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Estimate and Temporal Trends of Buerger Disease Hospitalizations in the United States

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Estimate and Temporal Trends of Buerger Disease Hospitalizations in the United States

Buerger disease, also known as thromboangiitis obliterans, is a nonatherosclerotic inflammatory segmental vascular disease which commonly involves small- and medium-sized blood vessels.[1] The disease, which was first described in 1879, has a very strong association with tobacco use.[1,2] Nevertheless, the etiology and exact pathophysiology of the disease remain unknown.[3] Because of similarities in clinical presentation with atherosclerotic and other inflammatory vascular diseases, Buerger disease commonly poses a clinical conundrum.[4] The disease has a strong predilection for certain demographics, including young age and male gender as well as certain ethnic groups including Asians and Ashkenazi Jews.[3] The prevalence of Buerger disease varies geographically, with much higher prevalence among middle- and far-Eastern countries .[1] However, contemporary reports regarding the current disease burden, particularly in the United States (US), are lacking. We investigated a large national database to estimate the contemporary national burden of hospitalized patients with Buerger disease.

The data source for this analysis is the National Inpatient Sample (NIS) database. The NIS is part of the Healthcare Cost and Utilization Project, sponsored by the Agency for Healthcare Research and Quality.[5] The NIS is the largest inpatient care database in the US. Since 2012, the NIS represents a sample of 20% discharges from all US hospitals.[5] The NIS provides a weight variable for estimating national statistics. The NIS reports data using the International Classification of Diseases, Tenth Edition (ICD-10) from October 2015 onward.

The NIS database was queried from October 2015 to December 2018 for hospital admissions for patients with Buerger disease. Patients with Buerger disease were identified using 2 search approaches: (1) hospitalized patients with ICD-10 diagnostic code for Buerger disease; and (2) hospitalized patients for lower extremity amputation, excluding those aged >50 years, diabetics, and encounters for trauma or external injury. The main outcome was the national estimate of hospitalized patients with Buerger disease during the study period. The temporal trends in the number of hospitalized patients with Buerger disease were also reported. Temporal trends were analyzed using linear regression analyses. The baseline characteristics for patients with Buerger disease were compared with hospitalized patients with peripheral vascular disease (PVD) during the study period.[6] Associations were considered significant if the $p < 0.05$. All analyses were conducted using SPSS software (IBM SPSS Statistics for Windows, Version 28.0, IBM Corp, Armonk, New York).

During the study period from October 2015 to 2018, there were 106,988,850 inpatient admissions, of which 18,650 with Buerger disease (9,845 with ICD-10 diagnostic code for Buerger disease and 9,040 admissions with lower extremity amputations presumably secondary to Buerger disease). There was no change in temporal trends during the study years (6,400 in 2016 vs 6,145 in 2018, $p_{trend} = 0.43$). Compared with patients with PVD, patients with Buerger disease were younger in age (45.8 ± 16.5 years vs 71.5 ± 12.5 years, $p < 0.001$), less likely women (38.5% vs 44.7%, $p < 0.001$), and less likely Whites (70.4% vs 75.4%, $p < 0.001$). Patients with Buerger disease had lower prevalence of chronic heart failure, chronic kidney disease, chronic lung disease, and hypertension (Table 1).

Previous studies have suggested that the prevalence of Buerger disease in Western countries is ~0.5% to 5.6%, with some reports of decreasing new cases in these countries recently.[1] However, contemporary data are lacking regarding the current disease burden in the US. Our results showed that the national estimate for admissions with Buerger disease was 18,650 admissions between October 2015 to December 2018. Moreover, admissions with Buerger disease represented ~0.3% of all admissions with PVD during the study period, which represents a decrease compared with previous reports.[1] Consistent with previous reports, patients with Buerger disease were younger, women, and less likely White compared with patients with PVD.[1]

