Knowledge, attitudes, and perceptions of hidradenitis suppurativa among young adults in Singapore

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Background: The prevalence of hidradenitis suppurativa (HS) is 0.00033% to 4.10% globally. Few epidemiological studies derive from Asia, with social stigmatization postulated to result in under-diagnosis.

Objective: This study aimed to assess the self-reported prevalence of HS, and the knowledge, attitudes, and perceptions towards HS among Singaporean young-adults.

Methods: A cross-sectional study (n = 158) was conducted by anonymous online questionnaire. The association between demographic factors and risk of potentially undiagnosed HS was evaluated using multivariable logistic regression. Differences between attitude-perception scores by demographic factors and knowledge of HS were tested using two-sample t-tests.

Results: The prevalence of diagnosed and potentially undiagnosed HS was 0.63% and 8.9%, respectively. Non-Chinese had significantly higher social attitude-perception scores than Chinese (P = .029). Females had significantly higher social (P = .048) as well as economic and work (P = .037) attitude-perception scores than males. Those with knowledge of HS had significantly higher attitude-perception scores for interpersonal (P = .031) and social (P = .0052) subsections.

Limitations: Small sample size, low frequency of HS cases, and self-reported prevalence may not generalize to the broader population in Singapore.

Conclusion: Our results suggest a potential underdiagnosis of HS. Non-Chinese stigmatize HS less than Chinese, and females less than males. Individuals with knowledge of HS might be more open to interpersonal and social interactions with HS sufferers. (JAAD Int 2023;12:72-80.)

Key words: attitudes; hidradenitis suppurativa; knowledge; perceptions; prevalence; young adults.

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Drs Seow and Chandran co-supervised the work.

Funding sources: None.

IRB approval status: Ethics approval was obtained from the departmental ethics review committee at the National University of Singapore (SSHSPH-DERC Reference Code SSHSPH 162) before data collection.

Patient consent: Consent for the publication of all patient photographs and medical information was provided by the authors at the time of article submission to the journal stating that all patients gave consent for their photographs and medical information to be published in print and online and with the understanding that this information may be publicly available.

Accepted for publication March 20, 2023.

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2666-3287

https://doi.org/10.1016/j.jdin.2023.03.010

INTRODUCTION

Hidradenitis suppurativa (HS) is a chronic follicular occlusive disease involving the follicular portion of the folliculopilosebaceous unit.[1] HS commonly presents postpuberty, causing pain, unpleasant odour, itching, and suppuration.[2] Globally, the prevalence of HS has been estimated to range between 0.00033% and 4.10%.[3] One South Korean study reported a HS period prevalence of 55.8 per 100,000 patients, and a standardized prevalence of 59.6 per 100,000 patients after adjusting to the world population.[4]

The aetiology of HS remains unclear, although there are various risk factors — positive family history, use of androgen-containing medications, and female sex.[2,4,5] Other associated factors include metabolic syndrome, obesity, positive smoking history, and inflammatory disease.[3,6,7]

HS is often underdiagnosed, partly owing to lack of knowledge of HS among primary care physicians.[8] HS may also be under-recognized by patients themselves.[9] HS has been noted to negatively influence patients' quality of life, with pain being most debilitating.[10] Studies have shown an increased risk of depression and anxiety,[11-13] and suicide.[14] Patients with HS often face troubles at work and encounter significant employment challenges.[15]

In this study, we aim firstly to determine the prevalence of HS, diagnosed or undiagnosed, among young adults. Secondly, to assess the associations between demographic factors and the risk of potentially undiagnosed HS, as well as between demographic factors with attitudes and perceptions of HS.

CAPSULE SUMMARY

- The prevalence of hidradenitis suppurativa (HS) among Asians is largely unknown as such studies are scarce in Asian populations.
- Our study suggests an underdiagnosis in the Singaporean population, which has not been previously reported. Race, sex and prior knowledge of HS affect attitudes and perceptions of the disease. We hope to pave the way for future research that could explore possible reasons for this underdiagnosis.

METHODS

Study design

Fig 1 depicts the study design. Participants completed an online questionnaire (Supplementary Materials, available via Mendeley at https://doi.org/10.17632/9cw8gpbkxm.2, Questionnaire) which collected information on demographic factors, risk factors, and if they had been previously diagnosed with HS.

