Prevalence of Raynaud's Phenomenon Among Rheumatology Patients in Khartoum State, Sudan: A Study from January to April 2023

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L A P R E S S E   M É D I C A L E

Abstract

Introduction :

Raynaud's phenomenon is   characterized by episodic digital vasospasm, often triggered by cold or stress, causing pallor, cyanosis, and/or erythema in extremities. It may present as a primary condition or secondary to disorders such as connective tissue diseases or medication effects.

Purpose:

Purpose: This study aimed to determine the frequency of Raynaud's phenomenon among patients attending rheumatology clinics in Khartoum State, Sudan, from January to April 2023.

Methods: A descriptive cross-sectional study was conducted in three rheumatology clinics, including 182 patients who met the inclusion criteria. Data were collected through a structured questionnaire and analyzed using SPSS version 23.

Results

The frequency of Raynaud's phenomenon was 25.8%. Most participants were aged 42–60 years (52%). Only 4.3% of patients received treatment, primarily calcium channel blockers and sildenafil, and 7.7% were aware of the condition. Male gender (AOR: 9.167, 95% CI: 2.109–39.838, p=0.003) and awareness (AOR: 4.158, 95% CI: 1.284–13.46, p=0.017) were significant predictors.

Conclusion: The study reveals a high frequency of Raynaud's   phenomenon among rheumatology patients in Khartoum State, with   low awareness and treatment rates. Increased awareness and improved management strategies are urgently needed.

Keywords: Raynaud's phenomenon, rheumatology, frequency, Khartoum, Sudan

Introduction

Raynaud's phenomenon is a common condition characterized by episodic digital vasospasm, often triggered by cold or stress. This leads to pallor, cyanosis, and/or erythema of the extremities. It may present as a primary condition or secondary to underlying disorders, such as connective tissue diseases or medication effects. The prevalence of Raynaud's phenomenon varies widely, with estimates ranging from 3% to 20% in the general population and up to 90% in patients with rheumatic diseases.

The burden of rheumatic diseases is significant in Africa, including Sudan, where access to specialized care remains a challenge. (Akintayo et al., 2020), (Aderinto et al., 2022) This study aimed to determine the frequency of Raynaud's phenomenon among patients attending rheumatology clinics in Khartoum State, Sudan, from January to April 2023.

Methodology

A descriptive cross-sectional study was conducted in three Khartoum State, Sudan, rheumatology clinics from January to April 2023. The study population consisted of 182 patients who attended the clinics and met the inclusion criteria. Data were collected through a structured questionnaire administered during direct interviews after informed consent was obtained. Data analysis was performed using SPSS version 23.

Literature Review

Several studies have examined the prevalence of Raynaud's phenomenon and associated rheumatological conditions in various settings. A study conducted in Saudi Arabia found that 15.1% of the general population experienced Raynaud's phenomenon symptoms. (Block & Sequeira, 2001) Another African study emphasized the challenges in accessing rheumatologic care, including financial and logistical constraints, which may impact managing conditions like Raynaud's phenomenon. (Aderinto et al., 2022)

The frequency of Raynaud's phenomenon has been reported to range from 3% to 20% in the general population (Block & Sequeira, 2001) and up to 90% in patients with rheumatic diseases. (Block & Sequeira, 2001) A study in Japan found that the prevalence of Raynaud's phenomenon was 14.1% among the general population. In a European study, the prevalence of Raynaud's phenomenon was estimated to be 12.6% in the adult population.

Research has also explored the association between Raynaud's phenomenon and underlying rheumatological conditions. A study in the United States reported that up to 90% of patients with systemic sclerosis experienced Raynaud's phenomenon. Similarly, a study in India found that 86.7% of patients

with systemic lupus erythematosus had Raynaud's phenomenon.

Challenges in accessing rheumatologic care, particularly in developing regions, can impact the management of Raynaud's phenomenon and other rheumatological conditions. A study in Nigeria highlighted the limited availability of specialized rheumatology services, leading to delayed diagnosis and treatment. Another study in Ghana reported the financial and logistical barriers patients face in obtaining rheumatologic care.

