

RESEARCH ARTICLE



Prevalence of Malaria among Patients Visiting Public Hospitals in Mogadishu, Somalia-Cross-Sectional Study

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Abstract:

Background: In tropical and subtropical areas, malaria is one of the main causes of death and morbidity. Malaria is a major worldwide health concern, especially in sub-Saharan Africa, which includes Somalia, where the majority of cases and deaths from the disease occur. Malaria has a negative impact on both public health and the economic growth of many developing nations. Examining and quantifying the prevalence of malaria among outpatients who have visited hospitals were the study's goal. Study was conducted between September, and November 2023.

Methods: A structured questionnaire was administered to 278 were collected patients visit two general hospitals at single time with obtained consented, blood samples were diagnosis used by rapid diagnosis test (RDTs), this study was identified the species of plasmodium used standard keys. Thus this study design was cross-sectional and quantitative study. The data source was primary information, and was nonrandom sampling. The data generated was analysis using percentage and present in graph forms. Chi-square was used to determine the degree of association between malaria prevalence and factors influencing its transmission, performed by (SPSS 20 version).

Results: total of 278 was recruited to conduct the study at out-patient department OPD in two hospitals, Mogadishu, Somalia. Out of 278 persons examined for malaria parasites, 12 (4.3%) were positive. Females were more participated than males 185 (66.5%). The respondents were observed 43.5% use it most of the time sleep under mosquito net.

Conclusion: The investigation clearly showed that the persons with malaria infection was minimal. Because the participants aware of the threat posed by mosquitoes in their area, they placed a strong emphasis on vector control measures as reduce the number of mosquito breeding sites. They also understood the significance of indoor residual spray (IRS), which is essential for both mosquito prevention and control.

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1. INTRODUCTION

Malaria is a life-threatening infectious disease caused by Plasmodium parasites that are transmitted to humans through the bites of infected female Anopheles mosquitoes. In many underdeveloped countries, it is also one of the main causes of mortality and morbidity. Malaria is one of the major worldwide health issues. The World Health Organization (WHO) estimates that there were 229 million cases of malaria

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worldwide in 2019. In the same year, malaria was responsible for almost 409,000 deaths as well. It's crucial to remember that malaria mostly strikes people in tropical and subtropical areas, with Africa bearing the brunt of the disease. However, initiatives like bed nets, mosquito control, and better access to diagnosis and treatment are being made in an effort to prevent and manage malaria (Kamau, Alice, 2020). Malaria is a serious problem for public health in Africa. The World Health Organization (WHO) estimates that 94% of malaria infections and fatalities globally occurred in Africa in 2019 (De Oliveira, Alexandre Macedo, 2011). Africa is still suffering malaria infection based on poor access to healthcare, and difficulties in exercising earlier at control and preventive measures in places that more common the mosquitoes. On combat malaria, however, a number of programmers and interventions are being put into place throughout Africa for illumination of malaria infection. These include the provision of antimalarial medications, indoor residual spraying, bed nets sprayed with insecticides, prevention and early treatment for lowering the fatality rates from malaria infection (Brousse, O., 2020). In Somalia, malaria is one of the problem about 51% of the total population (7.6 million) living in areas where the burden of disease is > 1 case per 1000 population. The most common of malaria species in the Somalia is *p falciparum* accounting of 95% of the malaria infection. There are limited national data on the true burden of malaria in Somalia. The World malaria report 2020 estimated that there were around 759,000 cases and 1942 deaths in Somalia in 2019. Somalia has taken steps to malaria eradication, including distributing bed nets treated, insecticide, antimalarial medications and public media awareness that aimed to minimize the national morbidity and mortality of malaria infection (Warsame, 22 May 2021). The objective of this study was examining and determines the magnitude of malaria prevalence among the population arrived at two public hospitals for health purpose. Though there has been mainstay of malaria control efforts in Mogadishu city about the distributions of Insecticide-treated bed nets (ITNs, and indoor residual spraying (IRS).

