Characteristics of patients with hidradenitis suppurativa seen at a tertiary care facility from 2009-2019: a retrospective chart review study

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To the Editor:

Hidradenitis suppurativa (HS) is a debilitating inflammatory chronic skin condition [1]. The etiology remains unclear; however, the pathogenesis has been suggested to include follicular occlusion, dysregulation of inflammatory cytokines, altered microbiota, and improper function of the pilosebaceous unit [2-5]. Patients may experience painful inflamed nodules, abscesses, and sinus tracts with scarring and fibrosis [6]. Given the limited studies on HS to date, there is wide variation in reported prevalence of HS, ranging from 0.00033-4.1% [7]. Importantly, there have also been few clinical trials focusing on treatment outcomes and there is currently only one FDA approved medication for treatment of moderate-to-severe HS [8]. Despite the limited data, we know that patients with this skin disease have an impaired quality of life and comorbidity burden. More research is needed on this orphan, debilitating disease [8].

The purpose of this study is to characterize patients diagnosed with HS at the University of California, Davis, Medical Center to better understand this patient population. Moreover, with reports of increased substance use among HS patients and the ongoing requirement for opioids among patients with chronic pain [9-12], we sought to identify any history of opioid use in this HS patient population. Additionally, prior research has shown a link between inflammatory bowel disease (IBD) and HS [13]. Therefore, we sought to identify any association between IBD and HS in our cohort. There is a great need for additional studies regarding this chronic disease and how to best manage patients to allow for an overall improved quality of life.

The study was approved by the University of California, Davis Institutional Review Board. Patients from the University of California Davis Health System with an ICD 10 (L73.2) diagnosis of HS from October 2009 to October 6, 2019 were selected from electronic medical records (EMR). Individuals of all ages were included in this retrospective chart review study. A total of 805 patients were included in the preliminary data extraction, and each individual chart was accessed. The only inclusion criterion was physician-confirmed diagnosis of HS, and 44 charts were excluded on this basis. A total of 761 charts of patients with HS were included in this study. Variables were collected: patient reported gender, age, patient identified race/ethnicity, body mass index (BMI), and smoking status. Discrete variables were compared to treatment outcomes, opioid use for HS, surgical procedures (incision & drainage, excision), and the prevalence of IBD in this patient population. Chi-square and Fishers exact tests were used for relationships between two categorical variables. For relationships between categorical variables and BMI, t-tests were used when there were two categories and analysis of variance (ANOVA) was used when there were more than two categories.

Between October 2009 and October 2019, there were 761 patients with physician-diagnosed HS in the University of California Davis Health System EMR. This included deceased individuals (N=7). Patient demographics are presented in **Table 1**. The mean

Table 1. *Patient demographics.*

Age	N
0-17	20
18-45	452
46-60	184
61-80	94
81-100	4
Gender	**N**
Female	563
Male	198
Race/Ethnicity	**N (%)**
African American or Black	164 (21.6)
American Indian or Alaska Native	9 (1.2)
Asian	55 (7.2)
Decline to state	33 (4.3)
Mexican American	2
Native American	1
Native Hawaiian or other Pacific Islander	11 (1.4)
Other	98 (12.9)
Unavailable or Unknown	41 (5.4)
White	347 (45.6)
Mixed Race (n from above)	
African American or Black & White	6
Native Hawaiian or other Pacific Islander & African American or Black	1
Asian and African American or Black	1
White and American Indian or Alaska Native	3
Asian and White	6
African American or Black and American Indian or Alaska Native	1
American Indian or Alaska Native and Native Hawaiian or other Pacific Islander	1
Ethnicity	**N**
Hispanic or Latino	103
Not Hispanic or Latino	592

BMI of this HS patient population was 36.6 with 73.5% of patients in the obese BMI category (**Table 2**). About 38% of study patients were either current or former smokers, leaving a majority of patients as never smokers (57.7%), (**Table 3**). Former smokers had a significantly greater BMI compared to patients that had never smoked (38.7 versus 36.0), (P=0.003). Data were collected regarding various surgical procedures that were done and is shown in **Table 4**. We further stratified HS disease associations based on patient age, gender and race/ethnicity.

