Hidradenitis Suppurativa: Disease Burden and Etiology in Skin of Color

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Keywords

Hidradenitis suppurativa · Disease burden · Skin of color

Abstract

Hidradenitis suppurativa (HS) is a chronic, debilitating skin disease. Although most studies on HS are conducted in largely Caucasian populations, evidence demonstrates a higher prevalence in patients with skin of color, including African and Hispanic populations. These racial subgroups are likely at risk for greater disease burden due to a higher prevalence of components of the metabolic syndrome, comorbid depression, and low socioeconomic status; however, there is a paucity of research in these populations. Additionally, studies examining the genetic and anatomical basis for HS, as well as the response to HS therapies, are lacking for patients with skin of color. Complicating this issue is the limited access to effective medical care, including dermatologists, for African and Hispanic populations as well as other minority groups. In this review, we identify gaps in the knowledge base, highlight the association between HS and patients with skin of color, and provide direction for much needed research into this condition.

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Introduction

Hidradenitis suppurativa (HS), also known as acne inversa, is a chronic, inflammatory skin disease that presents with painful and often malodorous abscesses, nod-

ules, sinus tracts, and scar formation, usually involving apocrine gland-bearing skin in the axillae, inguinal region, and perianal and perineal regions [1]. The pathogenesis of HS is thought to involve follicular hyperkeratosis with subsequent occlusion and dilatation of the hair follicle, leading to rupture, inflammation, abscess formation, and, despite possible disease remission, dermal contractures and disfiguring scars (Fig. 1) [1].

Risk factors for HS include cigarette smoking, obesity, and metabolic syndrome (MetS) [2, 3]. Although the prevalence of HS varies (from 0.00033 to 4.1%), studies have reported an increased prevalence in African and Hispanic populations, as well as in women [4, 5]. The disease burden of HS is largely due to a profound physical and psychological impact, which leads to depression and impaired quality of life (QoL) [6, 7]. Additionally, there are reports of HS being more common in individuals of low socioeconomic status (SES) [8].

The majority of the published studies on HS include largely Caucasian cohorts [9]. This may not represent the true prevalence of HS with respect to different racial subgroups, both internationally and in different regions of the USA [10]. More significantly, evidence demonstrates an increased prevalence of HS in individuals with skin of color (SOC); however, there is insufficient research to adequately assess the severity, comorbidities, genetic basis, and response to treatment in these populations (Table 1). In this review, we identify these knowledge gaps, underline the association between HS and minority populations, and provide directions for future research in this

Fig. 1. **a** Normal skin appendageal structure with normal-sized apocrine gland and no inflammation. **b** Early-stage disease with follicular hyperkeratosis and occlusion, apocrine gland enlargement, follicular dilation and early rupture, and perifollicular inflammation with mixed inflammatory cell infiltrate. **c** Late-stage disease with increased inflammation, formation of abscess and draining sinus tract, scarring, and fibrosis.

area (for further details, see the online supplementary material; see www.karger.com/doi/10.1159/000486741 for all online suppl. material).

Metabolic Syndrome

HS and MetS share several major risk factors, including non-Caucasian race (African Americans [AA] and Hispanics) and female gender [11–13]. AA and Hispanics are also significantly less likely to engage in regular exercise compared to Caucasians [14]. The impact of MetS on HS patients is significant, with the burden of MetS comorbidities reported as greater for HS than for psoriasis [3, 15]. Considering that HS disease severity has been correlated with body mass index, morbid obesity is more common in patients with high versus medium disease burden (37 vs. 22%). Nonobese HS patients report more frequent HS remission than obese patients (45 vs. 23%), and HS onset occurs at younger ages in patients with comorbid MetS. These findings suggest that African and Hispanic patients are at greater risk for MetS, chronic HS,

and severer HS [6, 16]. Studies with larger sample sizes of African and Hispanic populations are needed to further assess this potentially significant relationship (Table 2).

Depression and QoL

HS commonly has profound psychological and physical effects. HS has been associated with significant disability, embarrassment, and social isolation, as well as decreases in intimate relationships and sexual activity [17, 18], all of which lead to impaired QoL, depression, and anxiety [7, 16]. Depression is more prevalent in those with higher disease burden than those with medium disease burden (52 vs. 35%) [6]. HS patients have higher QoL impairment than patients with psoriasis, acne, neoplasms, strokes, and heart transplant candidates [6, 16, 17]. This has serious implications for African and Hispanic populations, who already have broader ranges of psychosocial stressors [19]. A survey that oversampled AA and Hispanics relative to Caucasians found that major depression was most prevalent among Hispanics (11%) followed by