2. MATERIAL AND METHODS

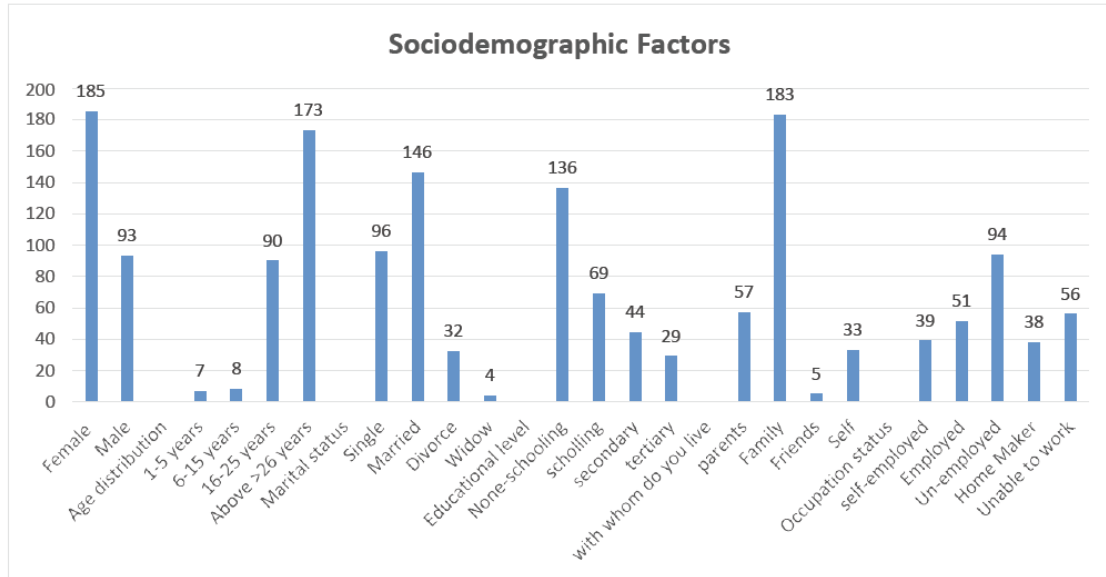
A structured questionnaire was administered to 278 were collected patients visit two general hospitals at single time with obtained consented, blood samples were diagnosis used by rapid diagnosis test (RDTs). The study was identified the species of plasmodium used standard keys. Thus this study design was cross-sectional and quantitative study. The data source was primary data and was nonrandom sampling. The data generated was analysis using percentage and present in graph forms. Chi-square was used to determine the degree of association between malaria prevalence and factors influencing its transmission, performed by (SPSS 20 version). Confidence interval was 95%, and marginal 0.5%. With conducted data collection at the out-patient's department OPD on September 2023 to November 2023. In addition, data collection was done by two general hospitals naming Banaadir and De Martino hospitals. Since persons with sign and symptoms of malaria regarded history crime, economic, disease and also age. Since out of 278 persons examined for malaria parasites, 12 (4.3%) were positive. Females were more participated than males 185 (66.5%). The respondents were observed 43.5% use it most of the time sleep under mosquito net. Furthermore, the result expressed that most of the respondents were no schooling.

3. RESULT

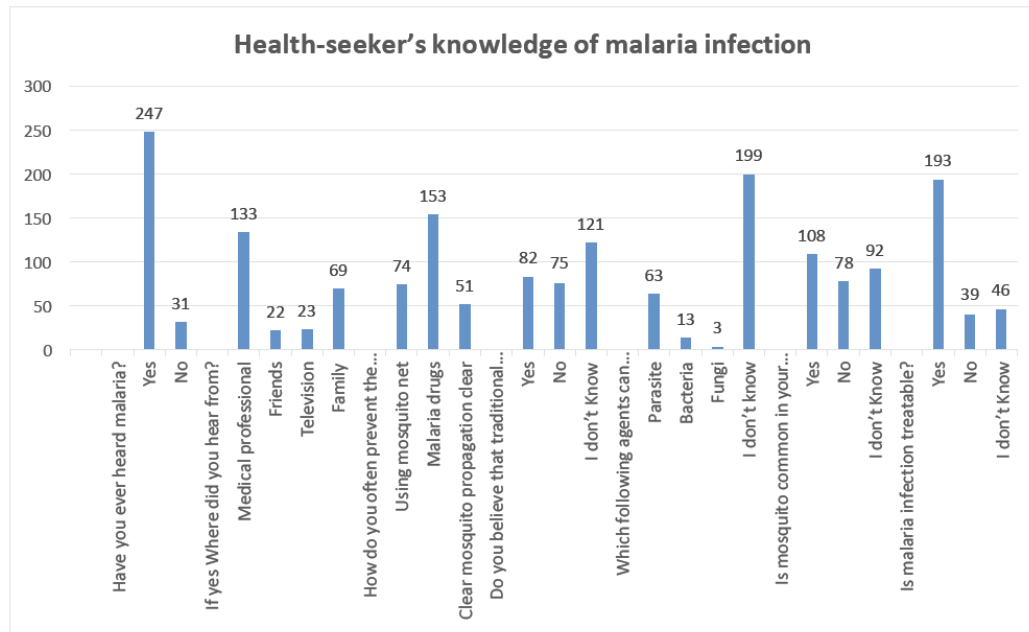
Total of 278 was recruited to conduct the study at out-patient department OPD in two general hospitals, Mogadishu, Somalia. This study was an observation based on factors influenced the malaria prevalence and impact of sociodemographic characteristics of malaria. The outcome of study was avoided information bias regarded on patients' response, of fever for the last 24hrs were only allowed to participate this study while more patients were visited both hospitals.

