Health status of newly arrived refugees in Toronto, Ont

Part 1: infectious diseases

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Abstract

Objective To determine the prevalence of selected infectious diseases among newly arrived refugee patients and whether there is variation by key demographic factors.

Design Retrospective chart review.

Setting Primary care clinic for refugee patients in Toronto, Ont.

Participants A total of 1063 refugee patients rostered at the clinic from December 2011 to June 2014.

Main outcome measures Demographic information (age, sex, and region of birth); prevalence of HIV, hepatitis B, hepatitis C, *Strongyloides, Schistosoma,* intestinal parasites, gonorrhea, chlamydia, and syphilis infections; and varicella immune status.

Results The median age of patients was 29 years and 56% were female. Refugees were born in 87 different countries. Approximately 33% of patients were from Africa, 28% were from Europe, 14% were from the Eastern Mediterranean Region, 14% were from Asia, and 8% were from the Americas (excluding 4% born in Canada or the United States). The overall rate of HIV infection was 2%. The prevalence of hepatitis B infection was 4%, with a higher rate among refugees from Asia (12%, $P<.001$). Hepatitis B immunity was 39%, with higher rates among Asian refugees (64%, $P<.001$) and children younger than 5 years (68%, $P<.001$). The rate of hepatitis C infection was less than 1%. *Strongyloides* infection was found in 3% of tested patients, with higher rates among refugees from Africa (6%, $P=.003$). *Schistosoma* infection was identified in 15% of patients from Africa. Intestinal parasites were identified in 16% of patients who submitted stool samples. Approximately 8% of patients were varicella nonimmune, with higher rates in patients from the Americas (21%, $P<.001$).

Conclusion This study highlights the importance of screening for infectious diseases among refugee patients to provide timely preventive and curative care. Our data also point to possible policy and clinical implications, such as targeted screening approaches and improved access to vaccinations and therapeutics.

EDITOR'S KEY POINTS

- There are limited published data on the health of refugees and refugee claimants in Canada. This study reviews the prevalence of infectious diseases in newly arrived refugees and claimants at a refugee clinic in Toronto, Ont, with subanalysis by key demographic factors. A companion article in this journal's issue explores the prevalence of chronic diseases.
- The prevalence of various infectious diseases, such as HIV and hepatitis B, was considerably higher than in the Canadian-born population, and there was statistically significant variation in rates of infection by region of origin. There was also a considerable burden of parasitic disease, including schistosomiasis and *Strongyloides* infection, in refugees from certain geographic regions.
- The authors recommend targeted screening practices informed by both regional patterns of disease and individual patient circumstances.

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Canada accepts approximately 25 000 refugees from around the world each year.[1] The health characteristics of refugees often differ from those of Canadian-born individuals and nonrefugee immigrants, and studies have shown that refugees tend to experience poorer health outcomes.[2,3] The burden of disease depends on country of origin, exposures, previous living conditions and access to health care, migration pathways, and various other factors.[3] Standardized health screening for refugee claimants before or on arrival in Canada is limited to the Immigrant Health Examination, consisting of a brief history and physical examination, chest x-ray scan (age 11 and older), urine test (age 5 and older), and syphilis and HIV testing (age 15 and older).[4] Thorough and more comprehensive medical care is at the discretion of subsequent health care providers, when or if refugees are able to access care. Providers might be unfamiliar with the acute and chronic health conditions affecting these migrant populations.

There are limited published data on the health of refugees and refugee claimants in Canada. This study reviews the prevalence of health conditions of newly arrived refugees and claimants at a refugee clinic in Toronto, Ont, with subanalysis by key demographic factors. Screening practices and key health indicators were guided by the 2011 *Evidence-based Clinical Guidelines for Immigrants and Refugees* from the Canadian Collaboration for Immigrant and Refugee Health.[3] This first article in our 2-part series details infectious diseases, and our accompanying article (**page e310**) explores chronic conditions,[5] both with a view to enhancing clinical care for refugees.

METHODS

We conducted a retrospective chart review of the electronic medical records of 1063 refugee patients at a specialized primary care clinic for refugees in Toronto. Any patient rostered at the clinic between December 1, 2011, and June 23, 2014, with at least 1 clinic visit and country of birth recorded in the electronic medical record was included in our study. Data were drawn from the earliest available standardized screening test results and demographic information recorded in patient charts as part of routine care. Patients were not subjected to, or deprived of, additional testing or treatment. This study was approved by the Women's College Hospital Research Ethics Board.