Participants with a previous HS diagnosis were assigned to complete both knowledge (disease specific health literacy) and attitude-and-perception (viewpoints and opinions) questionnaires towards those with HS.

Participants without a previous HS diagnosis were asked if they had heard of HS. Those who had heard were given both knowledge and attitude-and-perception questionnaires, while those who had not were only given the attitude-and-perception questionnaire. They then completed a prevalence questionnaire to identify potentially undiagnosed HS, by assessing if they met the clinical diagnostic criteria.

Participants and recruitment

To be eligible for this survey, participants must be aged 21 to 30 years old, able to provide informed consent for participation, and comprehend English.

Data were collected between 23 December, 2021 and 4 February, 2022. Participants were recruited from the general public through convenience sampling via word of mouth and messaging platforms. They were sent a link via popular messaging platforms such as WhatsApp and Telegram to a website containing the questionnaire. Upon clicking on the questionnaire link, a Participant Information Sheet was provided; consent was taken on the same page before starting.

Ethics declaration

Ethics approval was obtained from the departmental ethics review committee at the National University of Singapore (SSHSPH-DERC Reference Code SSHSPH 162) before data collection.

Questionnaire

Demographic data. Participants' age, in years, were analyzed as continuous variables. Categorical variables included race, ethnicity, sex, and smoking status. Participants were asked to indicate their highest education level, choosing from "*Primary School*", "*Secondary School*", "*Junior College*", "*Polytechnic*", "*Institute of technical education*

Abbreviations used:

BMI: body mass index
CI: confidence interval
Diff.: difference
HS: hidradenitis suppurativa
PR: permanent resident

(ITE)", "*University*, and "*Others*". BMI was re-coded into "*not overweight*" and "*overweight*", according to Singapore's Health Promotion Board's cut-off of 23.0 kg/m^2. Weekly physical activity duration was collected as a categorical variable, and participants indicated whether they exercised "*at least 150 minutes*", "*less than 150 minutes*", or "*not at all*". Participants were also asked to indicate if they had a prior clinical diagnosis of HS.

Measures of knowledge. Participants were asked to indicate if they had heard of or had any knowledge of HS. Those who indicated that they had went on to complete a knowledge questionnaire. Our knowledge questionnaire consisted of original questions that tested participants about general knowledge, symptoms, and treatment of HS. Questions were inspired by a previous study on acne[16] and the current clinical guidelines of HS.[17-19] Participants who had previously heard of HS and participants previously clinically diagnosed with HS had their knowledge of HS measured, with a score calculated from the average of the 16 questions in the knowledge section.

Measures of attitude-and-perception. All participants were first prompted on basic information about HS. They then went on to complete an attitude-and-perception questionnaire with 4 subsections (economics and work, interpersonal behaviour, social behaviour, and psychological wellbeing) which was adapted from a validated screening questionnaire used by Han et al.[20] We sought to find the demographic factors that would influence the attitude-and-perception scores of HS, regardless of HS diagnosis. A 5-point Likert scale was used for all questions in all subsections.

For economics and work, questions were adapted from Kristensen et al[21] which assessed how much the participants agreed that someone with HS would struggle to find a job.

For interpersonal behavior, questions were adapted from Kristensen et al[21] and a Korean study by Park et al[22] on acne scarring. Participants were assessed on how willing they would be to form interpersonal relationships, for instance, friendships and choice of partner, with individuals with HS.

