

Prevalence of Hidradenitis Suppurativa in Skopje, North Macedonia

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Keywords

Prevalence · Hidradenitis suppurativa · Acne inversa

Abstract

Introduction: Hidradenitis suppurativa (HS) exhibits varying prevalence globally, markedly influenced by geographical and ethnic distinctions. This study, part of the Global Hidradenitis Suppurativa Atlas (GHiSA) initiative, aimed to assess the prevalence of HS in North Macedonia and contribute to the global epidemiology of this complex dermatological disorder. **Methods:** Conducted at City General Hospital “8th September” in Skopje, North Macedonia, from March 23, 2023, to May 30, 2023, this single-center study enrolled 597 healthy adults using a validated screening questionnaire. The participants were selected from accompanied outpatients and visitors of hospitalized patients in various departments, excluding the dermatology de-

partment. The questionnaire consisted of questions leading to the diagnosis of HS, particularly about the presence of boils, and it was administered as an interview by dermatology residents under the supervision of dermatologists. Participants who tested positive on the screening questionnaire were examined by dermatologists. **Results:** Out of 600 participants, 597 successfully completed the questionnaire (291 male and 301 female), and among them, 5 individuals (3 male and 2 female) were identified as having HS. This indicates an HS prevalence rate of 0.84%. Demographic analysis showed a male predominance in the HS group, with a median age of onset at 36 years (42.0 in the control group). Smoking and higher BMI were associated with HS. Notably, the study identified HS cases among participants initially screening negative, emphasizing the complexity of diagnosis. The diagnostic questionnaire demonstrated a sensitivity of 0.60 and a specificity of 0.84. **Conclusion:** This epidemiological study contributes to the

global understanding of HS prevalence, demographic characteristics, and associated factors. With a rate of 0.84%, HS remains a significant concern. The observed male predominance in HS incidence deviates from global trends.

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Background

Hidradenitis suppurativa (HS), also known as acne inversa, is a chronic and recurrent inflammatory skin condition characterized by multiple painful inflammatory lesions. These lesions commonly occur in intertriginous areas and areas with a high concentration of apocrine glands [1]. The prevalence of HS is estimated to be approximately 1% in the general population; however, reported prevalence varies widely, ranging up to 4%, due to the diversity of methodologies and data sources utilized [2, 3]. Symptoms usually begin between puberty and age 40, with the typical onset in the second or third decade of life. Studies from Europe and North America indicate a higher prevalence among females, with a female-to-male ratio of approximately 3:1 [4]. Furthermore, the highest incidence within specific age groups occurs among patients aged 18–29 [4]. Genetic predisposition, obesity, smoking, diet, mechanical stresses on the skin, and hormonal factors are consistently cited as contributing factors to the development or worsening of the disease. To our knowledge, no prior epidemiological studies have been conducted on HS, specifically within the region of North Macedonia, Skopje. Therefore, the findings presented in this study represent the first comprehensive examination of HS prevalence within this geographic area. The Republic of North Macedonia is a landlocked country in Southeast Europe. Skopje, the capital and largest city, is home to a quarter of the country's 1.83 million people. The majority of the residents are ethnic Macedonians, a South Slavic people. Albanians form a significant minority at around 25%, followed by Turks, Roma, Serbs, Bosniaks, Aromanians, and a few other minorities. This study aimed to assess the prevalence of HS in Skopje, North Macedonia, while also investigating various epidemiological characteristics associated with the condition. Additionally, the research seeks to contribute to the existing body of knowledge on HS epidemiology, with the ultimate goal of informing healthcare strategies and interventions tailored to the needs of individuals affected by this chronic inflammatory skin disorder in Skopje, North Macedonia.

Objective and Methods

This study was conducted as part of the Global Hidradenitis Suppurativa Atlas (GHiSA) initiative, which aimed to assess the prevalence of HS across more than 50 countries distributed among 6 continents. The study followed the objective and approach previously published by Bouazzi et al. [5] to ensure uniformity across all participating sites. This particular study was conducted at City General Hospital “8th September” in Skopje, North Macedonia, and was a single-center study conducted in secondary care.

