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The Prevalence and Severity of Hand Eczema Among Adults in Tasiilaq, East Greenland

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Keywords: Arctic | cross-sectional | epidemiology | ethnic | Greenland | hand eczema | HECSI | Inuit | occupational exposure | wet work

ABSTRACT

Background: Hand eczema (HE) is described as a common disease in Greenland, but studies on its epidemiology and severity are lacking.

Objectives: To investigate the point prevalence and severity of HE among adults in East Greenland in relation to age, sex, and occupation.

Methods: In May 2022, we conducted a cross-sectional study in Tasiilaq, East Greenland. All adults aged ≥ 18 years were invited ($n = 1311$ individuals).

Results: A total of 295 participants accepted the invitation. Among these, the point prevalence of HE was 22.4% (95% confidence interval [CI]: 18.0–27.5, $n = 66/295$), and 5.0% based on the total invited population ($n = 66/1311$). The median age of participants with HE was 40 years (interquartile range [IQR]: 30–54), and the median age at disease onset was 25 years ([IQR]: 19–40). Females were more frequently affected than males (65.2%, $n = 43/66$). Atopic dermatitis was diagnosed in 7.6% of participants with HE. The mean Hand Eczema Severity Index (HECSI) score was 21 (range 2–112), and exposure to wet work was reported by 57.4% of the participants with HE.

Conclusions: Hand eczema is common in East Greenland, with a point prevalence similar to that in Nordic countries. The severity and distribution of HE in relation to age, sex, and occupation were comparable to those reported in other European studies.

1 | Introduction

Hand eczema (HE) is a common inflammatory skin disease that severely impairs quality of life and work ability, causing a major financial burden on society [1].

Greenland is the largest island on Earth and is located in the Arctic. The climate is cold, and humidity is low during most seasons. Greenland has a population of 56 600 individuals, of whom 89% are of Inuit and 8% of Danish descent [2]. The population mainly lives in towns and settlements along the west coast, which includes the capital Nuuk. A small portion of the population lives on the east coast, where Tasiilaq is the largest town with a total population of 1931 (adults: $n = 1311$; female adults: $n = 646$ by April 1, 2022) [2]. There are five nearby settlements (Sermiligaaq, Isertoq, Kulusuk, Tiilerilaaq, and Kuummiit). Each settlement has less than 250 inhabitants and is only accessible by helicopter or boat [2]. The Inuit populations lived in isolation for centuries, with those on the east coast remaining isolated until the late 19th century. This isolation led to a distinct genetic composition with minimal genetic admixture from other populations [3]. Hand eczema is considered a common disease in Greenland [4]. In particular, a high prevalence of HE has been reported among workers in the Greenlandic seafood processing industry [5]. The unique genetic composition, along with the cold climate and other environmental factors, could influence the prevalence and severity of HE [4]. Until our recently published study [6], no research had investigated the epidemiology of skin diseases in the general Greenlandic population. This is a sub-study of that broader investigation. While the main study was advertised as a general exploration of skin diseases, this sub-study specifically investigates the point prevalence of HE in relation to age, sex, severity and occupation among adults in the Greenlandic population.

2 | Methods

We conducted a cross-sectional population-based survey and a clinical skin examination in the town of Tasiilaq (latitude 66°, annual mean temperature −0.3°C, Figure 1) [7] between May 4 and 11, 2022, as published before [6]. All adults ≥ 18 years living in Tasiilaq (total $n = 1311$) were invited to participate, regardless of previous or current skin disease. Adults from the neighbouring settlements were also invited to participate, provided they travelled to Tasiilaq.

We promoted the study three months before enrolment via social media, local radio, newspaper articles, and with posters in Tasiilaq. The study was conducted in the community hall, which was centrally located and easily accessible. Informed, written consent was required from each participant before study inclusion.

