

Hyperhidrosis Prevalence: A Disease Underreported by Patients and Underdiagnosed by Physicians

Abstract

Background: Hyperhidrosis (HH) is a disorder characterized by excessive sweating beyond required for normal thermoregulation, as a result of the excessive functioning of the sudomotor sweat control system. HH is broadly classified into 2 categories: primary HH and secondary. Our aim was to study the prevalence of HH in patients attending dermatological outpatients. **Methods:** Randomly selected 832 attendees of dermatology outpatient department were requested to fill out a questionnaire for their presenting concerns to attend, the demography information (age, gender, and occupation), and presence of excessive visible sweating symptoms after the informed, written, and understood consent. This questionnaire was then evaluated by the researchers. And those who had a history of excessive sweating were evaluated in detail about HH by another questionnaire. **Results:** The overall prevalence of HH was 17.9% (149/832), whereas only self-reported prevalence was 10.2% (85/832) in the dermatology outpatients. Of 149 patients, 110 (73.8%) were of primary HH followed by 39 (26.2%) of secondary HH. **Conclusion:** This study showed a higher prevalence of HH in the attendees of dermatology outpatients of a tertiary care center but estimates that this disease affects a much larger proportion of individuals in the Nepalese population.

Keywords: Hyperhidrosis, hyperhidrosis disease severity scale, thermoregulation

Introduction

Hyperhidrosis (HH) is a disorder characterized by excessive sweating beyond required for normal thermoregulation^[1,2] as a result of the excessive functioning of the sudomotor sweat control system.^[3] HH is broadly classified into 2 categories: Primary HH and secondary HH and can further be delineated into focal or generalized. Secondary HH occurs with an underlying medical condition, such as neurological, endocrinological, cardiovascular, neoplastic, and infectious diseases, or secondary to medication intake. In contrast, primary or essential HH is idiopathic occurring without underlying medical conditions.^[4,5] It is usually focal (primary focal HH), bilateral, and relatively symmetric.^[4] The axillary disease is the most common, affecting approximately one-half of patients.^[6,7] This is followed by palmoplantar disease, which affects up to one-third of patients.^[6] Patients with primary HH can also have a generalized disease with varying degrees of severity; affecting the axillae, palms, soles, face, scalp, trunk, or other areas

of the body; as well as any combination of sites. Secondary HH is most often generalized, but in some cases, it can be focal. HH affects ~3% of the population in the USA and at least 176 million people worldwide.^[6] Prevalence is likely significantly higher than currently estimated because it is both underreported by patients and underdiagnosed by physicians. In a hospital-based study, the reported prevalence of HH varied from 16.7% in Canada to 18.4% in China.^[8] The prevalence of primary HH has shown a wide variation, ranging from 2.8% in the USA^[6] to 5.5% in Sweden,^[9] 16.3% in Germany,^[10] 12.8% in Japan,^[11] 14.5% in China, and 12.3% in Vancouver.^[8] The prevalence of secondary HH observed in the study conducted by Liu *et al.*^[8] was 3.9% in China, 4.4% in Canada, and 14.8% in Sweden.^[9] Therefore, this disease is not a rare event.^[6] Persons of all ages can be affected by HH. Primary HH, unlike secondary HH, usually begins either in childhood or adolescence. In a study with the general population^[12] found that the onset of symptoms occurred at a mean age of 15 years. The age of onset is

Surajsingh
Wadhawa,
Sudha Agrawal,
Manoj Chaudhary,
Sanjib Sharma¹

Departments of Dermatology
and ¹Internal Medicine,
B.P. Koirala Institute of Health
Sciences Ghopa, Dharan, Nepal

Address for correspondence:
Dr. Surajsingh Wadhawa,
Department of Dermatology,
B.P. Koirala Institute of Health
Sciences Ghopa, Dharan, Nepal.
E-mail: surajsinghw@gmail.com