Table 2. *Body mass index data for study population.*

BMI by Category	N
Underweight *(<18.5)*	4
Normal *(18.5- 24.9)*	49
Overweight *(25.0- 29.9)*	128
Obese *(30.0 and above)*	502
Average BMI by Gender	
Female	37.0
Male	35.8

Age

The age range for this study population was between 11 and 84 years, with a mean age of 41 years. More than half (58.7%) the patients were in the 18-44 age range category. The patients were divided into two age groups (younger than 45 years, 45 years and older). No significant differences were found between the BMI of the two cohorts (P=0.37). Smoking data is shown in **Table 3**. Patients younger than 45 years were found to have significantly higher percentage of never smoked (69.5% versus 46.7%), (P<0.0001). We additionally found significant differences in treatments utilized by patients based on age. Older patients were significantly more likely to take zinc (P=0.04) and younger patients were significantly more likely to use topical and/or oral antibiotics (P=0.03). Patients aged 45 years and older had a higher percentage use of biologics (13.1%

Table 3. *Smoking status in hidradenitis suppurativa patients.*

Status	N
Never smoker	439
Former smoker	158
Current smoker	23
Passive exposure	7
Female	**N**
Never smoker	339
Former smoker	111
Current smoker	92
Male	**N**
Never smoker	100
Former smoker	47
Current smoker	42

Table 4. *Surgical procedures in hidradenitis suppurativa patients.*

Surgical Procedure	N
Incision & Drainage	123
Excision	66
Both (I&D and excision)	16
Resection	1
Surgical drainage	1
Vulvectomy	1
Vulvectomy and I&D	1
Unclear	2
Blank	52
None	498

versus 9.4%, P=0.14) and a slightly higher percentage of surgical procedures (28.4% versus 27.4%, P=0.8), but both these differences were insignificant. Differences in opioid use among the two age groups (12.2% versus 10.9%) was also insignificant (P=0.64).

Gender

Patient-reported gender was collected for HS patients (**Table 1**). In this study population, 74% (563/761) of patients were female and 26% were male (198/761), consistent with previous reports showing a skewed female:male ratio [14]. Female patients had a slightly higher BMI compared to male patients (37.0 versus 35.8); however, the difference was not significant (P=0.147). There was no statistically significant difference between male and female patients with regard to smoking (P=0.063). There was a higher percentage of male smokers/former smokers (47.1%) compared to female smokers/former smokers 37.5% (**Table 3**). Significantly more women with HS used zinc (27.679% versus 18.782, P=0.014), as well as topical and/or oral antibiotics (88.41% versus 82.83%, P=0.0498) compared to men. Although a significant difference was not found, a slightly higher percentage of male patients underwent surgical procedures for their HS compared to female patients (30.6% versus 27%), (P=0.35). A trend towards significance was seen with a higher percentage of male patients utilizing biologics for their HS compared to female patients (14.4% versus 9.4%, respectively), (P=0.059). Although a higher percentage of male patients used opioids for their HS (13.9% versus 10.8%), a significant relationship was not found (P=0.29).

Race and ethnicity

In our study cohort, almost half the patients were White (45.60%) followed by African American or Black patients (21.68%), (**Table 1**). A significant difference was found between the BMI of patients when compared by race/ethnicity (P=0.021). Specifically, Asian patients had a significantly lower BMI compared to the reference group (patient that marked other for their race/ethnicity), (P=0.001). Patients who were never smokers were compared to current or prior smokers. A significantly higher percentage of White patients were smokers compared to all other races (P=0.017). Meanwhile, a significantly lower percentage of Asian patients were smokers (P=0.00006). No significant differences were found between smoking when comparing African American or Black patients to all other races (P=0.14). There was a significant difference between race/ethnicity and the use of zinc (P=0.017). Of the patients reporting races/ethnicities, African American or Black patients had a significantly higher percentage use of zinc compared to all of the other patients (30.67%, P=0.036). A significant relationship was also found between patient race and/or ethnicity and antibiotic use (P=0.040). Specifically, White patients had the lowest percentage use of topical and/or oral antibiotics (82.7%) and African American or Black patients had a significantly higher percentage use (92.1%) compared to the rest of the patient population (P=0.020). No significant differences were found between race and/or ethnicity and use of biologics. African American or Black patients had a significantly higher percentage of surgical procedures (incision and drainage or excision) for their HS (P<0.0001). Accordingly, a significant difference was found between opioid use and race (P<0.0001); a significantly higher portion of African American or Black patients required opioids for their HS (P<0.00001). Given prior reports of HS disproportionately affecting African American or Black patients more severely, it is likely that this phenomenon held true in our patient cohort, accounting for the increased requirement for zinc, antibiotics, surgical intervention, and opioid use in

this population [14,15]. However, this study is limited by lack of clearly recorded Hurley Stage for the vast majority of patients, many of whom were not seen by dermatology. This again highlights the need for greater awareness of this condition and earlier involvement of dermatology in patient care.