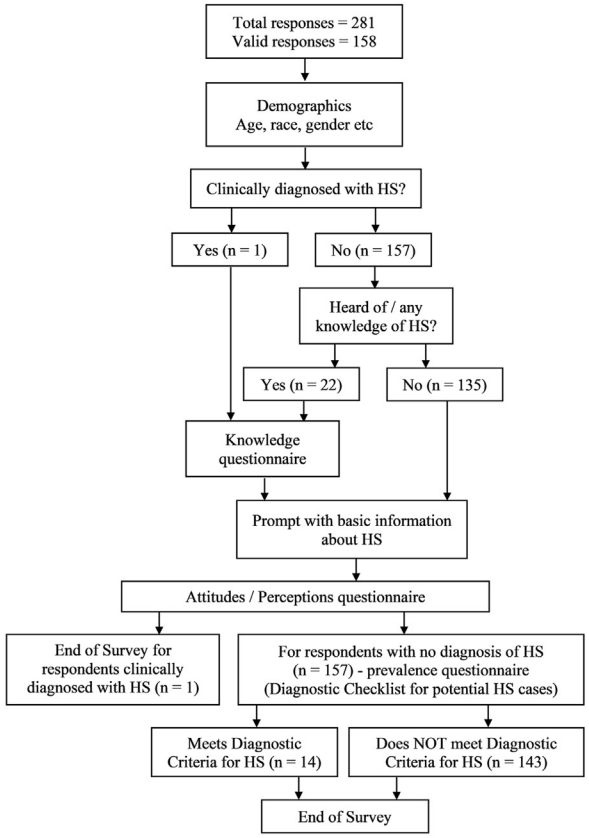

Fig 1. Flowchart of study design. *HS*, Hidradenitis suppurativa.

For social behavior, questions were adapted from Kristensen et al.[21] Participants were assessed on their own physical aversion towards persons with HS, and their perceived degree of embarrassment persons with HS might feel in public.

For psychological wellbeing, questions were adapted from the VQ-Dermato questionnaire.[23] Participants were asked how much they agree that someone with HS would be anxious about people knowing that they have HS.

A mean score was calculated for each subsection by taking the average of all the questions in that subsection. An overall mean attitude-and-perception score was calculated by taking the average of the 4 subsectional scores.

Measures of prevalence. A prevalence questionnaire was administered to participants with no prior clinical diagnosis of HS. Following the modified Dessau definition, HS is a clinical diagnosis. 3 criteria must be met for a positive preliminary diagnosis.[24,25]

1. The presence of typical lesions.[24,25] While these lesions are traditionally described as boils or

scars, HS is also known to be described as blackheads.[26,27] Additionally, patients also recognize HS lesions as pimples[28] or even sores and bumps.[29]
2. The presence of these lesions in typical locations, which are the intertriginous areas.[24,25] Hence, participants were asked if these lesions were present on any one of the following areas - armpits, groin and inner thighs, genitals, buttocks, abdomen, and/or under the breast.
3. Chronicity and recurrence.[24,25] Specifically, lesions must relapse more than twice over the duration of 6 months.[25,30]

We classified participants as potential HS cases if they reported having fulfilled all 3 criteria. The first 6 questions asked for the presence of typical lesions in the typical locations, while the seventh question asked if the lesions were present in those locations 2 or more times within the past 6 months. If participants answered "Yes" to any of the first 6 questions, and answered "Yes" to the seventh question, they are classified as a potential HS case.

Statistical analyses

Descriptive statistics such as mean and standard deviation were used to describe the profile of the study population. Univariable and multivariable logistic regression were used to evaluate the association between demographic factors and the risk of potentially undiagnosed HS. Differences between total attitude-and-perception scores by demographic factors (BMI, race, sex, education, smoking and physical activity) and knowledge of HS were tested using Welch two-sample t-tests. Pearson's product-moment correlation tests were conducted to calculate the correlation between knowledge scores and total attitude-and-perception scores. The subcomponent scores were similarly tested. All statistical analyses were conducted using R (Version 4.1). All tests were two-sided, and $P < .05$ was considered as statistically significant.

RESULTS

Out of the 281 responses to the questionnaire, 158 valid responses were included in our analytic sample. A valid response meant that the participants completed the questionnaire from start to end. Table I summarizes the sociodemographic data and overall description of the analytic sample. 1 (0.63%) out of 158 participants, had a previous diagnosis of HS by a medical professional (Table I).

Among the remaining 157 participants, based on our diagnostic criteria (see methods) for potential HS cases, 8.9% (n = 14) of participants had potentially undiagnosed HS, of which 57.1% were female (n = 8) and 42.9% were male (n = 6). 14% (n = 22) who were not previously diagnosed with HS had heard of HS. These individuals had significantly higher (P = .0052) social attitude-and-perception scores (Mean = 4.16, SD = 0.583) as compared to those who had not heard of HS (Mean = 3.71, SD = 0.934). However, there was no statistically significant correlation between participants' knowledge scores and attitude-and-perception scores.