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likely influenced by the affected body region.^[13] It affects equally males and females.^[13] Family history is often reported by patients affected by HH.^[14,15] It is exacerbated by stress, emotion, anxiety, or social situations and occurs in all seasons, including winter. The starch-iodine test for detecting the area of HH and the Hyperhidrosis Disease Severity Scale (HDSS) are instruments often used by clinicians assessing sweating problems.^[9] HH is still underdiagnosed by health professionals and a few studies assessed its prevalence in Sweden, Europe and the USA.^[6,8-10] No such studies have been done in Nepal till date to the best of my literature search. Knowledge regarding HH and its negative effects in the Nepalese population is important for evaluating health hazards, education, and priority planning in health care. Therefore, we conducted this study to estimate the prevalence, clinicoepidemiological characteristics, the most affected anatomical regions, severity, and associated disorders in HH patients attending the dermatology outpatients of a tertiary care hospital.

Method

This cross-sectional comparative study was initiated after approval by the Institutional Ethical Review Committee and was performed in accordance with the principles established in the Declaration of Helsinki. The time duration was between December 2017 and August 2018; and patients (attendees) attending the dermatology outpatient department (OPD) of both sexes were enrolled.

Sample size

Based on the previous study by Liu *et al.*^[8] in an outpatient hospital-based prevalence of HH of 18.4%, a total of 757 patients (attendees) were needed, considering an error of 5% and relative precision of 15%; however, a total of 832 attendees were enrolled with additional ~10% added to account for nonresponders (children, adolescents, and elderly, and those who lacked the discernment about the answer questionnaires were excluded). Informed, written, and understood consent was obtained from all the study participants.

Evaluation Methods for HH

Demographic data (age, gender, occupation, body mass index, and social status), age of onset of HH, pattern of sweating (duration of symptoms, onset (sudden/gradual), frequency, areas involved, symmetry, exacerbating or relieving factors, presence of sweating during sleep, and past treatment), family history of HH, associated symptoms, personal history of smoking/alcohol use, history of atopy, drug intake, seasonal variations, presence of any concomitant illness, such as fever, weight loss, anemia, gastrointestinal diseases, hepatobiliary diseases, renal diseases, thyroid diseases, diabetes mellitus, current and past medications, and associated psychiatry comorbidity information were collected and recorded from each HH

patient. The cutaneous examination was performed to assess the involvement and associated dermatological disease.

The study was divided into 2 parts. In the first part, the randomly selected 832 attendees of dermatology OPD were requested to fill out a questionnaire for their presenting concerns to attend, the demography information (age, gender, and occupation), and presence of excessive visible sweating symptoms after the informed, written, and understood consent. This questionnaire was then evaluated by the researchers. Those who had a history of excessive sweating were evaluated in detail about HH using another questionnaire.

Definition of HH

HH involves excessive sweating of the underarms, hands, feet, face, groin, or other body areas, which was much more than what was normal and occurs regardless of temperature, exercise, or situation for ≥ 6 months duration.

Investigations

Following investigations were carried out in the patient presenting as late-onset or recent onset of HH for the diagnosis of secondary HH: complete blood count, absolute eosinophil count, peripheral blood smear, thyroid function test, lipid profile, fasting and postprandial blood sugar, X-ray chest posteroanterior view, renal function test, liver function test, and human immunodeficiency virus serology. Associated dermatological diseases were also clinically evaluated and additional investigation such as Gram's stain, potassium hydroxide microscopy, or fungal culture or histology was done whenever needed.

Statistical analysis

After completion of the study, data were statistically described in frequencies (number of cases) and percentages (%) when appropriate. Categorical variables were compared using χ^2 test and continuous variables were compared with the Student *t*-test when data were normally distributed. When data were not normally distributed, statistical comparisons were made using the Mann-Whitney U-test. All statistical calculations were done using computer programs IBM SPSS (Statistical Package for the Social Science) statistics for Window Version 10.0.