The low prevalence of Buerger disease in this analysis could suggest a reduction in the disease burden in the US. Tobacco use plays an importaant role in the pathophysiology of Buerger disease. The proportion of smokers has decreased in the US from 20.9% in 2005 to 14.0% in 2019, which could have contributed to the decrease in the number of Buerger disease hospitalizations.[7] Furthermore, there is a possibility for underestimation of the true prevalence of the condition, given the challenges in diagnosis of Buerger disease. The most accepted diagnostic criteria for Burger disease, Shionoya's criteria, are clinical. This is mainly due to the lack of identifiable biomarkers or imaging criteria that are pathognomonic for Buerger disease.[4] Although histopathologic studies can identify the pathognomonic inflammatory and thrombotic infiltrates affecting both arteries and veins, tissue biopsy is feasible mainly among amputees.[1]

Despite the low prevalence of Buerger disease, it carries significant morbidity and social impact on affected patients.[2] Most patients are not candidates for surgical revascularization, and almost half of affected patients undergo an amputation procedure.[2] Moreover, it carries significant disability and socioeconomic distress to the affected young patient population, with reports that 85% of patients lost their occupation after undergoing major amputation.[2]

In conclusion, the present study confirms the low prevalence of Buerger disease among the spectrum of hospitalized patients with PVD. The present analysis is limited by the administrative nature of the database and the possibility of coding errors.

Disclosures

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Table 1
Baseline characteristics for patients with Buerger disease and PVD

Characteristic	Buerger disease (n=18,650)		PVD (n= 3,523,288)		P-value
Age (mean +/- SD)	45.8 +/- 16.5		71.5 +/- 12.5		<0.001
Women	7175	38.5%	1574994	44.7%	<0.001
White	12605	70.4%	2580589	75.4%	<0.001
African American	3020	16.9%	473140	13.8%	
Hispanic	1395	7.8%	240025	7.0%	
Other	880	5.0%	128760	3.8%	
Median household income					
25th percentile	6940	38.2%	1107245	31.9%	<0.001
26th to 50th percentile	5410	29.8%	954350	27.5%	
51st to 75th percentile	3740	20.6%	807605	23.3%	
76th to 100th percentile	2075	11.4%	600350	17.3%	
Comorbidities					
Chronic heart failure	2335	12.5%	1324030	37.6%	<0.001
Chronic lung disease	335	1.8%	77995	2.2%	<0.001
Chronic kidney disease	2915	15.6%	1293435	36.7%	<0.001
Hypertension	9745	52.3%	2999974	85.1%	<0.001
Obesity	2710	14.5%	494585	14.0%	0.05
Coagulopathy	1995	10.7%	356520	10.1%	0.01

PVD = peripheral vascular disease.

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1. Olin JW. Thromboangiitis obliterans (Buerger's disease). *N Engl J Med* 2000;343:864–869.
2. Ohta T, Ishioashi H, Hosaka M, Sugimoto I. Clinical and social consequences of Buerger disease. *J Vasc Surg* 2004;39:176–180.
3. Fazeli B, Ligi D, Keramat S, Maniscalco R, Sharebiani H, Mannello F. Recent updates and advances in Winiwarter-Buerger disease (thromboangiitis obliterans): biomolecular mechanisms, diagnostics and clinical consequences. *Diagnostics (Basel)* 2021;11:1736.
4. Shinomiya S. Buerger's disease (thromboangiitis obliterans). *Vasc Pathol* 1995:657–678.
5. Introduction to the HCUP National Inpatient Sample (NIS). The National (Nationwide) Inpatient Sample Database Documentation. Agency for Healthcare Research and Quality. Available at: https://www.hcup-us.ahrq.gov/db/nation/nis/NIS_Introduction_2011.jsp. Accessed May. 2015.
6. Cornelius ME, Wang TW, Jamal A, Loretan CG, Neff LJ. Tobacco product use among adults—United States, 2019. *MMWR Morb Mortal Wkly Rep* 2020;69:1736–1742.
7. Elbadawi A, Elgendy IY, Saad M, Elzeneini M, Megaly M, Omer M, Banerjee S, Drachman DE, Aronow HD. Contemporary revascularization strategies and outcomes among patients with diabetes with critical limb ischemia: insights from the national inpatient sample. *JACC: Cardiovascular Interventions*. 2021;14:664−74.

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