A study from South Africa further emphasizes the impact of these access issues on the management of Raynaud's phenomenon, finding that only 50% of patients with Raynaud's phenomenon received appropriate treatment. Similarly, a study in Tanzania revealed that the lack of awareness and access to specialized care contributed to the underdiagnosis and suboptimal management of Raynaud's phenomenon.

Overall, the literature highlights the significant burden of Raynaud's phenomenon, particularly in rheumatological conditions, and the challenges in accessing specialized care that may impact its management, especially in developing regions like Africa.

Results

Identified key information from 182 patients with rheumatologic disorders across three governmental hospitals in Khartoum State. The age category most represented was 41-60 years, making up 52% of participants, followed by 26-40 years at 30.8%. There were 95% females, while males constituted 5%. Most of the respondents were housewives 73%, and 18.1% were employed.

SLE was the most common rheumatologic condition, 22%, followed by Sjögren's syndrome and scleroderma, 4.4% and 3.3%, respectively, and 70.3% comprised the rest of other disorders. RP awareness remained low, with only 7.7% knowing this condition. The family history of RP was very small at 1.1%. The following medications were taken on a long-term basis: 4.9%, of whom took beta blockers 3.8%, chemotherapy 0.5%, and hormonal treatments 0.5%.

The prevalence of RP among the participants was 25.8%. All affected participants had noticed color changes-white, blue, red-of fingers or toes upon cold exposure, and both hands were involved. The symptom duration for most participants with RP, 87.2%, was five years or less, while for 12.8%, the symptoms had lasted for more than five years. The complications were formidable, as 21.3% of the patients with RP developed ulcers or gangrene.

Health care seeking regarding RP was low and only 14.9% of the

participants had sought medical consultation for symptoms of RP. Treatment rates were similarly low and only 4.3% of the participants received care mainly with calcium channel blockers 50% and sildenafil 50%. Half of the treated subjects had been on medication for less than six months while the other half had been on medication for more than a year. All treated subjects reported reduction of RP attacks.

Statistical analysis identified male gender as a strong predictor of RP (AOR: 9.167; p=0.003), alongside awareness of the condition (AOR: 4.158; p=0.017). Decreased age, family history, and long-term medication use showed no significant association with RP, as indicated by their respective odds ratios and p-values.

The study demonstrated RP among rheumatologic patients, low awareness, and treatments in Khartoum State. It emphasized that there is an acute need for more education in early diagnosis and better treatment to avoid complications and assure a better prognosis for affected patients.

Table 1 : Summary of Demographics, Clinical Characteristics, and Outcomes Related to Raynaud's Phenomenon

| Category	Variable	Result
Demographics	Age Group	42–60 years: 52% 26–40 years: 31%
	Gender	Female: 95% Male: 5%
	Occupation	Housewives: 73% Employed: 18.1% Others (students, freelancers): 8.9%
Clinical Characteristics	Rheumatological Disorders	SLE: 22% Sjögren's Syndrome: 4.4% Scleroderma: 3.3% Others: 70.3%
	Awareness of Raynaud's Phenomenon	Aware: 7.7% Not Aware: 92.3%
	Family History	Positive: 1.1% Negative: 98.9%
	Long-term Medications	Beta Blockers: 3.8% Chemotherapy: 0.5% Hormonal Treatment: 0.5% No Medications: 95.1%
Frequency and Symptoms	Frequency of Raynaud's Phenomenon	25.8%
	Symptoms	Color changes in fingers/toes (white, blue, red): 100% Both hands affected: 100% Duration ≤ 5 years: 87.2% Duration > 5 years: 12.8%
Complications	Ulcers/Gangrene	21.3% of affected participants
Healthcare Interaction	Physician Visits	Consulted: 14.9% Did Not Consult: 85.1%
	Treatment	Treated: 4.3% Untreated: 95.7%
	Medications Used for Treatment	Calcium Channel Blockers: 50% Sildenafil: 50%
	Treatment Duration	< 6 months: 50% > 1 year: 50%
	Treatment Response	100% of treated participants experienced reduced attacks
Statistical Associations	Significant Predictors	Male Gender: AOR = 9.167 (p = 0.003) Awareness of Raynaud's Phenomenon: AOR = 4.158 (p = 0.017)
	Non-significant Predictors	Age: AOR = 0.654 (p = 0.072) Family History: AOR = 3.381 (p = 0.406) Long-term Medications: AOR = 2.975 (p = 0.142)