There were no statistically significant demographic risk factors associated with undiagnosed HS (Table II). Social attitude-and-perception scores were significantly higher (P = .029) for non-Chinese (Mean = 4.38, SD = 0.591) than Chinese

Table I. Sociodemographic attributes and description of analytic sample (n = 158)

Continuous variables	Mean	SD
Age	22.8	2.27
Categorical variables		***n*** **(%)**
Sex		
Male		84 (53.2)
Female		74 (46.8)
Citizenship		
Singaporean		148 (93.7)
Singaporean PR		10 (6.3)
Diagnosis of HS		
Yes		1 (0.6)
No		157 (99.4)
Potential HS case		14 (8.9)
Not potential HS case		143 (91.1)
Ethnicity		
Chinese		151 (95.6)
Non-Chinese		7 (4.4)
Malay		2 (1.3)
Indian		1 (0.6)
Others		4 (2.5)
Highest education level attained		
Junior College/Polytechnic		77 (48.7)
University		81 (51.3)
BMI (m/kg^2)		
Not overweight		120 (75.9)
Overweight		38 (24.1)
Smoking status		
Current or past smoker		15 (9.5)
Never smoked		143 (90.5)
Physical activity		
At least 150 mins/week		63 (39.9)
Less than 150 mins/week		95 (60.1)
Heard of HS (n = 157)		
Yes		22 (14.0)
No		135 (86.0)

BMI, Body mass index; *HS*, hidradenitis suppurativa; *PR*, permanent resident.

Table II. Univariable and multivariable logistic regression assessing the association between demographic factors and presence of undiagnosed HS

	Crude OR (95% CI)	*P*-value	Adjusted OR (95% CI)*	*P*-value
Age	0.83 (0.57-1.09)	.246	0.76 (0.5-1.05)	.135
BMI	1.33 (0.35-4.28)	.645	1.46 (0.33-5.84)	.598
Race	4.6 (0.61-24.03)	.0861	4.89 (0.58-30.76)	.101
Sex	1.56 (0.52-4.94)	.435	2.59 (0.68-11.18)	.176
Education	0.96 (0.31-2.94)	.94	0.92 (0.26-3.16)	.899
Smoking	1.67 (0.24-7.04)	.532	4.63 (0.53-31.95)	.126
Physical activity	1.6 (0.52-4.91)	.403	2.2 (0.62-8.1)	.221

BMI, Body mass index; *HS*, hidradenitis suppurativa.
*Models were adjusted for age, BMI, race, sex, education, smoking, and physical activity.

(Mean = 3.74, SD = 0.910) (Table III). Females had significantly higher social attitude-and-perception (Mean = 3.92, SD = 0.863) and economics and work attitude-and-perception (Mean = 3.31, SD = 0.656) scores compared to males (Mean = 3.64, SD = 0.929, P = .048 and Mean = 3.09, SD = 0.643, P = .037 respectively). Interpersonal attitude-and-perception scores were significantly higher (P = .031) for individuals who had heard of HS (Mean = 4.01, SD = 0.645) as compared to those who had not heard of HS (Mean = 3.67, SD = 0.658).

DISCUSSION

Prevalence of formally-diagnosed HS in our study population was 0.63%, whereas potential prevalence of HS, based on symptoms declared, was almost 14 times higher at 8.9%. A previous study by Han et al conducted in an outpatient non-dermatological medical department in Singapore found 6.4% (66 of 1025) of respondents screened positive for potential HS, similar to our estimate,[20] and 27.3% (6 of 22) of screen-positive respondents who consented to examination were diagnosed with HS by a dermatologist.

Although the cases in our study were not confirmed by a dermatologist, a significant proportion of them are likely 'true' undiagnosed HS cases. Compared to the study by Han which only screened if participants "ever had typical lesions of HS", our study uses 7 questions to screen if participants meet all 3 diagnostic criteria of HS, and thus is more specific. Moreover, our study was directed at young adults, who are at the highest risk of HS, given its typical age of onset. Therefore, the rate of 'true' undiagnosed cases in our population is likely greater than the older, hospital-based population by Han et al.