Researcher collected data at two hospitals for an interview and used RDTs for blood investigation. Researcher was adhering the ethical consideration, patients take them a consent at time of interview and examination. The researcher brought Vaxpert RDTs for blood sample test. This study was non- probability sampling used for the participants who fit the criteria, such as patients with history of fever in the previous 24 hours, pain joints, loss appetite, and bitter mouth (**Graphs 1-3**).

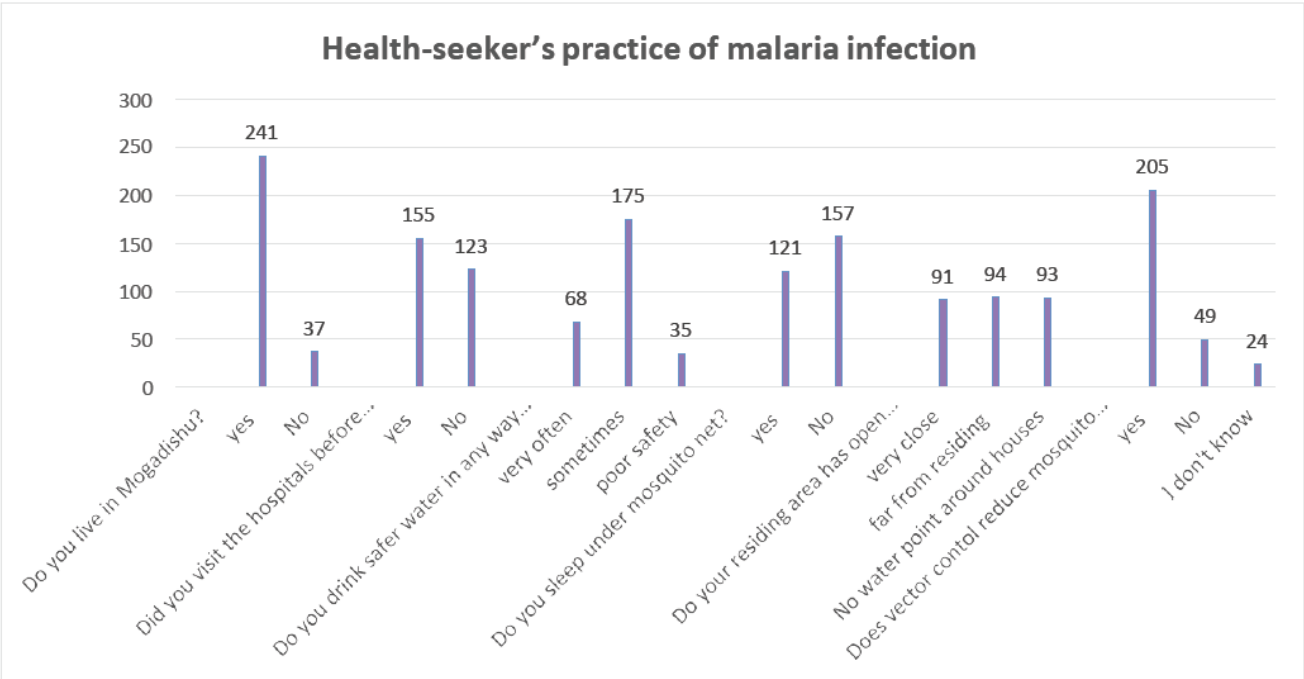
Used on a population proportion of 50% and a signal proportion of the population, the study's total sample size was 278. In addition, the researcher has obtained approval letter from the National Institute of Health Somalia (NIH) and as well as approval letters from two hospitals about data collection.