All participants provided written informed consent prior to enrollment in the study. The data were collected by dermatology residents under the supervision of dermatologists. A validated screening questionnaire, translated into the Macedonian language, was used. The translation process involved two authors and two certificate sworn translators working independently. Subsequently, the translated material was reviewed by another certificate sworn translator. All translators unanimously agreed upon the final version of the translation. Patients who tested positive on the screening questionnaire were examined by dermatologists using the three mandatory clinical diagnostic criteria: typical lesions, typical topography, and chronicity. The study protocol was approved by the Ethics Committee at City General Hospital “8th September” (14/1162/2).

The study enrolled healthy adult participants who accompanied outpatients and visitors of hospitalized patients in various departments such as internal medicine, ophthalmology, neurology, and otorhinolaryngology, excluding the dermatology department. Pregnant women, individuals under the age of 18, and those unable to provide consent were excluded from the study. Participants were consecutively sampled until the desired sample size was achieved.

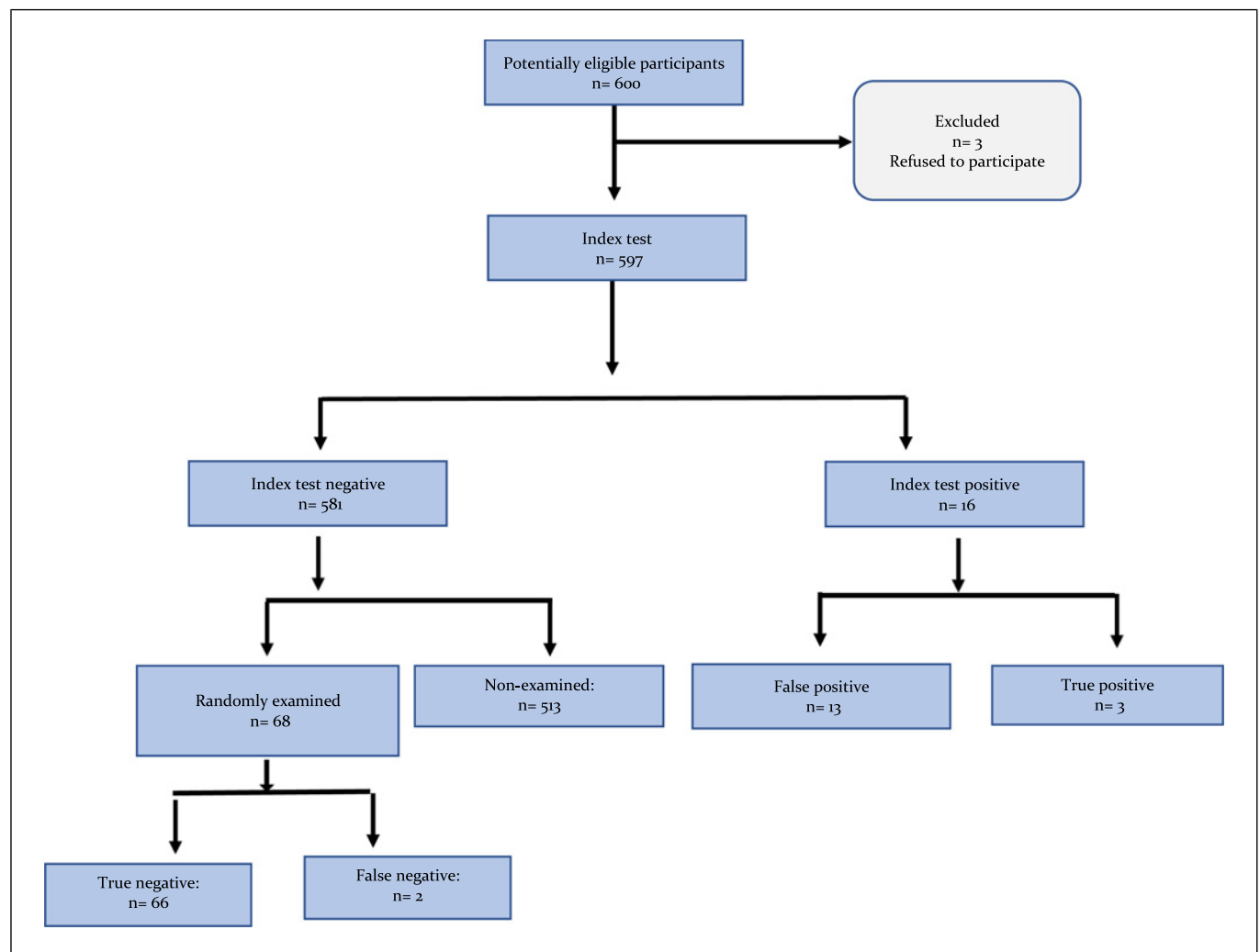
Results

Out of 600 healthy adults accompanying patients, 597 (99.6%) participants completed the validated questionnaire, while three participants were excluded as they refused to sign the consent form and declined participation. The study found that the prevalence of HS in the remaining 597 participants was 0.84% (with a 95% confidence interval of 0.36–1.95%).

Table 1 presents the demographic characteristics of the study participants. Among the participants, 5 patients with HS were identified. The distribution of sexes in the HS group was 60% males and 40% females. In the control group, the distribution of sexes was 291 (49.2%) male and

Table 1. Demographic characteristics and comparison between control and HS groups

Demographics	Control group	HS group	<i>p</i> value
Patients, <i>n</i>	592	5	
Sex, <i>n</i> (%)			
Male	291 (49.2)	3 (60.0)	0.6818
Female	301 (50.8)	2 (40.0)	
Age, median (IQR), years	42.0 (30.0–54.0)	36.0 (30.0–47.0)	0.4083
BMI, median (IQR)	26.0 (23.2–29.3)	28.1 (25.9–30.4)	0.2315
Smoker, <i>n</i> (%)			0.3676
Yes	220 (37.2)	3 (60.0)	
No	372 (62.8)	2 (40.0)	