We collected the following demographic and social data: age at first visit, sex, country of birth, refugee class, and referring organization or contact. For the investigation of infectious diseases, we collected the following health status findings: HIV serology, hepatitis B serology (hepatitis B surface antigen and surface antibody), hepatitis C antibody, *Strongyloides* serology, *Schistosoma* serology, stool ova and parasites, gonorrhea and chlamydia testing (culture or nucleic acid amplification test), syphilis testing, and varicella immune status (varicella immunoglobulin G antibody).

Patients' birth countries were categorized according to the World Health Organization regional groupings for regional subanalysis.[6] Given the low number of patients from the Western Pacific Region (namely South Korea and China), it was merged with the South-East Asia Region into one category renamed *Asia*. In our data subanalysis we excluded 39 patients born in Canada or the United States, as these were primarily infants born to refugee parents, with demographic and health characteristics differing from refugees born elsewhere. Age categories for analysis were based on clinical relevance for each health indicator and guided by World Health Organization designations.

We conducted subanalyses using SAS, version 9.2, software and subgroup comparisons with the Fisher exact test; *P* values less than .05 were considered significant.

RESULTS

Basic demographic information describing our patient population is outlined in **Table 1**.[6] We saw more female than male patients (56% vs 44%). The median age of patients was 29 years, with an interquartile range of 15 to 39 years; 11% of patients were younger than age 5. Refugees were born in 87 different countries (**Figure 1**). The top source countries were Hungary (210 patients), North Korea (119 patients), and Nigeria (93 patients). Approximately 33% of patients were from Africa, 28% were from Europe, 14% were from the Eastern Mediterranean Region, 14% were from Asia, and 8% were from the Americas (excluding 39 patients [4%] born in Canada or the United States). Most patients arrived as refugee claimants (92%); only 5% were government-assisted refugees. Most refugees were referred to the clinic through refugee shelters (73%). Other referral sources included family or friends (12%), other community agencies (10%), and health care providers (4%).

Rates of HIV and hepatitis infection are shown in **Table 2**.[6] Among tested patients, 2% had positive HIV serology findings; 13 out of 14 cases were female patients of African origin. The overall rate of hepatitis B infection was 4%, with a significantly higher rate among refugees from Asia (12%, $P<.001$). Overall hepatitis B immunity was 39% (**Table 3**).[6] Rates of immunity were highest among refugees from Asia (64%, $P<.001$) and among children younger than 5 years of age (68%, $P<.001$). There were 4 identified cases of hepatitis C infection (prevalence of <1%).

Table 1. Baseline demographic characteristics of clinic patients: *N* = *1063.*

VARIABLE	N (%)
Sex	
• Male	464 (44)
• Female	599 (56)
Age, y	
• 0-4	120 (11)
• 5-14	139 (13)
• 15-24	163 (15)
• 25-34	288 (27)
• 35-44	203 (19)
• 45-54	94 (9)
• 55-64	36 (4)
• ≥ 65	20 (2)
Region of birth based on WHO classification[6]	
• Africa	351 (33)
• Americas*	81 (8)
• Asia†	145 (14)
• Eastern Mediterranean	148 (14)
• Europe	299 (28)
• Canada and the US‡	39 (4)
Refugee class	
• Government-assisted refugee	57 (5)
• Infant or child born in Canada	31 (3)
• Refugee claimant	975 (92)
Referral source	
• Refugee shelter	771 (73)
• Family or friend	132 (12)
• Other community agency	110 (10)
• Other health care provider	38 (4)
• Not available	12 (1)

US—United States, WHO—World Health Organization.
*Excludes patients born in Canada and the US.
†Asia region includes WHO regions[6] of South-East Asia (127 patients) and the Western Pacific (18 patients).
‡Patients born in Canada and the US are excluded from subsequent analyses.

Table 4 shows rates of selected parasitic diseases.[6] Approximately 3% of tested patients had evidence of *Strongyloides* infection, with equal prevalence in children and adults. The highest rate of infection was in the African Region (6%, *P* = .003). Among patients from Africa, 15% had positive test results for antischistosomal serology. Gastrointestinal parasites were identified in 16% of 391 submitted stool samples, with no significant regional variation. *Dientamoeba fragilis* and *Entamoeba histolytica* or *Entamoeba dispar* were the most commonly identified species (**Table 5**). However, only 1 out of 12 cases of *E histolytica* or *E dispar* was confirmed pathologic *E histolytica*.