Graph 1 Presented: The majority of the participants 185 (66.5%) were female. Moreover, the most participants of age group were 173 (62.2%), older than 26 years of age. Furthermore, the marital status of participants was married 146 (52.5%), on top of that the educational attainment of the interviewees, 136 (48.9) had not attended school at all for their lives, in addition the participants whom live with families were 183, (65.8%). Another point is occupation status of the participants was 94 (33.8%) un-employed.



Graph 2 Presented: The most participants in this study 247 (88.8%), was perceiving the malaria, where more participants have gotten messages about the malaria from the medical professional as individuals and collectively 133 (49%), in addition most of the participants 153 (55%) were making at the prevent of mosquitoes, with majorly they used malaria drugs, on top of that more participants didn't believe 121 (43.5%) the traditional medicine treating patients with malaria infection, moreover, majority of the participants didn't aware the primary cause of malaria infection 199 (71.6%), another point is half of participants 108 (48.8%) reported the mosquito is in common at their residence. Despite the participants were recognizes 193 (69.4%) of malaria is treatable.



Graph 3 Presented: The participants of this study was reported 241 (86.7%) live in Mogadishu city, furthermore, the participants 155 (55.8%) were visit the hospitals before, another point is, most of the participants were 175 (62.9%) reported they get sometime safe water which is in-adequate, on top of that more participants reported 157 (56.5%) didn't sleep under mosquito net, due to poor perception, villages are living the participants 94 (33.8%) are far away a water points, and in addition 205 (73.7%) of participants have reported more emphasize to vector control and protect the transmission of mosquitoes in order to reduce, they use all measurement to mitigate the malaria case.

Table 1: Shows the outcome of the study that factors influenced the malaria prevalence was analyst by chi-square used to determine the degree of association between variables. Even though, the result was revealed no significant regarded p value >0.005. So that's why this table indicate that no significant relationship between the dependent and independent variables.

Table 1: Association between sociodemographic characteristics and prevalence of malaria.

VARIABLES	Malaria Positive		Malaria negative		X ² value	DF	P value
	No.	%	No.	%			
Gender							
Male	6	6.5	89	93.5	1.542	1	0.214257
Female	6	3.2	179	96.8			
Age distribution							
1-6 years	0	00	7	2.6	1.215976	3	0.749175
6-15 years	0	00	8	3			
16-25 years	3	25	87	32			
>26 years	9	75	164	61			
Marital status							

(Table 1) Contd....

VARIABLES	Malaria Positive		Malaria negative		X ² value	DF	P value
	No.	%	No.	%			
Single	5	41.7	91	32.2	0.490443	3	0.920986
Married	6	50	140	52.6			
Divorce	1	8.3	31	11.5			
Widow			4	1.4			
Education level							
No schooling	4	33	132	49.6	1.462044	3	0.691
Schooling	4	33	65	24.4			
Secondary	2	16	42	15.7			
Tertiary	2	16	27	10.1			
Occupation status							
Self-employed	3	25	36	59.8	8.196636	4	0.0846
Employed	4	33	47	55.8			
Un-employed	0	00	94	53.4			
Home maker	1	8.3	37				
Unable to work	4	33	52				
With whom do you live							
Parents	4	33.3	53	19.9	1.471561	3	0.688849
Family	7	58.3	176	66.2			
Friends	0	00	5	1.9			
By my self	1	8.3	32	12			

Table 2: Revealed on the outcome of patients' knowledge was associated with malaria prevalence in certain factors didn't have an impact at p value above 0.05. Another point is the outcome of the study was shown the treatment of traditional medicine has strongly associated with prevalence of malaria infection and has effectively treated patients with malaria infection regarded $P < 0.005$.

Table 2: Association between health-seeking knowledge and prevalence of malaria.