Results

This study was carried out to describe the prevalence, clinicoepidemiological characteristics of HH, and its impact on the quality of life. During this study period, a total of 832 attendees in dermatology OPD were requested to fill out a questionnaire on their presenting concerns, demography, and were evaluated in details regarding the presence of sweating symptoms. Among them, 149 had excessive sweating and were enrolled as cases in this study. Two hundred and thirty-four subjects who had no complaint

of excessive sweating were selected randomly and enrolled as controls for the assessment of associated cutaneous and systemic diseases. The flowchart of the recruitment process of the study population is depicted in Figure 1.

Prevalence of HH among dermatology outpatients

In our study population, self-reported (presented to the dermatology OPD with symptoms of excessive sweating only) HH was found in 85 cases, whereas dermatological diseases associated with the presence of excessive sweating (HH) were found in 64 cases. Thus, the overall prevalence of HH was 17.9% (149/832), whereas only self-reported prevalence was 10.2% (85/832) in the dermatology outpatients [Table 1]. Distribution of patients with HH is also shown in Table 2. Figure 2 shows HH of palms and plantar.

Discussion

HH is a disorder characterized by excessive sweating beyond the level physiologically required for thermoregulation.^[16,17] Its etiology can be primary (idiopathic) recent studies having tried to demonstrate a putative genetic link^[18,19] or secondary to other diseases, such as infections, neurological disorders, metabolic disorders, neoplasms, spinal cord injuries, anxiety, and stress.^[12,20] For those suffering from it, HH causes profound embarrassment—at the social, psychological, professional, and emotional level. The degree of impairment of quality of life (QoL) in patients with HH is comparable with that seen in patients with chronic diseases, such as severe psoriasis, kidney failure, and advanced-stage rheumatoid arthritis.^[21] HH is still

underdiagnosed by health professionals, and no such studies have been done in Nepal. Therefore, we conducted this study to estimate the prevalence, clinicoepidemiological characteristics, the most affected anatomical regions, severity, associated disorders, and impact on the QoL in HH patients attending the dermatology outpatients of a tertiary care hospital.

Prevalence of HH

There are few data on the worldwide prevalence of HH that reported values ranging from 0.072% to 38%.^[21,22] In our study, the overall prevalence of HH was 17.9%, which was similar to studies done in Germany and Japan with a prevalence of 16.3% in Germany and 12.5% in Japan.^[10,11] However, it was different from a study done in the USA with 2.8% prevalence,^[6] and was much higher reported from tropical India (38%). Possible reasons for wide variation may include differences in study methods, precise definitions used, the ethnic composition of the study population, age, gender, occupation, and environment. For the assessment of HH prevalence, the prevalence of HH in our study was found to be 17.90% which is much higher than 2003 US study^[6] and shows how intensely it has been underreported. The high burden of the HH indicates the importance of the cautious selection of HH patients versus non-HH ones for future genetic or epidemiological studies, as many patients with HH do not report their excessive