In terms of sexually transmitted infections (STIs) among women requesting STI testing or undergoing Papanicolaou testing or prenatal screening, 2% of tested female patients (7 of 313) had positive screening results for chlamydia, 1% (5 of 370) had positive screening results for syphilis, and none had positive screening results for gonorrhea. Male patients were not routinely tested for STIs.

Varicella susceptibility (nonimmune status) was 8% overall among those tested, with the highest rates among patients from the Americas (21%, *P* < .001). Rates of susceptibility decreased with advancing age (*P* < .001); no patients older than age 50 were nonimmune (**Table 6**).[6]

DISCUSSION

In our study population of primarily refugee claimants, we found a considerable burden of infectious disease. Health indicators tended to vary statistically significantly by geographic region and to reflect global epidemiologic patterns.

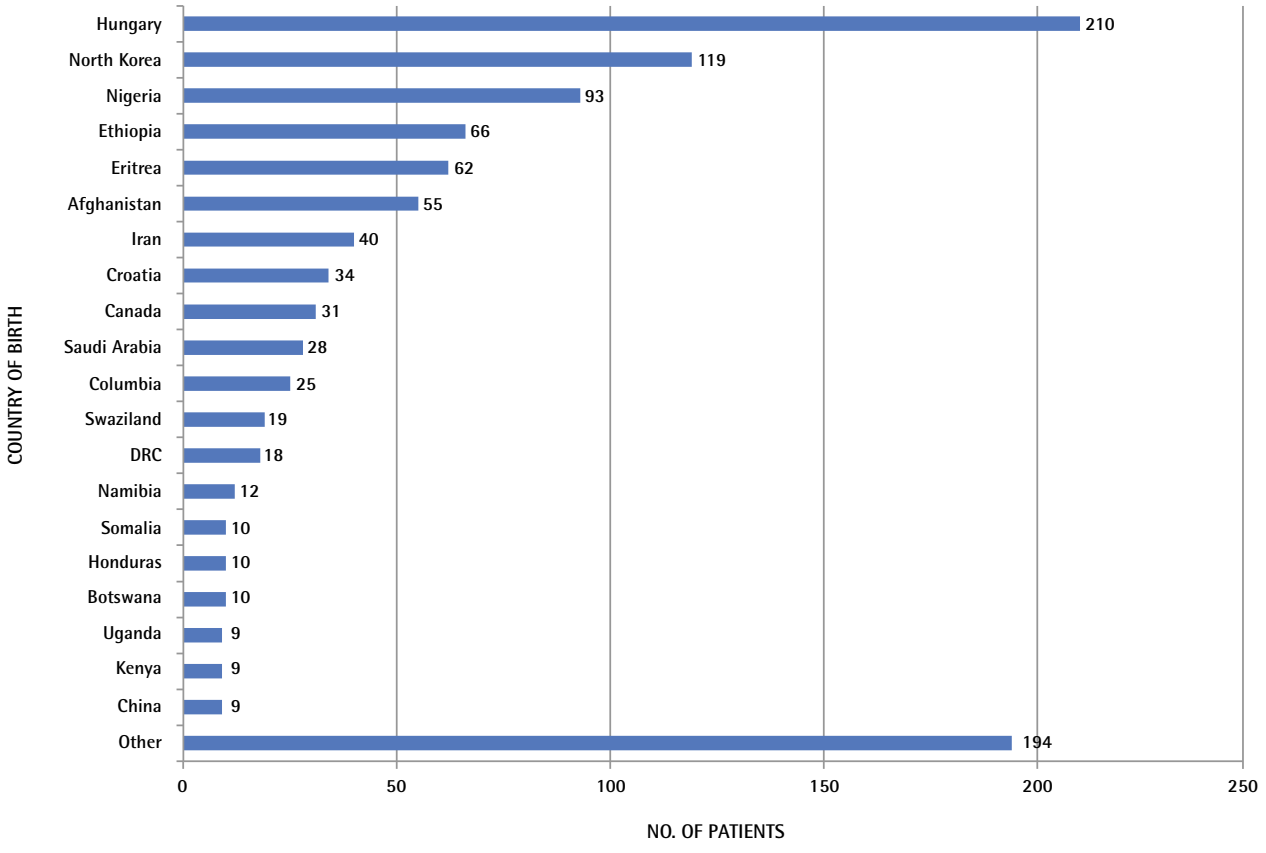
The rate of HIV in our patient population (2%) was substantially higher than the estimated prevalence of HIV in the general Canadian population (0.2%).[7] The regional clustering in patients from Africa (6%) mirrors worldwide trends, with an estimated HIV prevalence of 4.7% in sub-Saharan Africa.[8] The female predominance of HIV in our study might reflect a higher number of women connecting with care for reproductive needs such as prenatal care.