VARIABLES	Malaria positive		Malaria negative		X ² value	DF	P value
	No.	%	No.	%			
Have you ever heard malaria?							
Yes	11	91.6	236	88.7	0.1005	1	0.751227
No	1	8.3	30	11.3			
Did you visit the hospitals before today?							
Yes	5	41.6	150	56.3	1.009	1	0.315115
No	7	58.3	116	43.6			
How do you often prevent the mosquito bite?							

(Table 2) Contd....

VARIABLES	Malaria positive		Malaria negative		X ² value	DF	P value
	No.	%	No.	%			
Using net	2	16.6	72	27.0	2.0601	2	0.356983
Malaria drugs	9	75.0	144	54.1			
Cleaning place	1	8.3	50	18.7			
Do you believe that traditional medicine cured malaria infection?							
Yes	6	50.	76	28.571	6.3588	2	0.041609
No	5	41.6	70	26.315			
I don't know	1	8.3	120	45.112			
Which following agents can cause malaria infection?							
Parasite	4	33.3	59	22.1	1.431809	3	0.698096
Bacteria	1	8.3	12	4.5			
Fungi	0	00	3	1.1			
I don't know	7	58.3	192	72.2			
Is your village common a mosquito?							
Yes	4	33.3	104	39.1	0.22284	2	0.894563
No	4	33.3	74	27.8			
I don't know	4	33.3	88	33.1			
Do you live in Mogadishu?							
Yes	10	83.3	231	86.8	0.122518	1	0.726320
No	2	16.6	35	13.2			

Table 3: Shows all factors influencing the malaria prevalence was analysed quietly as to identify the degree of association between predictable factors and explanatory factor along the p value 0.005. On top of that patients who have taken malaria treatment was statistically significant $p < 0.005$. Despite of that the most generated outcome has expressed the statistically not significant, because H_0 is supported accordingly. However, the results were figured out the malaria infection was less association with factors influencing malaria prevalence. Furthermore data was drawn there was weak correlations between factors.

Table 3: Association between health-seeking practices and prevalence of malaria.

VARIABLES	Malaria Positive		Malaria negative		X ² value	DF	P value
	No.	%	No.	%			
Is malaria treatable?							
Yes	12	6.2	181	93.8	5.523394	2	0.063184
No	00	100	39	100			
I don't know	00	100	46	100			
Did you ever take malaria treatment?							
Yes	11	6.4	161	93.6	4.719765	1	0.029818
No	1	0.9	105	99.1			

(Table 3) Contd....

VARIABLES	Malaria Positive		Malaria negative		X ² value	DF	P value
	No.	%	No.	%			
Do you drink safer water in any way to make treatment?							
Very often	3	4.4	65	95.6	0.209506	2	0.900547
Sometimes	7	4	168	96			
Poor safety	2	5.7	33	94.3			
Did you often sleep under mosquito net?							
Yes	6	5	115	95	0.213897	1	0.643730
No	6	3.8	151	96.2			
Does your village close with wet area, and stagnant water?							
Very close	4	4.39	87	95.6	0.002284	2	0.998859
Far from villages	4	4.25	90	95.7			
No water surrounding	4	4.30	89	95.6			
Does vector control reduce mosquito transmission?							
Yes	7	3.4	189	96.6	2.160564	2	0.339500
No	4	8.2	45	91.8			
I don't know	1	4.1	23	95.9			

4. DISCUSSION

This study indicates the magnitude of malaria in Mogadishu city and expressed the low incidence of malaria among the health seekers attending at Banaadir and Martine hospitals, each hospital the participants arrived have done blood test used RDTs, seeking for malaria cases, therefore the hospitals are also located at different districts, these two hospitals are public hospitals providing all medical services in need. The present study was analysed the following variables such as sociodemographic characteristic, health-seeker knowledge, and health-seeker practices based on the malaria infection and mosquito control. Thus, this study found 12 (4.3%) of malaria infections cases among the health-seekers after being diagnosed with malaria parasites, however the diagnostic was done seems mostly negative. In addition, the positive patients were 12 patients aged 15 and 26 years old above, once as a gender both male and female have consisted. Moreover, the positive patients with malaria are mostly living in Mogadishu city according to the outcome. Also this outcome of positive malaria indicates the low incidence in Mogadishu city, regarding the number with malaria patients have obtained the study, which the largely of participants are strongly exercise the family hygiene and vector control measurement. Compare support study in low estimate for malaria prevalence obtained in this study is in agreement with another study carried out at a similar altitude in Ethiopia (Woyessa, 2012). Similar support study among 706 patients with complete information, 111 (15.7%) cases were identified: 105 were positive for *Plasmodium falciparum* only (De Oliveira, 2011). The present result conforms with the recorded higher prevalence of *Plasmodium* infection in males than in females in the hospital. However, studies have shown that females have better immunity to parasitic diseases and this was attributed to genetic and hormonal factors (Science, 2015). Compared to support the average of age in our study was 27.28 years as compared to the range of 10-60 years in their study. The prevalence of malaria in febrile patients was 20% in our study as compared to 34.85% in that study (Khan, 2006). On top of that this study didn't express any statistically significant correlation with the prevalence of malaria infection has observed the inferential statistics, hence a couple of variables have indicated the association with malaria cases. So regarded the MoH of Somalia has been providing efforts to intervene and control the malaria infection in the society and has also effective cooperation with