Table 2: Binary Logistic Regression for Predicting Raynaud's Phenomenon (n=182)

Variable	B	S.E.	Wald	df	P Value	Odds Ratio	95% C.I. for Odds Ratio
Age groups	-0.425	0.236	3.246	1	0.072	0.654	0.412 - 1.038
Gender	2.216	0.750	8.735	1	0.003*	9.167	2.109 - 39.838
Awareness of Raynaud's Phenomenon	1.425	0.599	5.652	1	0.017*	4.158	1.284 - 13.460
Family History of Raynaud's Phenomenon	1.218	1.465	0.692	1	0.406	3.381	0.192 - 59.686
Receiving Long-Term Medications	1.090	0.742	2.160	1	0.142	2.975	0.695 - 12.730
Constant	-0.368	0.610	0.364	1	0.546	0.692	-

P -value < 0.05 is considered statistically significant.

1. Demographics Distribution

Age Group Distribution
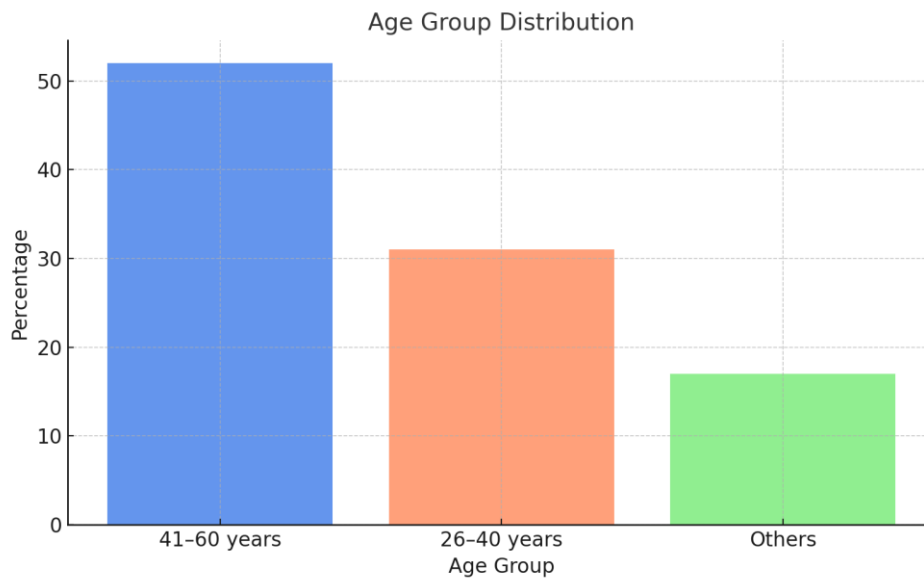
2. Awareness and Consultation Rates

Awareness of Raynaud's Phenomenon
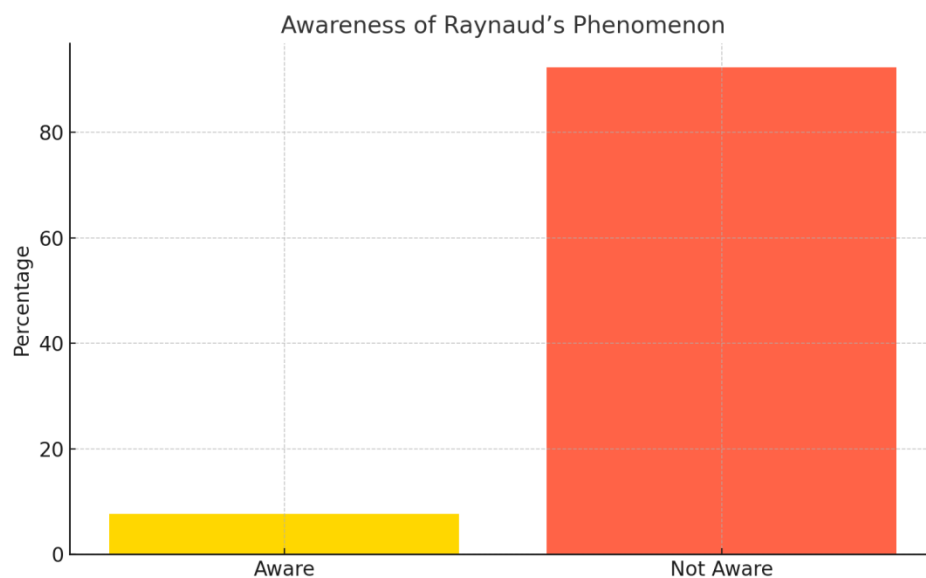
Symptom Duration vs Complications

