



Original Research

Seasonal and gender variation in skin disease: A cross-sectional study of 3120 patients at Razi hospital ☆☆☆★

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ARTICLE INFO

Article history:

Received 28 June 2021

Revised 20 September 2021

Accepted 21 September 2021

Keywords:

Seasonal variation
skin disease
prevalence
Iran

ABSTRACT

Objective: We aimed to determine the prevalence of different skin diseases and their seasonal variations at the Razi dermatology hospital from 2019 to 2020.**Methods:** In this cross-sectional study, we obtained data from the medical records of 3120 patients visiting the dermatology clinic of Razi hospital. The prevalence of skin diseases was evaluated using meteorologically defined seasons. We looked for significant equally distributed results during each season.**Results:** During all seasons, women were referred to our clinic more frequently than men. Some diseases demonstrated significant seasonality with a peak during the winter, including acne, eczema, wart, seborrheic dermatitis, nevus, vitiligo, lentigo, and dermatophytosis. Atopic dermatitis was more frequent during the spring and winter compared with other seasons ($p < .05$). Actinic keratosis and lichen planus showed a significant seasonal trend with a peak during the summer ($p < .05$). Infections, including viral, bacterial, and fungal skin diseases, were more frequent during the winter than the summer ($p = .001$).**Conclusion:** This study provides an overview of the seasonal distribution of dermatology visits at our referral hospital, which will aid in developing better policies to prevent and manage skin disorders in outpatient visits.© 2021 The Authors. Published by Elsevier Inc. on behalf of Women's Dermatologic Society. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Skin disease accounts for 8.4% of outpatient visits in primary health care offices (Hancox et al., 2004). Despite the high prevalence and burden of skin diseases, they have been neglected as a priority in the development of health policies. The proper management of skin problems at outpatient clinics has been suggested as an effective strategy to decrease costs of hospital visits and improve patients' quality of life. To educate primary health care workers to focus on the diagnosis and treatment of the most common cutaneous diseases, one needs to determine the most prevalent skin disorders that present for care in each region (Jha and

Gurung, 2006). Several studies have indicated that the frequency of skin diseases could be affected by climate change (Maraki and Tselentis, 2000; Osmani et al., 2015; White, 2012). However, due to wide environmental and climatic differences around the world, patterns of seasonality presumably vary in different regions.

Iran is located in the west of Asia and is a four-season country with a continental climate. The average temperature during the winter is approximately 3°C and 8°C (37°F–46°F) and increases during the summer (30°C–32°C [86°F–90°F]). The annual precipitation rate varies from 600 mm to 1000 mm in plains and mountains. Reports on the seasonality of skin diseases from Iran are scarce. The Razi hospital has the main tertiary dermatology referral department in Iran. With regard to the lack of experienced health care providers who can effectively provide primary skincare in rural areas of the country, most patients were referred to this center with skin disease manifestations or exacerbations. To provide basic data for improving health policies in the region, we aimed to describe the most prevalent dermatologic outpatient diagnosis and

☆ Originally received: June 28, 2021.

☆☆ Final revision: September 20, 2021.

★ Accepted: September 21, 2021.

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Table 1
Gender and age difference of clinical visits during each season

	Gender			Age groups, year, n (%)						
	Female	Male	Total	0–15	16–30	31–45	46–60	61–75	>76	Total
Season										
Autumn	385	221	606	57 (9.4)	217 (35.8)	196 (32.2)	88 (14.5)	43 (7.1)	5 (0.8)	606
Spring	436	224	660	54 (8.2)	222 (33.6)	237 (35.9)	106 (16.1)	33 (5)	8 (1.2)	660
Summer	506	275	781	58 (7.4)	260 (33.3)	301 (38.5)	109 (14)	43 (5.5)	10 (1.3)	781
Winter	674	399	1073	95 (8.9)	356 (33.2)	369 (34.4)	161 (15)	82 (7.6)	10 (0.9)	1073
Total	2001	1119	3120	264	1055	1103	464	201	33	3120

its seasonal variation during a year-long period in Razi hospital in Tehran, Iran.