Each participant was interviewed about sociodemographic data, history of physician-diagnosed skin disease, and current symptoms of skin disease. A skin examination was offered to

FIGURE 1 | Nighttime view of the town of Tasiilaq illustrating the Arctic setting.

each participant and performed by a physician with a minimum of 1 year's experience in dermatology. The diagnosis of current HE and atopic dermatitis were based on clinical findings supported by reported symptoms, with the diagnosis of atopic dermatitis determined using the Hanifin and Rajka criteria [8]. Participants with current HE were offered an HE-specific questionnaire to complete, which included questions on current profession, occupational exposures, healthcare-seeking behaviour, disease duration, and frequency of flare-ups. Disease severity was measured using the Hand Eczema Severity Index (HECSI), a commonly used tool for assessing the intensity and the extent of HE [9]. The HECSI score incorporates the extent of the eczema on both hands and six clinical signs (erythema, infiltration/papulation, vesicles, fissures, scaling and oedema). The HECSI score ranges from 0 to 360 points. We categorised each score into severity levels based on the cut-off values proposed by Oosterhaven and Schuttelaar [10], where HE was defined as clear (0), almost clear (1–16), moderate (17–37), severe (38–116) and very severe (≥117). Chronic HE (CHE) was defined as HE that lasted for more than 3 months or had ≥2 flares within the last 12 months, as reported by the participants [11].

Each participant with a skin disease was informed about their condition and locally available treatment options. If it was suspected that HE was caused by occupational exposures, we submitted a report to the Greenlandic Centre for Work Injuries, as part of the Danish Labour Market Insurance. The study was approved by the National Scientific Ethics Committee for Greenland (KVUG-2021-23) and the Agency of Health and Prevention in Greenland, and it followed the principles of the Helsinki II Declaration.

2.1 | Statistical Analysis

Statistical analysis was performed in SAS Studio (https://www.sas.com). We defined point prevalence as the proportion of participants with HE relative to (1) the total number of study participants and (2) the total invited adult population in Tasiilaq, assuming that all individuals with HE in the invited population participated in the study. The Wilson score interval was used to calculate confidence intervals (CI). Study data were collected and managed using REDcap electronic data capture tools version 13.7.14.

3 | Results

A total of 295 adults participated in the study, representing 22.5% of the total adult population in Tasiilaq ($n = 295/1311$, Figure 2). Full study details of the main study are presented elsewhere [6]. Hand eczema was diagnosed in 66 participants, equalling a point prevalence of 22.4% (95% CI: 18.0–27.5, $n = 66/295$, Table 1), making it the most common skin disease in the study. The self-reported lifetime prevalence of physician-diagnosed HE was 20.3% ($n = 60/295$). Among the total invited adult population, the point prevalence of HE was 5.0% ($n = 66/1311$).

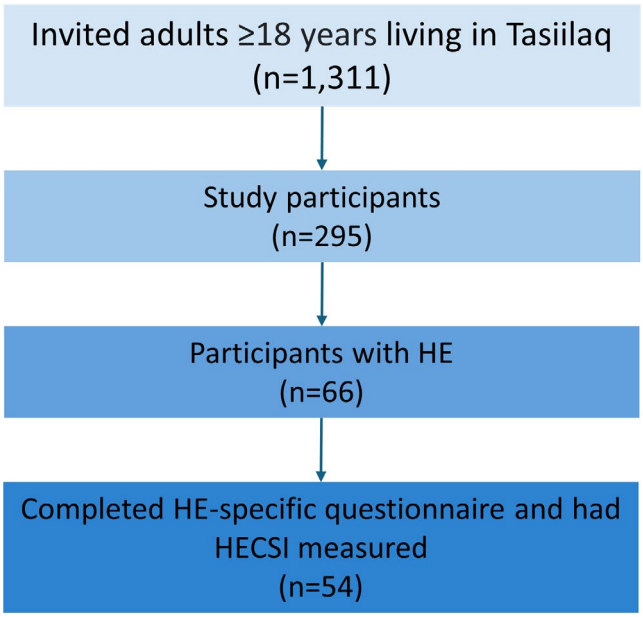

FIGURE 2 | Flowchart of the study participant enrollment. HE = hand eczema. HECSI = hand eczema severity index.