We found an elevated rate of chronic hepatitis B infection (4%), with a significantly higher (*P* < .001) burden of disease among refugees from Asia (12%), where hepatitis B is endemic. Previous studies report a 0.4% hepatitis B infection rate in the general Canadian population,[9] compared with 1.6% to 4% among immigrants to Canada.[3,9,10] A meta-analysis of chronic hepatitis B infection among immigrants to countries with low hepatitis B prevalence found an overall pooled seroprevalence of 9.6% among refugees, with the highest rates among refugees from East Asia and the Pacific (13.2%) and sub-Saharan Africa (10.5%).[11] Higher rates of hepatitis B infection among refugees highlight the importance of hepatitis B screening to ensure timely treatment and to immunize close contacts.

Further, our data underscore the substantial proportion of refugees who remain susceptible to hepatitis B infection owing to their nonimmune status (61%). A recent meta-analysis of hepatitis B immunity among immigrants found a similar susceptibility rate of 60%.[11] Refugees are often limited to crowded living conditions, potentially with hepatitis B carriers, increasing their risk of hepatitis B exposure and transmission.[3] These individuals could greatly benefit from the introduction of a systematic hepatitis B vaccination program for newcomers to Canada, a gap in current preventive care.

The rate of hepatitis C infection (< 1% overall) was lower than expected in our study population, compared with the estimated global hepatitis C prevalence of 2.2%

Figure 1. Patients' country of birth



DRC—Democratic Republic of the Congo.

to 3%, with variable geographic distribution,[12,13] but the rate is similar to previously estimated rates (0.8%) among newcomers to Canada.[14] Research has shown that immigrants experience higher rates of both hepatitis B– and hepatitis C–related morbidity and mortality than the Canadian-born population does.[3] With new effective hepatitis C therapies available, early screening of refugees, at least from highly endemic regions (eg, hepatitis C prevalence ≥3%[3]), with subsequent treatment might be considered to prevent long-term morbidity.

A substantial proportion of patients presented with parasitic infections particular to specific geographic regions. However, *Strongyloides* infection rates in our population (3% overall, 6% in African patients) were lower than rates seen in previous studies of African and Southeast Asian refugees, where *Strongyloides* prevalence ranged from 9% to 77%.[3] *Schistosoma* infection was identified in 15% of study patients from Africa, the region that accounts for most infections globally,[15] with previously published rates ranging from 2% to 73% among African refugees.[3] The variable global and regional distribution of these parasitic infections reflects the heterogeneity of local exposures and risk factors.[15,16] *Strongyloides* and *Schistosoma* infections can persist for years subclinically before progressing to severe health complications. Thus, targeted testing and treatment, guided by geographic prevalence patterns, can prevent these damaging health consequences using a more cost-effective approach than universal screening.

In tropical regions, varicella tends to occur at older ages (older than 10 to 15 years), leaving 15% to 30% of adolescents and adults susceptible to infection.[3,17] Further, the severity of varicella infection worsens with age and can have particularly adverse consequences during pregnancy.[18,19] In our population, 17% of adolescents (14 to 19 years) and 6% of young adults (20 to 39 years) were susceptible to varicella. These lower rates of susceptibility likely reflect the high proportion of refugees from Eastern Europe in our population, with greater childhood exposure to varicella compared with that in tropical regions. A recent study of newcomers to Montreal, Que, revealed a similar rate of adult varicella susceptibility at 6%.[17] Given the health consequences of adulthood varicella infection, these findings reinforce recommendations to screen for

Table 2. Prevalence of HIV, hepatitis B, and hepatitis C infection in clinic patients