Inflammatory bowel disease

One of the goals of this retrospective chart review was to assess whether there was a relationship between HS and IBD. The prevalence of IBD in this cohort was 3.4% (26/761). Specifically, 19 patients had a diagnosis of Crohn disease and 7 had ulcerative colitis diagnosis. An additional 11 patients had an unconfirmed diagnosis of IBD. This data supports prior studies on increased prevalence of IBD among HS patients [13]. In comparison, the overall prevalence of Crohn disease in North America has been reported to be around 0.2%, highlighting the increased incidence in our HS population [16].

Discussion

Hidradenitis suppurativa has been suggested to disproportionately affect women as well as African American or Black patients [14]. With a 3:1 ratio, HS has been found to be more prevalent in women compared to men [14]. This similar outcome was seen in our study population when comparing male and female patients. Few studies have reported higher prevalence of HS in African American or Black patients [14]. Although increased prevalence among African American or Black patients was not seen in our study, the greater use of surgical procedures and need for opioid medications in African American or Black patients may indicate more severe disease. Further study is required in this area.

Tobacco smoking has been reported to be associated with HS [17]. In a recent population-based retrospective analysis in the United States by Garg et al., it was found that the incidence of HS was higher in tobacco smokers compared to nonsmokers [17]. Specifically, a two-fold increase in HS incidence was found. A higher HS incidence was seen in tobacco smokers between the ages of 30-39 years, women, African Americans, and those who had a BMI of 30 or greater. On the contrary, in this UC Davis patient population, almost two-thirds of patients were never smokers. With almost 40% of this study population having current or prior smoking exposure, it is vital to discuss smoking cessation with patients.

Zinc supplementation has been suggested to be an effective adjuvant treatment for HS, although the exact mechanism remains to be elucidated [18]. In general, zinc tends to be well tolerated with few gastrointestinal side effects (nausea, vomiting), [19]. The significant finding with increased zinc use among women could be related to women using supplements more often than men [20]. This was also observed with antibiotic use, although there was a smaller difference between the two genders. As with many HS cohorts, over 80% of this cohort patient population were prescribed antibiotics for their HS. Although antibiotics currently remain a common component of an HS treatment regimen, there is some concern for long term antibiotic use because of associations with antibiotic resistance and effects on the gut microbiome [21].

An association between HS and IBD has been reported [13]. In fact, in a meta-analysis and systematic review, Chen et al. found a significant association between HS and IBD, with HS patients being disproportionately affected by IBD. Although the overall prevalence of Crohn disease in North America has been reported to be around 0.2% (201/100,000), the prevalence in our University of California Davis HS cohort was increased 10-fold at 2.5% [16]. It is imperative to continue to monitor for a relationship between IBD and HS. Patients with an HS diagnosis who report gastrointestinal symptoms (abdominal pain, recurrent diarrhea, bloody stool, and body weight loss) should be referred for additional studies with a gastroenterologist [13].

Study limitations included retrospective study design, and clinical diagnosis that relied on the chart and not confirmed clinically by study investigators. In this study, we did not record which patients were diagnosed by a non-dermatologist physician. Additionally, owing to the various physician specialties that managed our HS patients, Hurley scores were not available for all patients and thus was not recorded.

Conclusion

Overall, this retrospective chart review showed the patient data for physician-diagnosed HS patients seen in the inpatient and outpatient setting at the UC Davis Health System from 2009-2019. Hidradenitis suppurativa patients were characterized by their demographic and treatment data to better understand the patient population at the University of California Davis Health System. A majority of study patients were female and consistent with prior reports had a higher BMI (>30). Significant differences were seen between the various treatments required based on patient-reported race/ethnicity. Importantly, there was a higher prevalence of IBD in this patient population compared to the general population, highlighting the need to inquire about GI symptoms in our HS patients. Although significant differences were not noted between opioid use among age groups or patient reported gender, a significantly higher percentage of African American or Black patients required opioids for their HS, again highlighting potential racial disparities in this disease. With very little NIH funding and very few NIH grants compared to other cutaneous studies, there is a great need for additional studies and funding to better the quality of life and clinical outcomes for all our HS patients.

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Potential conflicts of interest

The authors declare no conflicts of interest.

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