**Fig. 1.** Patient flow diagram. STARD-2015 reporting guidelines. Five cases out of 597 appeared to have HS [6].

301 (50.8%) female, while in the HS group, it was 3 (60%) males and 2 (40%) females. The median age of the control group was 42, and in the HS group was 36 years. Among

the HS patients, 60% were smokers, and the mean BMI was 28.1. In contrast, in the control group, 220 individuals (37.2%) were smokers, and the mean BMI was 26.

Table 2. Summary of prevalence and test parameters

	Physically examined	
	positive	negative
Boil questionnaire		
Positive	3 (true positive)	13 (false positive)
Negative	2 (false negative)	66 (true negative)
Prevalence: 5/597 = 0.84% (95% CI: 0.95: 0.36%–1.95%). Sensitivity 0.60 (3/5) CI: 0.15, 0.95. Specificity 0.84 (66/79) CI: 0.74, 0.91. Positive predictive value 0.19 (3/16) CI: 0.04, 0.46. Negative predictive value 0.97 (66/68) CI: 0.90, 1.00.		

Additionally, 68 randomly selected participants who initially screened negative for HS (comprising 11.7% of the total sample) underwent clinical assessment. Among these participants, two were found to have HS, as depicted in Flowchart 1. Notably, 1 of the patients, a 19-year-old female, was initially classified as screen-negative based on her response regarding the presence of recurrent nodules. However, upon random selection for evaluation and photography, inflamed nodules were discovered in the axillary region, as shown in Figure 1.

In the non-HS group, there was a slight predominance of female participants (50.8%), with a median age of 42 and a median BMI of 26. Comparatively, there were no statistically significant differences between the HS and non-HS groups in terms of demographic characteristics, such as sex and median age ($p = 0.6818$ and $p = 0.4083$, respectively). Additionally, the two groups had no statistically significant differences regarding BMI and smoking.

The validity of the diagnostic questionnaire was also assessed in this study, as presented in Table 2. The sensitivity of the diagnostic questionnaire was determined to be 0.60, while the specificity was 0.84. The positive predictive value of the diagnostic questionnaire was 0.19, and the negative predictive value was 0.97.

Discussion

In our study, we identified 5 patients with HS, resulting in an overall prevalence of 0.84% in our selected target population. A similar prevalence of 0.77% was reported in the UK from a study that used the nationwide Clinical Practice Research Datalink (CPRD) [7]. In Ireland, a cross-sectional study conducted in four selected hospitals reported the highest prevalence in Europe at 1.4% [8].