	HIV INFECTION (ANTIBODY)			HEPATITIS B INFECTION (SURFACE ANTIGEN)			HEPATITIS C INFECTION (ANTIBODY)		
VARIABLE	NO. OF POSITIVE RESULTS (NO. OF AVAILABLE RESULTS)	PREVALENCE, %	*P* VALUE	NO. OF POSITIVE RESULTS (NO. OF AVAILABLE RESULTS)	PREVALENCE, %	*P* VALUE	NO. OF POSITIVE RESULTS (NO. OF AVAILABLE RESULTS)	PREVALENCE, %	*P* VALUE
Total	14 (657)	2		32 (908)	4		4 (886)	< 1	
Sex			.012			.47			.32
• Male	1 (259)	< 1		16 (389)	4		3 (386)	< 1	
• Female	13 (398)	3		16 (519)	3		1 (500)	< 1	
Age group, y			.70			.10			.54
• 0–14	1 (94)	1		2 (167)	1		1 (158)	< 1	
• ≥ 15	13 (563)	2		30 (741)	4		3 (728)	< 1	
Region[6]			< .001			< .001			.44
• Africa	13 (235)	6		10 (320)	3		1 (311)	< 1	
• Americas*	0 (59)	0		0 (69)	0		0 (65)	0	
• Asia†	0 (89)	0		16 (139)	12		0 (136)	0	
• Eastern Mediterranean	1 (105)	< 1		3 (142)	2		0 (141)	0	
• Europe	0 (169)	0		3 (238)	1		3 (233)	1	

*Excludes patients born in Canada and the United States.
†Asia region includes World Health Organization regions[6] of South-East Asia and the Western Pacific.

varicella antibodies among refugees 13 years of age and older and to vaccinate those who are susceptible, as well as to vaccinate all children younger than 13 years.[3,20]

Limitations

This study includes a diverse sample of refugee patients; however, our data are not generalizable to all refugee populations arriving in Canada. We relied on data from patients who voluntarily sought care at a primary care clinic in downtown Toronto and who completed recommended laboratory tests, introducing several levels of selection bias. Further, our results reflect unique demographic characteristics at a particular time point in refugee migration patterns to Canada and Toronto, whereas immigration dynamics fluctuate frequently. Additionally, most patients included in this study were refugee claimants, who might differ from government-assisted and privately sponsored refugees in terms of pre-migration histories, demographic factors, and health status.

Reliance on retrospective chart review also introduces potential sources of inaccuracies, including clinician error in data entry and missing results. Further, some patients only connected to the clinic many months after immigrating, possibly confounding the picture of their "initial health status" on arrival in Canada.

This study captures only a subset of important indicators of refugee health; we focused on health conditions with objective diagnostic measurements. Future investigation into a wider array of health conditions is crucial to advancing best practice standards for refugees.

Although we found statistically significant geographic variation for most health characteristics, regional designations might obscure important intraregional and intracountry variation. Consideration of a patient's unique pre-migration history and migratory journey is vital to appropriately tailoring clinical care.

Table 3. Prevalence of hepatitis B immunity in clinic patients

	HEPATITIS B IMMUNITY (SURFACE ANTIBODY)		
VARIABLE	NO. OF POSITIVE RESULTS (NO. OF AVAILABLE RESULTS)	PREVALENCE, %	*P* VALUE
Total	351 (903)	39	
Sex			.33
• Male	143 (387)	37	
• Female	208 (516)	40	
Age group, y			< .001
• 0–4	39 (57)	68	
• 5–14	54 (109)	50	
• 15–29	93 (265)	35	
• 30–44	105 (329)	32	
• 45–59	38 (106)	36	
• ≥ 60	22 (37)	59	
Region[6]			< .001
• Africa	130 (316)	41	
• Americas*	27 (69)	39	
• Asia†	89 (139)	64	
• Eastern Mediterranean	49 (143)	34	
• Europe	56 (236)	24	

*Excludes patients born in Canada and the United States.
†Asia region includes World Health Organization regions[6] of South-East Asia and the Western Pacific.

