design:
3. Data collection and entry:
4. Analysis planning, data analysis and interpretation:
5. Manuscript writing and drafting:
6. All authors revised the manuscript and approved it for publication.

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