All participants with HE lived in Tasiilaq, apart from three participants who lived in the neighbouring settlements. The median age of participants with HE was 40 years (interquartile range [IQR] 30–54), and the median age at disease onset was 25 years (IQR 19–40). Of the 66 participants with HE, 43 were female (65.2%). The point prevalence of HE among the total invited female population was 6.7% ($n = 43/646$), compared to 3.5% among males ($n = 23/665$).

Nearly all participants were of Inuit descent (97.0%, $n = 64/66$) and were current smokers (66.7%, $n = 44/66$). Five participants with HE were also diagnosed with atopic dermatitis, which was the most common coexisting skin condition (7.6%, $n = 5/66$, Table 1). The participants' occupations were distributed equally among unskilled (27.3%, $n = 18/66$), semi-skilled (25.8%, $n = 17/66$), and skilled work (25.8%, $n = 17/66$). There were too few participants to provide details on specific occupations, as this could reveal personally identifiable information. Overall, most participants worked in the service sector, mainly in personal care and healthcare, followed by elementary occupations, including cleaning, fishing, hunting, and cooking.

A HE-specific questionnaire was completed by 81.8% of the participants with HE ($n = 54/66$, Table 2). The prevalence of CHE was 88.9% (95% CI: 77.8%–94.8%, $n = 48/54$). More than half of the participants had sought medical attention for their HE in the past year (61.1%, $n = 33/54$). Wet work was the most common exposure (57.4%, $n = 31/54$) followed by a cold environment (16.7%, $n = 9/54$). The 54 participants who completed the HE-specific questionnaire also had their HECSI severity scores measured. The mean HECSI severity score was 21 (range 2–112), indicating that most participants had a mild HE (53.7%, $n = 29/54$). The mean HECSI score was similar for males (23) and females (20).

TABLE 1 | Characteristics of the participants diagnosed with hand eczema.

Characteristics	Total, $N = 66$[a]
Sex	
Female	43 (65.2)
Male	23 (34.8)
Ethnicity[b]	
Inuit	64 (97.0)
Mixed Inuit/Danish	1 (1.5)
Other	1 (1.5)
Age, years, median (IQR)	40 (30–54)
BMI, kg/m^2, median (IQR)	26.5 (24.4–30.2)
Accommodation	
House/attached house	43 (66.2)
Apartment	22 (33.8)
Nursing home/dormitory	—
Household members	
≤ 2	17 (26.2)
3–5	33 (50.0)
≥ 6	15 (22.7)
Educational level[c]	
Low	33 (50.0)
Medium	4 (6.1)
High	29 (43.9)
Employment status	
Unemployed	10 (15.2)
Unskilled work[d]	18 (27.3)
Semi-skilled work	17 (25.8)
Skilled work	17 (25.8)
Full-time student or retired	4 (6.1)
Traditional diet[e]	
≤ 1 time weekly	21 (31.8)
2–5 times weekly	34 (51.5)
≥ 6 times weekly	11 (16.7)
Smoking status	
Current	44 (66.7)
Former	10 (15.2)
Never	12 (18.2)
Alcohol consumption	
No	31 (47.7)
Yes	34 (52.3)
≤ 14 units weekly	26 (76.5)
≥ 14 units weekly	8 (23.5)
Coexisting skin conditions	
None	52 (78.8)
Atopic dermatitis[f]	5 (7.6)
Acne vulgaris	2 (3.0)
Discoid eczema	2 (3.0)
Blue nevus	1 (1.5)
Phototoxic eczema	1 (1.5)
Lichen simplex	1 (1.5)
Rosacea	1 (1.5)
Age at disease onset, years, median (IQR)	25 (19–40)