Table 4. Prevalence of selected parasitic infections in clinic patients

	STRONGYLOIDES			SCHISTOSOMIASIS*			STOOL PARASITES		
VARIABLE	NO. OF POSITIVE RESULTS (NO. OF AVAILABLE RESULTS)	PREVALENCE, %	*P* VALUE	NO. OF POSITIVE RESULTS (NO. OF AVAILABLE RESULTS)	PREVALENCE, %	*P* VALUE	NO. OF POSITIVE RESULTS (NO. OF AVAILABLE RESULTS)	PREVALENCE, %	*P* VALUE
Total	23 (792)	3		42 (278)	15		63 (391)	16	
Sex			.67			.12			.07
• Male	11 (337)	3		20 (102)	20		33 (162)	20	
• Female	12 (455)	3		22 (176)	12		30 (229)	13	
Age group, y			.45			.024			.21
• 0-14	4 (131)	3		2 (47)	4		15 (70)	21	
• ≥ 15	19 (661)	3		40 (231)	17		48 (321)	15	
Region[6]			.003			NA			.24
• Africa	18 (293)	6		42 (278)	15		29 (219)	13	
• Americas†	1 (62)	2		NA	NA		5 (32)	16	
• Asia‡	1 (115)	< 1		NA	NA		16 (65)	25	
• Eastern Mediterranean	1 (124)	< 1		NA	NA		11 (57)	19	
• Europe	2 (198)	1		NA	NA		2 (18)	11	

NA—not applicable.
*Testing limited to patients from the African Region only.
†Excludes patients born in Canada and the United States.
‡Asia region includes World Health Organization[6] regions of South-East Asia and the Western Pacific.

Table 5. Parasite species identified in positive stool samples

SPECIES	NO. OF POSITIVE RESULTS
Dientamoeba fragilis	25
D fragilis and *Ascaris lumbricoides*	1
D fragilis and *Blastocystis hominis*	1
D fragilis and *Enterobius vermicularis*	1
Entamoeba dispar	10
Entamoeba histolytica	1
E dispar and *Giardia lamblia*	1
B hominis	5
Trichuris trichiura	5
G lamblia	3
G lamblia and *B hominis*	1
Schistosoma mansoni	2
Strongyloides stercoralis	2
Enterobius vermicularis	1
Hookworm	1
Hymenolepis nana	1
Sarcocystis hominis	1
Taenia	1

Table 6. Prevalence of varicella susceptibility (nonimmune status) in clinic patients

	VARICELLA SUSCEPTIBILITY (LACKING IgG ANTIBODY)		
VARIABLE	NO. SUSCEPTIBLE (NO. AVAILABLE RESULTS)	PREVALENCE, %	*P* VALUE
Total	66 (814)	8	
Sex			.20
• Male	22 (344)	6	
• Female	44 (470)	9	
Age group, y			< .001
• 0-13	26 (86)	30	
• 14-19	9 (64)	14	
• 20-29	12 (204)	6	
• 30-39	14 (236)	6	
• 40-49	5 (135)	4	
• 50-59	0 (56)	0	
• ≥ 60	0 (33)	0	
Region[6]			< .001
• Africa	28 (289)	10	
• Americas*	13 (61)	21	
• Asia†	11 (116)	9	
• Eastern Mediterranean	4 (131)	3	
• Europe	10 (217)	5	

IgG—immunoglobulin G.
*Excludes patients born in Canada and the United States.
†Asia region includes World Health Organization regions[6] of South-East Asia and the Western Pacific.

Conclusion

This retrospective analysis of the health status of newly arrived refugees in Canada sheds light on their unique health needs. The prevalence of various infectious diseases, such as HIV and hepatitis B, was considerably higher than in the Canadian-born population and there was a considerable burden of parasitic disease, including schistosomiasis and *Strongyloides* infection, in refugees from certain geographic regions. We recommend targeted screening practices informed by both regional patterns of disease and individual patient circumstances. Our data also identify potential future policy implications, including a need for improved access to hepatitis B vaccination and to tropical disease diagnostic and therapeutic approaches. Future research directions to improve clinical care for this population include in-depth analysis of the health status and needs of specific demographic groups, expanded exploration of mental health and chronic disease, and investigation of access to care for refugees.

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Contributors

Dr Redditt contributed to the study design, data collection and interpretation, and drafting the manuscript. **Dr Janakiram** contributed to data interpretation and editing the article. **Ms Graziano** contributed to data collection and editing the article. **Dr Rashid** contributed to the study concept and design, data interpretation, and editing the article. All authors approved the final version of the submitted manuscript.

Competing interests

None declared

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