As aforementioned, physician-related factors, such as the ability to recognize HS and distinguish it from other dermatological conditions like acne, may contribute to under-diagnosis, as seen in a Portuguese study of HS awareness in General Practitioners.[8] Communication-related factors such as physicians using colloquial terms like 'boils' to explain HS to patients may contribute to poor awareness.[31] Patient-related factors may lead to underdiagnosis of HS. Studies show that most young individuals with dermatological conditions do not seek professional help.[32,33] Commonly cited reasons include embarrassment or the belief that their condition does not warrant visiting the doctor.

No demographic factors were statistically significant risk factors of potentially undiagnosed HS in our study population. Although smoking and obesity were reported to increase the risk of developing HS, we could not elicit these findings. Smoking is a well-established risk factor of HS, with rates up to 90% in HS patients in western populations.[18,34] Smoking in Asian HS patients is significantly lower than Western HS patients at 29% in Japan,[35] 34% to 38.3% in Korea[4,36] and 32.8% in Singapore,[37] and has been postulated as a cause for male predominance of HS in Asia.

Non-Chinese have significantly higher social attitude-and-perception scores than Chinese, suggesting non-Chinese are less stigmatizing towards HS. Studies from Singapore and Malaysia showed a higher prevalence of HS among non-Chinese.[37-39] Similarly, other studies showed that non-Chinese are more likely to suffer from other dermatological conditions like keloidal scars and pilonidal diseases, which are common misdiagnoses of HS.[40,41] We postulate the higher prevalence of dermatological conditions in non-Chinese predisposes them to encounter HS or similar dermatological conditions in their community, thus having greater acceptance towards HS patients.

A previous study found males were more likely to suffer from HS in Asian populations, as opposed to a female preponderance in non-Asian populations.[37]

Table III. Two-sample t-tests of various demographic factors and attitude-and-perception scores (n = 157)

	Reference	Economics and Work Diff. (95% CI)	Interpersonal Diff. (95% CI)	Social Diff. (95% CI)	Psychological Diff. (95% CI)	Total attitude-and-perception Diff. (95% CI)
BMI						
Overweight (n = 37) vs Not overweight (n = 120)	Overweight	0.2 (−0.03, 0.43)	−0.03 (−0.25, 0.19)	0.12 (−0.22, 0.45)	0.08 (−0.13, 0.28)	0.09 (−0.09, 0.27)
Race						
Non-Chinese (n = 7) vs Chinese (n = 150)	Non-Chinese	−0.25 (−0.77, 0.27)	−0.37 (−0.98, 0.23)	−0.64* (−1.19, −0.09)	−0.34 (−1.33, 0.65)	−0.4 (−0.93, 0.12)
Sex						
Female (n = 83) vs Male (n = 74)	Female	−0.22* (−0.42, −0.01)	−0.01 (−0.21, 0.2)	−0.28* (−0.57, 0)	0 (−0.2, 0.19)	−0.13 (−0.3, 0.04)
Education						
University (n = 80) vs JC/Poly (n = 77)	University	−0.12 (−0.33, 0.08)	0.1 (−0.11, 0.31)	0.06 (−0.23, 0.34)	−0.14 (−0.33, 0.05)	−0.03 (−0.2, 0.15)
Smoking status						
Smoked (n = 15) vs Never smoked (n = 142)	Smoked	0.06 (−0.27, 0.4)	0 (−0.44, 0.43)	0.22 (−0.3, 0.73)	−0.17 (−0.48, 0.15)	0.03 (−0.3, 0.35)
Physical activity						
At least 150 mins (n = 62) vs Less than 150 mins (n = 95)	At least 150 mins	0.19 (−0.02, 0.4)	0.03 (−0.19, 0.26)	0.18 (−0.12, 0.48)	0.05 (−0.15, 0.25)	0.11 (−0.07, 0.3)
Knowledge of HS						
Heard of HS (n = 14) vs Not heard of HS (n = 143)	Has knowledge	0.08 (−0.2, 0.35)	−0.34* (−0.66, −0.03)	−0.45* (−0.75, −0.14)	0.19 (−0.1, 0.47)	−0.13 (−0.33, 0.07)

BMI, Body mass index; *HS*, hidradenitis suppurativa.
*$P < .05$; denotes statistical significance.