Note: Data are *n* (%) unless otherwise stated.
Abbreviations: BMI = body mass index; HE = hand eczema.
[a]There are missing data *N* for the following variables: Accommodation $n = 1$, household members $n = 1$, alcohol consumption $n = 1$, age at disease onset $n = 41$.
[b]Mixed Inuit/Danish was defined as individuals with parents of both Danish and Greenlandic descent. Other was defined as nationalities other than Greenlandic.
[c]Educational level: low was defined as no or primary education; medium was defined as secondary education; high was defined as post-secondary education.
[d]Unskilled work includes hunters and fishers.
[e]Traditional diet: Marine mammals, fish, and game.
[f]Atopic dermatitis was defined by the Hanifin and Rajka diagnostic criteria [8].

4 | Discussion

This was the first study to investigate the point prevalence and severity of HE in the adult Greenlandic population and, to our knowledge, in any Inuit population [12]. Physician-diagnosed HE affected nearly a quarter of the study participants and 5.0% of the total invited adult population of Tasiilaq.

The point prevalence based on clinical examinations in adults from the general population is reported at 5.0%, primarily from studies in European and Nordic countries [12]. However, the point prevalence in the invited adult population represents a minimum estimate and is likely an underestimation, as a substantial proportion of individuals who may have had HE were not examined. Therefore, the true prevalence of HE in Tasiilaq is likely higher than the 5.0% reported in the total invited population but lower than the 22.4% observed among the study participants. The lifetime prevalence of HE at 20.3% was higher than the 15.6% reported in European adults. This difference may result from recall bias in self-reported data, leading to over-reporting, or because of selection bias due to voluntary participation, as individuals with more challenging HE may have been more motivated to participate.

Consistent with other studies, females were more frequently affected by HE [13–15]. Many female participants worked in the

TABLE 2 | Characteristics of hand eczema among the participants.

Characteristics	Total, $N = 54$
Sex	
Female	36 (66.7)
Male	18 (33.3)
HECSI severity score, mean (range)	
Female	20 (2–104)
Male	23 (3–112)
Total	21 (2–112)
HECSI severity level	
Clear (0)	0 (0)
Mild (1–16)	29 (53.7)
Moderate (17–37)	15 (27.8)
Severe (38–116)	10 (18.5)
Very severe (≥ 117)	0 (0)
Anatomical localization	
Fingertips	27 (50.0)
Fingers	37 (68.5)
Palms	26 (48.1)
Back of hands	29 (53.7)
Wrists	9 (16.7)
Chronic hand eczema prevalence	
No	6 (11.1)
Yes	48 (88.9)
Health care treatment in the past year	
No	21 (38.9)
Yes	33 (61.1)
Primary exposures	
Wet work[a]	31 (57.4)
Cold	9 (16.7)
Fish	8 (14.8)
Meat	3 (5.6)
Oils	2 (3.7)

Note: Data are *n* (%) unless otherwise stated.
Abbreviation: HECSI = Hand eczema severity index.
[a]Wet work included frequent use of disposable gloves, alcoholic hand disinfectant, and hand washing with soap and water.

personal care or healthcare sectors and were exposed to wet work. Exposure to wet work and other irritants in both occupational settings, particularly in the healthcare sector, and domestic environments may explain the higher point prevalence of HE in females [15, 16]. The higher point prevalence of HE observed in females may also be influenced by greater health awareness, increasing their likelihood of participation compared to males.

Overall, wet work was the most frequent occupational exposure and is considered a significant risk factor for the development of HE [14]. Many participants were exposed to wet work and cold environments outside their workplace and often engaged in hunting, fishing, and other outdoor labor. These combined exposures and physically demanding tasks may contribute to the high point prevalence of HE observed and pose a risk factor for HE in Arctic regions.