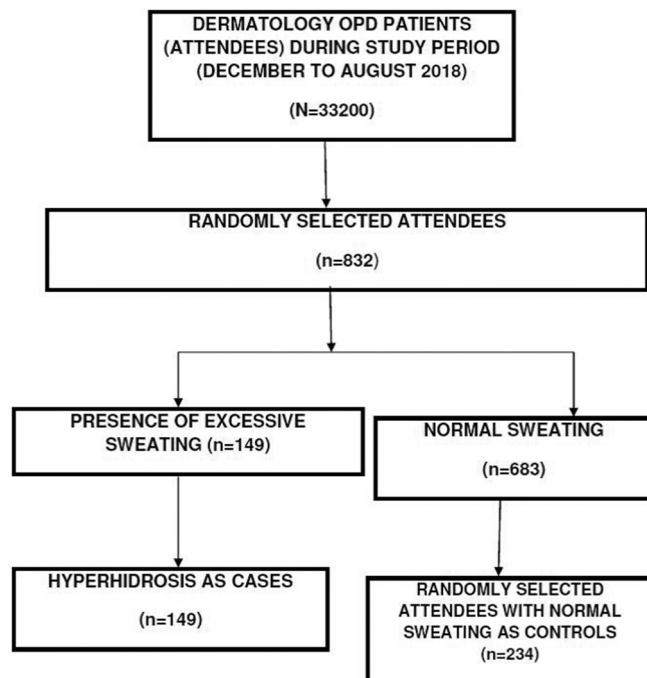


Figure 1: The flowchart of the recruitment process of the study population

Table 1: Prevalence of hyperhidrosis among dermatology outpatients

Patients presentation to the OPD for dermatological problem	Case (n=149), n (%)
Infection and infestation	30 (20.2)
Bacterial	3
Viral	9
Fungal	12
Parasitic (scabies)	6
Inflammatory disorders	2 (1.4)
Dermatitis	17 (11.4)
Urticaria/angioedema	3 (2)
Pigmentary disorders	3 (2)
Hair disorders	2 (1.3)
External injuries/bites	2 (1.3)
Tumors/swelling	5 (3.4)
Miscellaneous	0
Hyperhidrosis	85 (57)

OPD=Outpatient department

Table 2: Age-wise and gender-wise distribution of patients with hyperhidrosis

Age (years)	Cases, n (%)
≤18	75 (50.3)
19-24	61 (40.9)
25-34	11 (7.4)
≥35	2 (1.4)



Figure 2: Bilateral palms with excessive sweating (a), plantar hyperhidrosis (b), positive iodine starch test on palm (c), positive iodine starch test of plantar hyperhidrosis (d)

sweating unless they are asked for it. We also examined the potential impact of the presenting concerns of the subjects have on the prevalence of HH. In general, the presenting diagnoses influenced the prevalence of HH, with a true prevalence of 17.9% and self-reported prevalence of 7.69%. Future speculation about the cause and the details is recommended.

Demographic characteristics

In our study population, the majority (91.3%) of the HH patients belonged to the age of <25 years. This is an important factor because this age group is marked by an intense need to establish interpersonal relationships, to play sports, and to perform the activities, and the development of these activities may be seriously affected by this disease.^[12] These findings were in corroboration with the study done in Brazil by Lima *et al.*^[21] Among 149 patients, males had been affected more (84, 56.4%) than females (43, 43.6%). Similar males' preponderance was observed in other studies too.^[22-24] However, this was contradicted by Lear *et al.*^[25] who showed a higher prevalence of HH among females. Another study by Tu *et al.* has shown no gender differences.^[26] Males are likely to develop HH or females often seek treatment for HH in clinical practice might give a false impression that it is predominant in females or there is no gender difference. This variation might reflect the concern of the individual over the existing problem among individuals. To our knowledge, this population-based study is first for assessment of HH prevalence in Nepal. The impact of geographical locations on the prevalence of HH has not been investigated previously. Our study took place in Dharan city located on Province No 1. However, the prevalence of HH in the other studies seems to be similar, suggesting that geographical locations do not seem to influence the development of HH.^[27]

HH and religion

In our study, the maximum number of patients practiced Hindu religion, that is, 122 (81.9%). This may be explained because of the fact that 80.8% of the Nepalese population in Nepal are Hindu (Central Bureau of statistics, 11th national consensus 2068).

HH and occupation

In our study, the majority (84.6%) of patients were students, which was almost similar to the findings in the study done in polish adults where 50% of the students were affected.^[28] In a study by Lear *et al.*^[25] they have also found that students were highly affected by HH (43.4%) than people of other occupation. Many studies have revealed the onset of HH during adolescence in the majority of cases.^[23,26] In our study, the mean age of the patients was 17.25 years. Their increased awareness of the disease, more involvement in social activities, and more concern about the health than patients of other occupation might be a few suggested facts for HH common in students.