Although there has been a reported male predilection for HS, researchers suggested the lower prevalence of HS among Asian females was due to underdiagnosis from socio-cultural reasons, like cultural norms that prioritize female modesty, resulting in females possibly being reluctant to have a doctor examine areas like the perineum. Yet, our survey found females had significantly higher social attitude-and-perception scores than males. This suggests females stigmatize HS less than males, with males having more stigmatizing attitudes in workplace and social contexts. This was also observed in other attitude-and-perception surveys on vitiligo and psoriasis, where men had poorer social attitude-and-perception scores.[42,43] We postulate that despite Asian females prioritising modesty and potentially avoiding medical examination, they are more empathetic and less prejudicial to individuals with HS. Previous studies showed females are more empathetic than males[44] and similar attitude-and-perception studies on vitiligo and psoriasis showed females are more affected in quality of life.[45,46] Females having increased perception of a lower quality of life could suggest a greater empathy to the gravity of suffering that dermatological conditions like HS can induce. It is important for school-based education and public health campaigns to be implemented to reduce the stigma towards HS, particularly among males. Efforts can be directed at females to emphasize the need for early diagnosis to overcome the potential reluctance for physical examination.

Individuals who had heard of HS have significantly higher interpersonal and social attitude-and-perception scores than individuals who had not. We hypothesize this disparity stems from misconceptions like HS is contagious or is a product of poor hygiene.[47] Such misconceptions could lead to avoidance of HS patients. Conversely, individuals who had heard of HS, and have knowledge of its pathophysiology, might be more open to interpersonal and social interactions with HS patients, leading to higher attitude-and-perception scores.

Our study has several limitations. Firstly, it was our small sample size. This may in part be due to the high reading level of our questionnaire, which could have been interpreted as being too difficult and tedious to complete. With limited sample size and power, statistical analyses like multivariable logistic regression of various demographic factors and HS prevalence might have led to non-significant findings. Secondly, there might be selection bias in the sample of participants included in the study. Participants were recruited via convenience sampling. As most of the initial recruiters were medical students (who have completed Junior College/Polytechnic), it is not unexpected that their social circles would comprise mainly of individuals with certain forms of higher education. It is thus possible, that individuals with lower socioeconomic statuses were under-represented in our sample population. Given that HS tends to be more common among individuals with lower socioeconomic statuses,[48] this might also have contributed to the lack of participants with a diagnosis of HS. Thirdly, clinical examination by dermatologists to confirm the presence or absence of HS lesions among participants were not performed for all participants. Lastly, participants were given a warning of potentially discomfort-inducing images to assess attitude-and-perception scores. Individuals who felt uncomfortable might have withdrawn from the survey, potentially affecting results.

CONCLUSIONS

Prevalence of formally diagnosed HS in our sample is 0.63%, with potential prevalence being as high as 8.9%. Non-Chinese seem to stigmatize HS less than Chinese, and females seem to stigmatize HS less than males. Individuals who had heard of HS might be more open to interpersonal and social interactions with HS patients. This study highlights the potential underdiagnosis of HS in the Singaporean context, which could guide further research into investigating potential areas that might lead to this underdiagnosis. In addition, this study highlights the knowledge, attitudes, and perceptions of young adults toward individuals with HS in Singapore. This will inform the strategy of HS health education to bridge these knowledge gaps among the general populace.

The authors would like to thank Bryant Lim Po-Yuen, Chong Wei Xuan, Darren Leong Qi Ming, Goh Keyi Chloe, Mah Zheng Hui, Ng Wen Wei Victoria, Ong Rui Song Ryan, Ryan Emmanuel Jian Leong, Sherlyn Priscilla, Shina Yeo Qing Chun, Sia Jun Wei, Tan Jian Shiun, Tan Ping Ren, Tan Yi Qian Chloe, Teo Yao Neng, Teoh Ning and Tian Yuhan for their contributions towards data collection.

Conflicts of interest

None disclosed.

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