Disease onset occurred in early adulthood for most participants, which is comparable to findings reported in other studies [12]. Hand eczema often affects young adults in the middle of their careers, leading to high cost of illness because of sick leave, reduced working capacity, and job loss [17]. Atopic dermatitis was diagnosed in 7.6% of the participants with HE and was the most common coexisting skin condition. Atopic dermatitis is a well-known risk factor for HE, and it is associated with a poor prognosis [1]. However, few studies have clinically examined its prevalence in adults with HE and have been limited to selected populations [18]. Therefore, further clinical studies are needed to determine the global prevalence of atopic dermatitis among adults with HE in the general population [18].

Approximately one-third of the participants had not sought medical attention for their HE within the past year, which was comparable to the healthcare-seeking behaviour of the Danish general population [19].

Most participants had mild HE that was equally distributed between sexes, consistent with previous findings in adult populations [12, 20]. The mild severity of HE may be influenced by the warmer temperatures in late spring, as HE often worsens in colder, low-humidity conditions. However, this relationship still requires investigation in Arctic populations [1]. Additionally, two-thirds of the participants were current smokers, which could have impacted HE severity. Some studies have found a positive association between smoking and an increased prevalence and severity of HE, although the causal relationship remains unclear [21–23]. Half of the participants reported a low educational level, which has previously been associated with HE [24]. The high proportion of participants with low education in this study may reflect their engagement in physically demanding jobs.

4.1 | Strengths and Limitations

This study had some limitations. Selection bias may most likely be present because of voluntary participation, as individuals with more challenging HE could have been more motivated to participate than those without. This may have caused a higher point prevalence among the participants, but a lower point prevalence compared to the total invited adult population. Additionally, the severity of HE among the participants might have been overestimated.

Individuals who lived in the settlements had to travel by boat to take part in the survey, which could explain their lower participation rate. However, we invited all adults, regardless of skin disease, and we advertised several months before the study

start. We did not perform patch and prick testing. Therefore, we could not determine the causes of HE nor identify specific HE subtypes. Understanding HE risk across occupational groups in Arctic regions is critical for prevention, particularly given the high prevalence observed among Greenlandic seafood processing workers, a key industry in Greenland [5, 25].

The strengths of this study included a cross-sectional, population-based design with clinical skin examinations conducted by at least one physician with experience in dermatology, ensuring consistent evaluation of HE and HECSI. Additionally, there was a high participation rate, with almost a quarter of the total adult population in Tasiilaq participating within a single week. Using other methods, such as a questionnaire-based study approach by email, might have reached more respondents, but this method poses challenges in Greenland as some segments of the population may be unfamiliar with it, which could lead to inconsistent evaluations.

5 | Conclusion

HE is common in adults living in East Greenland and is at least as prevalent as in Europe and Nordic countries. The severity and distribution of HE, in relation to age, sex, and occupation, were comparable to findings from other studies.

Author Contributions

Morten Bahrt Haulrig: investigation, writing – original draft, formal analysis, project administration, conceptualization, funding acquisition, methodology, visualization, writing – review and editing, resources. **Anna M. Andersson:** writing – review and editing, methodology, resources. **Julia-Tatjana Maul:** writing – review and editing, investigation. **Jingyuan Xu:** investigation, writing – review and editing. **Su M. Lwin:** investigation, writing – review and editing. **Carsten Flohr:** investigation, writing – review and editing, funding acquisition. **Lone S. Hove:** investigation, writing – review and editing. **Christopher E. M. Griffiths:** investigation, writing – review and editing, funding acquisition. **Anders Koch:** writing – review and editing, methodology. **Claus Zachariae:** investigation, writing – review and editing, methodology. **Jacob Pontoppidan Thyssen:** investigation, project administration, writing – review and editing. **Tove Agner:** project administration, investigation, writing – original draft, writing – review and editing, methodology, supervision, conceptualization, visualization, resources.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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