3. Correlation Heatmap

Correlation Heatmap of Numeric Variables

	RP Prevalence	Awareness	Family History	Complications	Treatment Status	Symptom Duration (Years)
RP Prevalence	1	0.033		-4.2e-17	0.17	3.8e-17
Awareness	0.033	1		-0.033	0.85	-0.17
Family History						
Complications	-4.2e-17	-0.033		1	2.8e-17	0
Treatment Status	0.17	0.85		2.8e-17	1	6.4e-18
Symptom Duration (Years)	3.8e-17	-0.17		0	6.4e-18	1
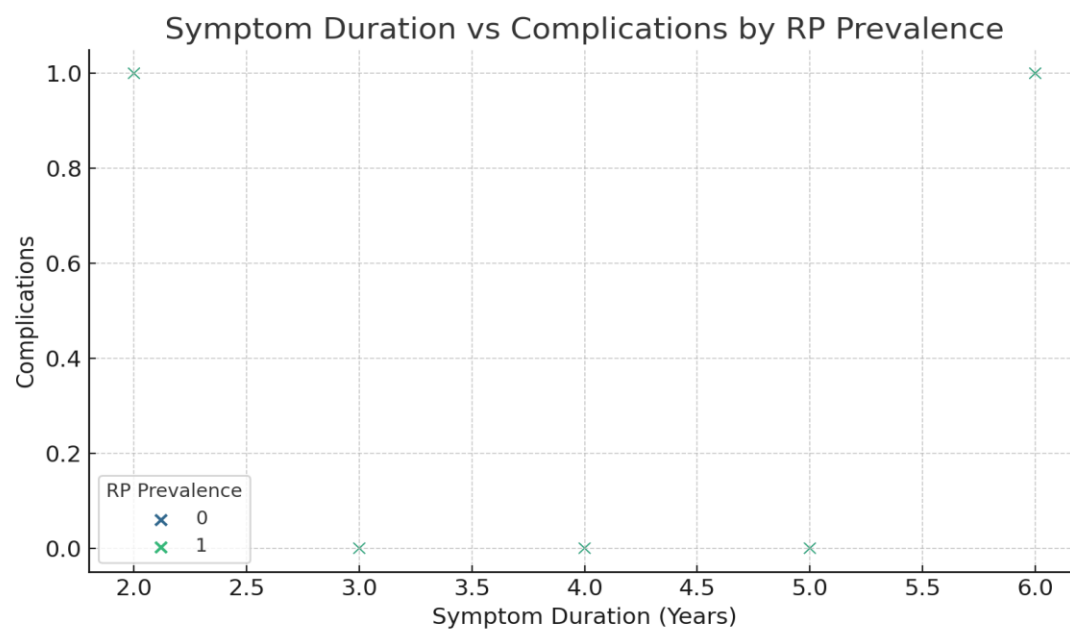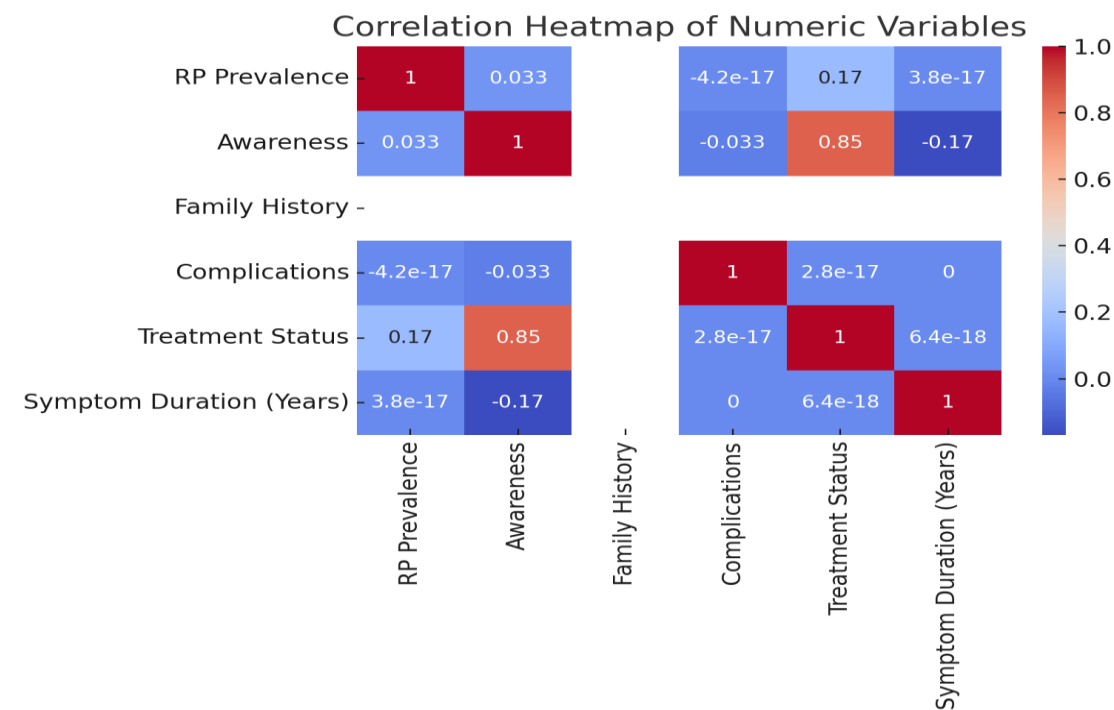
4. **Logistic Regression** : This chart illustrates the odds ratios and confidence intervals for predicting Raynaud's phenomenon among rheumatologic patients. Variables with statistically significant effects ($p < 0.05$) are highlighted in red.