Table 1. Summary of study cohorts in studies of hidradenitis suppurativa

Setting	Objective of study	HS patients in cohort, <i>n</i>	Percentage white	Percentage African American	Percentage Hispanic	Percentage other ethnicity	Year of publication	Reference No.
Israel	Comorbidities	3,207	0	None	None	100 (Israeli)	2015	42
Netherlands	Comorbidities	106	Majority	Not reported	Not reported	Not reported	2016	43
Denmark	Comorbidities	358	>96.5	Not reported	Not reported	Not reported	2014	3
Denmark	Comorbidities	5,964	Majority	Not reported	Not reported	Not reported	2016	44
USA	Comorbidities	15	33.3	60	None	Not reported	2016	45
Denmark	Comorbidities	462	97	Not reported	Not reported	Not reported	2016	46
USA	Treatment	76	Not reported	81.6	Not reported	Not reported	2016	29
USA	Prevalence/incidence	381	33	65	Not reported	2	2015	5
USA	Prevalence/incidence	5,410	56.2	30.1	Not reported	12.4	2017	4
USA	Prevalence/incidence	268	90.3	Not reported	Not reported	9.7	2013	10
USA	Prevalence/incidence	366	25.7	54.4	Not reported	19.9	2014	9
USA	Prevalence/incidence	1,046	66.7	13.9	13.4	6	2014	47
Canada	Demographics	80	75	Not reported	Not reported	Not reported	2016	7
USA	Demographics	236	77.1	22.9	Not reported	Not reported	2014	18
Czech Republic	Clinical trial	8	50	None	None	50	2010	33
International	Clinical trial	154	71.4	18.8	Not reported	Not reported	2012	34
International	Clinical trial	307	76.2	20.2	Not reported	3.6	2016	35
International	Clinical trial	326	83.7	8.9	Not reported	7.4	2016	35
Denmark	Clinical trial	21	Not reported	Not reported	Not reported	Not reported	2011	36

HS, hidradenitis suppurativa; USA, United States of America.

Table 2. Hidradenitis suppurativa in skin of color: recommendations for clinical care and research

Issue	Recommendations
Metabolic syndrome	Studies evaluating the relationship between the metabolic syndrome and skin of color in patients with HS are needed Increase surveillance for metabolic syndrome in patients with HS, and vice versa, especially those with skin of color Encourage lifestyle modifications (e.g., diet, exercise, and smoking cessation) in patients with HS
Depression and quality of life	Studies examining and comparing depression, quality of life, and mental health in the different racial subgroups of patients with HS are needed Increased evaluation of the severity of depression in patients with HS is warranted
Socioeconomic status	Studies examining the relationship between HS, race, and socioeconomic status are needed Increase social support through HS support groups, HS foundations, educational programs, and access to social work in HS patients with low socioeconomic status
Genetics	Genetic studies in HS patients with skin of color are needed
Anatomy	Studies comparing the anatomy and dysfunction of axillary structures between racial subgroups in patients with HS are needed
Analyzing treatment response	Increase enrollment and reporting of patients with skin of color in HS clinical trials such that study cohorts more accurately reflect the demographics of HS
Access to effective care	Increase HS knowledge and awareness among nondermatologists Evaluate barrier to access to dermatologists for patients with skin of color, especially those with low socioeconomic status Initiate early screening for teens and young adults at risk through school and community health programs and health education classes Provide longitudinal HS care plans through multidisciplinary centers involving social workers, dieticians, weight loss counselors, and nursing educators, especially in communities with high prevalence of HS and skin of color

HS, hidradenitis suppurativa.

AA (9%), then Caucasians (8%) [14]. Factors such as functional limitations, lack of health insurance, and lifestyle factors such as smoking and exercise, all of which varied across racial groups, were believed to contribute to the difference in depression rates [14]. Chronicity of major depressive disorder is higher in AA than Caucasians (57 vs. 39%). AA are also more likely to rate their depression as severe/very severe and more disabling [20]. Given these findings, African and Hispanic patients with HS may be at greater risk for depression and severer depression, in part because HS has a larger negative impact on their QoL [21]. However, data for these populations are lacking, and research comparing mental health and QoL of HS patients in different racial subgroups is needed (Table 2).

Socioeconomic Status

HS is reportedly more common in individuals of low SES [8], which is more prevalent in African and Hispanic populations, especially in the USA [14, 19]. Racial differences in SES are also closely associated with racial disparities in health and psychosocial well-being among AA and Hispanics [14, 19]. This may directly contribute to the higher prevalence of HS in patients with SOC. Low SES is closely associated with MetS, with odds of MetS significantly increased in females with less than 5 years of education (OR = 2.28; 95% CI = 1.48–3.51) and unfavorable social class, as described by current occupation (OR = 2.59; 95% CI = 1.32–4.79 for unemployed females) [13, 22]. Altogether, these findings suggest a potential relationship between HS, race, SES, MetS, and psychological comorbidities, though additional investigation is needed in this area (Table 2).