According to a meta-analysis conducted in accordance with PRISMA guidelines, it was concluded that the prevalence

of HS varies significantly among different geographical populations, ranging from 0.2% to 0.6% based on a dataset of 118,760,093 HS cases published from Europe, the USA, South America, and Asia-Pacific. This variation is more likely to be a result of differences in ethnic distribution among various continents [9].

In our study, male predominance was observed in the HS group, which contrasts with findings from other studies. Most studies have observed that HS is twice as prevalent in women compared to men. A large population-based study in the USA found that the incidence of HS was twice as high among women than men [2]. Similarly, a French study, which included 618 consecutive patients, showed a female predominance with a female-to-male ratio higher than 3 [10]. However, our study aligns with the demographic data from a population-based study in Korea, which also showed a higher proportion of HS in men with a male-to-female ratio of 1.6:1 [11].

The median age in our study, which was 36 years, aligns with findings from other studies. A study conducted in Greece, similar to ours, reported a median age of 37 years among HS patients, ranging from 13 to 96 years. The most frequently reported age of disease onset in that study was 26.7 ± 12.7 years [12].

In our study, we observed a higher prevalence of smokers among the HS patients compared to the non-HS participants, exceeding the general population smoking rate in North Macedonia, which is reported to be 35% [13]. Regarding smoking and HS, studies suggest a strong association between HS and smoking, with higher rates of active and former smoking in individuals with HS compared to controls [14, 15].

Our study also confirms that a higher body mass index (BMI) is more common among patients with HS compared to the general population. Several studies have found a positive correlation between increasing BMI and disease severity in HS patients [13].

Due to the only 5 confirmed HS patients in our study, the two groups did not exhibit statistically significant differences. Despite these limitations, we were able to confirm a positive correlation between smoking and being overweight with HS. Our results are in line with the published international experience. A multicenter approach and an expanded participant pool, is poised to furnish more precise epidemiological insights into the prevalence and demographic characteristics of HS within the Republic of North Macedonia.

HS is a complex dermatological disorder with a global distribution. Being a rare disease, its prevalence varies significantly by geographical region and race/ethnicity. Our study may contribute to a better understanding of demographic and epidemiological characteristics and

contribute to formulating policies and guiding principles for improving disease diagnosis, management, and providing the comprehensive multidisciplinary approach these patients deserve.

Key Message

In this explorative, cross-sectional, descriptive study based on a validated questionnaire, the prevalence of hidradenitis suppurativa was 0.84%.

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Statement of Ethics

This study protocol was reviewed and approved by the Ethics Committee at City General Hospital "8th September," with Approval No. 14/1162/2." Written informed consent was obtained from all individual participants included in the study.

Conflict of Interest Statement

G.B.E.J. has received honoraria from AbbVie, ChemoCentryx, Coloplast, Incyte, InflaRx, Novartis, Pierre Fabre, and UCB, for participation on advisory boards; grants from AbbVie, As-

traZeneca, InflaRx, Janssen-Cilag, Leo Pharma, Novartis, Regeneron, and Sanofi, for participation as an investigator; and speaker honoraria from AbbVie, Boehringer-Ingelheim, Galderma, and MSD. He has also received unrestricted departmental grants from AbbVie, Leo Pharma, and Novartis. D.B. declares that UCB Nordic has paid for EADV 2022 and EADV 2023 congress participation and received teaching honoraria from UCB Nordic. All other authors have no conflicts of interest to declare.

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Author Contributions

I.T., V.B.B., and V.T. performed the translation and completed the administrative part of the study. I.D. and A.R.-D. were involved in the planning of the work and supervised the work. I.T. and V.B.B. processed the experimental data in the Excel graph, drafted the manuscript, and designed the figures. D.B. and R.C. contributed to conceptualization, data analysis, and manuscript review; C.E.M. contributed to conceptualization and manuscript review. G.B.E.J. contributed to conceptualization and manuscript review. K.D., as an extern collaborator, aided in interpreting the results and worked on the manuscript. All authors discussed the results and commented on the manuscript.

Data Availability Statement

The data that support the findings of this study are not publicly available due to information that could compromise the privacy of research participants, but are available from the corresponding author, I.T., upon reasonable request.

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