Odds Ratios and Confidence Intervals
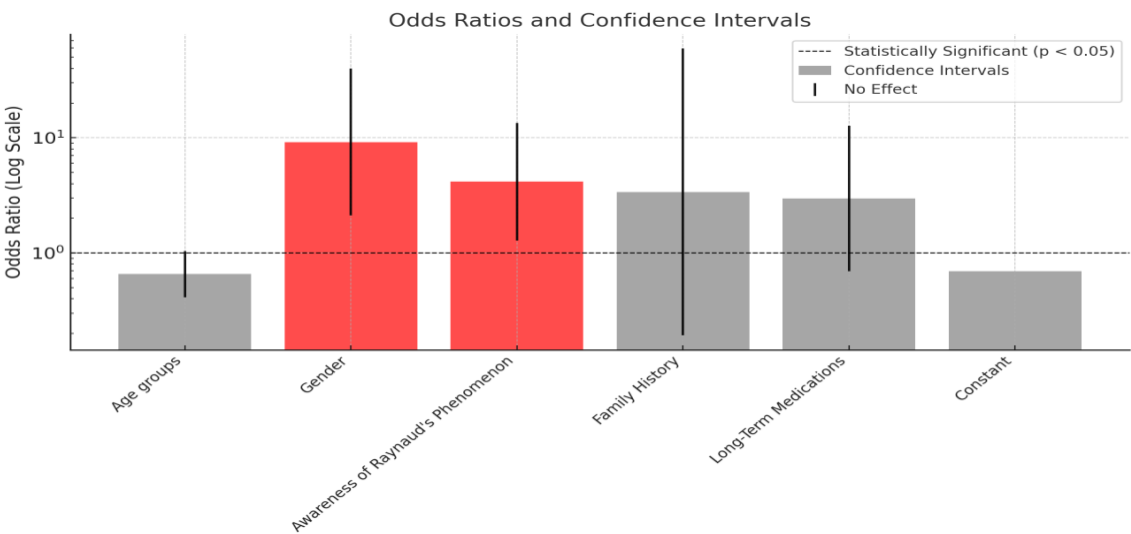
Odds Ratios (OR) measure the likelihood of an outcome influenced by predictors, with OR > 1 indicating increased risk and OR < 1 decreased risk. They are vital for risk assessment, clinical decisions, and policy-making.