Family history of HH

In our study, 47.7% of the study population had a family history of HH. This is similar to the positive family history observed by Ro *et al.* (65%) and Felini *et al.* (44%).^[14,23] In a survey of 410 Japanese patients, positive family history was seen in 147 (36%) patients.^[19]

History of atopy

It has been shown in various studies that sweat is an important factor in an exacerbation of atopic dermatitis. In a survey of adult atopic patients, sweating was named as a principal factor for an exacerbation of atopic dermatitis. Also, genetic colonization of atopy and HH is also possible.^[29]

Aggravating factors

Eccrine sweat glands are innervated by cholinergic fibers from the sympathetic nervous system. Their sweat secretion function is affected by emotional and gustatory stimuli. Excessive sweating of HH patients is usually triggered by anxiety, embarrassment, fear, anger, excitement, or mental stress. In our study, there had been the presence of aggravating factors in 75.8% of cases of HH and we focused on self-perceived psychological stress in those affected by HH, which has a strong social component. In general, the body of a human being adapts successfully to environmental and internal challenges, which lead to complex physiological, psychological, and behavioral responses. This stress response depends on the situation, the kind of stressor and whether the stress is acute, episodic or chronic. Avoiding a handshake, wearing dark clothes, changing shirts several times a day, worrying about someone seeing the pit stains – all of this implies that psychological stress constitutes a strong social component in the everyday life of the hyperhidrotic. In our study, we studied aggravating factor with stress in 28.9% of cases, heat in 26.2%, and food (tea, coffee, spicy food) in 8.1%, and majority of them were having aggravation in summers (69.8%). These findings were similar to studies in Germany, Brazil, and Japan, in which 30–37.9% of patients with HH are frequently or constantly bothered by their sweating leading to stress^[10] and study done in 2009 by Yamashita *et al.*^[19] in which there was 56.7% exacerbation by stress, emotion, anxiety, or social situation, whereas 22% had exacerbation because of heat or humidity.

Fitzpatrick's skin type and type of HH

In our study population, majority, that is, 67.8% of patients were of Fitzpatrick skin type IV and 32.2%, with Fitzpatrick skin type III which was different from the study done in Japan by Cloward^[27] which states Japanese, that is, Fitzpatrick skin type III are 20 times more affected than other ethnic groups with a prevalence of 13.02%. Also, similar findings were seen in the study done in Germany which showed a prevalence of 16.3%.^[10] Whereas a similar study in Japan showed the prevalence of 12.8%,^[11] another study done in Canada by Liu *et al.*^[8] showed the prevalence of 4.4%, and in 2004, in China, a study done by Stratton, *et al.*^[6] showed the prevalence of 3.9%.

Site of HH (palms, soles, axillary region)

Although a full understanding of the pathophysiology of HH is lacking, there is evidence implicating a heightened

sympathetic activity through the T2 and T3 ganglia resulting in palmar HH.^[13] In our study, palmoplantar HH with 2 sites involvement of palms and soles was seen in 74.5% of cases, whereas palmoplantar-axillary HH was seen in 25.5% of cases with involvement of 3 sites, that is, palms, soles, and axilla, which was similar to a study done in Sweden; 50% of the patients had 2 or 3 areas of involvement. Park *et al.* also found palms, soles, and axilla the commonly affected sites (54.6%).^[12]

Severity of HH

The severity and impact of HH were assessed using the HDSS, which provides a qualitative measure allowing tailored treatment; this validated and reliable instrument has been used in other studies of HH.^[30] The HDSS is used to determine the severity of sweating experienced by the respondents. The HDSS, a 4 point single scale is used to read, the severity of symptoms based on tolerability and interference with daily activities. In our study, 85 patients (57%) had sweating that was “barely tolerable or intolerable and frequently or always interfered” the daily activities. Similarly, Park *et al.*^[12] observed >90% of patients interfering daily activities. As HH is a disease which can hamper work and daily activity and may have an impact on life, further multicenter studies are needed to determine the prevalence and association of HH with cutaneous, medical, and systemic diseases. One center-based study may provide an estimation of prevalence for future study for the Nepalese population. We are also planning to do a review study on night sweating in the future by asking more details about the pattern of the night sweating. A multicenter study including all the province of Nepal is needed to know the true prevalence of HH in Nepal.

Conclusion

This study showed a higher prevalence of HH in the attendees of dermatology outpatients of a tertiary care center but estimates that this disease affects a much larger proportion of individuals in the Nepalese population. There is a necessity of education and adequate and appropriate management for the HH.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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