governmental bodies, non-governmental organizations, and foreign entities, it is a vital to maintaining malaria control initiatives and mitigating the malaria prevalence in Mogadishu and throughout Somalia. Similarly, numerous actions carried out by international organizations and local health authorities in Mogadishu have had an impact. like provision of bed nets treated with insecticide, indoor residual spraying, and the availability of potent antimalarial drugs are some of these initiatives. Moreover, public education awareness and community involvement are essential for spreading knowledge and practices about malaria prevention measures, including using bed nets and getting medical attention as soon as possible for suspected cases.

CONCLUSION

The results of this investigation clearly showed that the participants' incidence of malaria infection was minimal. Because the participants were aware of the threat posed by mosquitoes in their area, they placed a strong exercise on vector control measures that reduce the number of mosquito breeding sites. They also understood the significance of indoor residual spray (IRS), which is essential for both mosquito prevention and control. The findings highlight the importance of ongoing surveillance, early detection, and prompt treatment strategies to reduce the impact of malaria on public health. Additionally, efforts should be intensified to enhance public awareness and education on preventive measures, such as the use of bed nets, mosquito repellents, and environmental management to minimize mosquito breeding sites. Furthermore, collaborations between healthcare providers, governmental agencies, and non-governmental organizations are essential to implementing and sustaining effective malaria control programs. Strengthening the healthcare infrastructure, ensuring the availability of diagnostic tools and appropriate antimalarial medications, and investing in research for new preventive and treatment methods are crucial steps in mitigating the prevalence of malaria. In conclusion, addressing the prevalence of malaria requires a multi-faceted and coordinated approach involving healthcare professionals, policymakers, and the community at large. By implementing comprehensive strategies, which can make substantial progress in reducing the impact of malaria on the health and well-being of individuals attending public hospitals. None of them was not indicated specific area with high burden of malaria morbidity.

RECOMMENDATION

Enhanced Surveillance Systems

Strengthen malaria surveillance systems to continually monitor and report cases accurately and implement real time or near real time reporting mechanisms to facilitate prompt responses to outbreaks.

Public Awareness and Education

Launch targeted public awareness campaigns to educate communities about malaria prevention, symptoms and the importance of seeking timely medical care and emphasize the use of bed nets, appropriate clothing and other preventive measures.

Vector Control Measures

Intensify efforts in vector control, such as indoor residual spraying and larval source management and ensure the availability and accessibility of insecticide treated bed nets especially in high risk areas.

Improved Diagnostic Facilities

Upgrade diagnostic facilities in public hospitals to ensure accurate and timely diagnosis of malaria cases and provide training for healthcare professionals on the latest diagnostic techniques.

Capacity Building

Invest in training healthcare professionals to enhance their capacity for early detection and effective management of malaria cases and provide ongoing education on updated treatment guidelines and emerging trends in malaria.

Community Engagement

Foster community engagement in malaria control programs, encouraging communities to actively participate in preventive measures and reporting suspected cases.

AUTHORS' CONTRIBUTIONS

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

CONSENT FOR PUBLICATION

Participants in this study provided informed consent, acknowledging that their anonymized data could be used for research purposes, including publication in academic journals or presentations at scientific conferences. No personal identifying information will be published, ensuring confidentiality throughout the process.

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DATA AVAILABILITY STATEMENT

Data are available upon request.

CONFLICT OF INTEREST

The author confirms that this article's content has no conflict of interest.

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