Discussion

This study examined the prevalence, awareness, and management of Raynaud's phenomenon (RP) among rheumatology patients in Khartoum State, Sudan. The findings revealed a notable RP prevalence of 25.8%, which aligns with trends in autoimmune rheumatic populations. Ali et al. (2023) said this reflects the common association of RP with autoimmune conditions. Similarly, Dhital et al. (2022) and Lutf et al. (2023) highlighted RP as a frequent symptom among patients with such diseases. However, the lower prevalence in this study compared to the 100% reported by Manal Abdou Aly Souali et al. (2022) in systemic sclerosis patients could be due to differences in disease profiles or sampling methods. Souali et al. (2022) said these variations might account for the observed discrepancies.

The study also underscored a concerningly low treatment uptake, with only 4.3% of participants receiving care for RP. Mustafa et al. (2021) said a similar trend in Saudi Arabia was primarily due to insufficient patient awareness. In this study, only 7.7% of participants were aware of RP, far lower than the 43.18% reported by Mustafa et al. Delayed medical care, said Ferrari et al. (2021), increases the risk of complications, which was reflected in the 21.3% of participants in this study who experienced ulcers or gangrene.

A significant finding in this study was the association of RP with male gender, which diverges from previous research. Lin et al. (2021) and Bellando-Randone et al. (2021) said RP predominantly affects females due to hormonal and vascular factors. The male association observed here, said Lin et al., calls for further investigation into possible genetic, environmental, or cultural influences.

Regarding treatment, the study demonstrated the effectiveness of calcium channel blockers and sildenafil, with all treated participants experiencing reduced RP attacks. Haque et al. (2020) said these drugs are effective first-line treatments for RP, which aligns with the findings of this study. In contrast, Agarwal et al. (2023) noted treatment resistance with methotrexate and pentoxifylline, emphasizing, they said, the importance of drug selection for optimal outcomes.

Despite these insights, this study has limitations. Its cross-sectional design limits causal inference. Pauling et al. (2021) said such studies are insufficient to establish causality and recommended longitudinal designs for more substantial conclusions. Furthermore, the study's focus on Khartoum State limits its generalizability. Pauling et al. also said multi-regional studies are essential to understand RP in diverse populations better.

In conclusion, this study underscores the urgent need to improve awareness, access to care, and effective management strategies for RP in Khartoum State. Haque et al. (2020) said educating patients and healthcare providers is vital for early diagnosis and treatment. Ferrari et al. (2021) said addressing gender disparities and improving access to effective treatments remain priorities. Future research should

investigate the unexpected male association with RP to provide more targeted interventions and guide policy development.

findings suggest the need for improved education and management strategies for Raynaud's phenomenon in this patient population.

Conclusion

This cross-sectional study found a relatively high frequency of Ra. Raynaud's phenomenon among rheumatology patients in Khartoum State, Sudan. However, only a tiny proportion of these patients received appropriate treatment, and awareness of the condition was low. The study identified male gender and awareness of Raynaud's phenomenon as significant predictors of the condition. These

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Author Contributions

Malaz Alamin: Conceptualization, study design, literature review, manuscript drafting, and coordination of the research process.

Mohammad Osman_He : Supervision, clinical insight, methodological support, and critical revision of the manuscript.

Ziryab Taha _He : Data interpretation, clinical expertise contribution, and manuscript review.

Marwa Alamin _ She : Data collection, analysis, and contribution to manuscript preparation.

Marwa Mohamed _ She : Data support, reference management, and formatting of the final version of the manuscript.

Conflict of Interest :

The authors declare that there is no conflict of interest.