Genetics

Genetics studies have demonstrated an autosomal dominant pattern of familial HS inheritance. HS patients have mutations in genes (*NCSTN*, *PSENEN*, *PSEN1*) that code for subunits of γ -secretase, which normally cleaves Notch receptor, a transmembrane protein involved in epidermal and follicular development and differentiation [23, 24]. Notably, a significant number of these studies were conducted in Chinese populations [25–27]. Although 1 study identified a mutation in *NCSTN* in an African family [28], genetic studies of HS in SOC are lack-

ing, despite a higher prevalence of HS in these populations. This is notable since unique genetic mutations may contribute to the varying HS phenotypes seen in women and racial subgroups. AA (83%) and female (74%) HS patients in Chicago, IL, were more likely to have recalcitrant HS, progressive symptoms, and require surgical interventions [29], suggesting that patients with SOC may be more likely to have forms of HS that are less treatment responsive. Because genetic factors may be largely responsible, studies comparing genetic variations and epigenetic phenomena among various racial subgroups of HS patients are warranted (Table 2).

Anatomy

Skin appendageal anatomy appears to differ between racial subgroups. Patients of African descent are reported to have larger, more numerous, and more productive apocrine glands than Caucasians [30, 31]. This suggests that African populations may have an anatomical predisposition for both HS and severer HS. Of note, these reports were published before 1965; thus, there is paucity of basic science research in SOC in this area [32]. Investigating potential variations in pilosebaceous unit anatomy and dysfunction among racial subgroups is crucial towards a better understanding how HS differs between these populations (Table 2).

Treatment Response in SOC

Adalimumab is currently the only approved systemic medication for HS. While clinical trials have demonstrated the efficacy of adalimumab in reducing disease burden, they did not sufficiently examine the clinical response in patients with SOC (Table 1) [33–36]. One study was conducted solely in Caucasian and Romany individuals, while another consisted of 80–88% Caucasians [33, 35]. A Danish trial did not report race for any participants [36]. Two trials did have cohorts containing 19–20% AA; however, this still contrasts with results from studies reporting that AA make up to 65% of patients with HS in the USA, have a 1-year incidence of HS more than double that of Caucasians, and have the highest 1-year incidence of HS across all age groups [4, 5, 34, 35]. Furthermore, none of the trials reported the percentage of patients that were Hispanic or stratified the responses to adalimumab by race. The majority of the efficacy trials investigating other systemic agents, including etanercept, infliximab,

anakinra, and ustekinumab, either did not report race or had largely Caucasian cohorts [37–40]. Taken together, this highlights the underrepresentation of non-Caucasian subjects and the need for trials that enroll more HS patients with SOC and stratify results by racial subgroups (Table 2).

Access to Effective Care

Adding to the aforementioned issues is access to care for patients with low SES and SOC, in whom HS is commonly misdiagnosed and underdiagnosed, and who often quit seeking medical care due to ineffective results [7, 18]. This may be partly explained by a large proportion of HS patients who are diagnosed or managed by nondermatologists [7, 21]. Dermatologists diagnose HS patients significantly earlier in the disease course (65% of HS patients diagnosed by dermatologists were Hurley stage I or II, vs. 35% for nondermatologists), and are more likely to use medical (almost all visits) and procedural (20% of visits) treatment for HS compared to other providers [7, 21]. This stresses the need to increase disease awareness among nondermatologists and to improve SOC patient access to dermatologists (Table 2).

In the USA, AA made about one third as many annual dermatology visits per capita as Caucasians, and Hispanics averaged even less [21, 41]. These reports suggest that HS is underdiagnosed and undertreated in SOC, which can be attributed to the limited access to dermatological care, low SES, and cultural factors [21]. Data from the National Center for Health Statistics suggest that the percentage of visits with HS as the diagnosis in which the patient was AA (23%) was significantly higher than the percentage of all visits by AA (13%) [18]. While most patients diagnosed with HS were not AA (77% Caucasians and other groups combined), AA were significantly over-

represented (26%) in the HS population when emergency department visits were considered [18]. These results allude to the prevalence, disease burden, and lack of effective management of HS in patients with SOC.

Conclusion

HS is a chronic, disabling disease that disproportionately affects patients with SOC. Due to a constellation of genetic and psychosocial factors, African and Hispanic populations experience severer HS, lower QoL, and more comorbid conditions, including MetS and depression. Despite these issues, there is insufficient research and access to care for HS patients of SOC and low SES. Large, population-based studies are needed to fully understand the prevalence and burden of HS in patients with SOC, delineate the genetic and anatomical factors unique to racial subgroups, and determine whether patients with SOC respond differently to HS therapies. The roles that diet, lifestyle, climate, and health care access play in the natural history of HS also deserve further exploration. Finally, efforts should be made to increase access to care to dermatologists, including early screening for at-risk populations and implementation of longitudinal HS care plans.

Key Message

Hidradenitis suppurativa disproportionately affects skin of color patients, but research in these populations is lacking.

Disclosure Statement

Dylan E. Lee, Ashley K. Clark, and Vivian Y. Shi declare that they have no relevant conflict of interest, and no financial interest exists either.

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