Methods

This cross-sectional study was conducted using the medical information of 3408 patients visiting the dermatology clinics of Razi hospital. The data were obtained from medical records from March 2019 to March 2020 and were evaluated using meteorologically defined seasons as follows: March 1 to May 31 (spring); June 1 to August 31 (summer); September 1 to November 30 (autumn); and December 1 to February 28 (winter). Because Razi is a referral dermatology hospital, no unrelated diagnoses were reported. Only new cases were included, and 288 medical records were excluded due to incomplete data. Skin disorders were categorized into several groups: disorders of pigmentation, adnexal diseases, neoplasms, alopecia, urticaria, erythematous-purpuric disorder, papulosquamous and eczematous dermatoses, vesiculobullous diseases, connective tissue diseases, disorders of Langerhans cells and macrophages, viral infection, bacterial infection, fungal infection, cysts, leishmaniasis, and scabies.

The one-sample χ^2 test was used to assess the difference in the distribution of the disease among the four seasons. With regard to the descriptive nature of our study, no adjustments were made for comparisons. This study received approval from the local ethical committee (IR.TUMS.MEDICINE.REC.1397.762).

Results

Of the 3120 included records, 64.13% were from female patients. During all seasons, women were referred to our clinic more frequently than men (Table 1). The majority of patients (69.17%) were young and middle-aged adults with an average age of 35.24 ± 15.62 years. During all seasons, patients age 31 to 45 years were referred more frequently (35.35%) than others, except during autumn, in which 35.8% of patients were 16 to 30 years old. Most visits occurred during winter (34.39%), followed by summer (25.03%), spring (21.15%), and autumn (19.43%).

According to Table 2, papulosquamous and eczematous dermatoses, adnexal disease, disorders of pigmentation, and viral infections were the most common disease groups during all seasons. Alopecia was also a principal reason for referral during spring and autumn. Skin neoplasms and fungal infections were other important reasons for referral during winter and summer. Generally, acne (14.64%) was the most prevalent diagnosis during annual visits, followed by psoriasis (7.24%), eczema (5.61%), wart (nongenital; 4.81%), and seborrheic dermatitis (4.65%; Table 3). Acne and psoriasis were also the most common diagnoses in outpatient visits in spring, summer, and autumn.

Acne, eczema, wart, seborrheic dermatitis, nevus, vitiligo, lentigo, and dermatophytosis showed significant seasonality, with a peak in winter ($p < .05$). Furthermore, atopic dermatitis was more frequent in spring and winter compared with other seasons ($p = .05$). Actinic keratosis and lichen planus showed a significant

seasonal trend, with a peak in summer ($p < .05$). Infections, including viral, bacterial, and fungal skin diseases, were more frequent in winter than summer ($p = .001$).

Discussion

The pattern of skin diseases varies among different countries and even regions within a single country. We observed a significant seasonal variation in the distribution of some skin diseases, including papulosquamous and eczematous dermatoses, adnexal disease, disorders of pigmentation, viral and fungal infections, connective tissue disease and urticaria, and erythematous-purpuric disorders. Because autumn is the beginning of the academic semester in Iran, the increase in the frequency of young patients' referral during this season could be due to the psychological effects of disease on patients' appearance. Acne was the most prevalent reason for referral and showed a significant seasonal peak in winter. This result was in accordance with the results by Hancox et al. (2004) in the United States, which showed aggravation of acne during winter. Seasonality of skin disease has been explained by monthly alteration of ultraviolet radiation that regulates the inflammatory skin processes. The types and load of skin bacteria can be affected by temperature change (Hancox et al., 2004).

During all seasons, women were referred to our clinic more frequently than men. However, due to the observational nature of our study, we cannot confirm a true exacerbation based on the number of visits. Fungal disease had a higher frequency in winter compared with other seasons. However, this infection has shown various seasonality patterns with regard to the type of pathogen and host-related factors in previous studies. For example, vector-borne infections mostly tend to occur during summer; however, zoonotic fungal infections mostly occur in cold seasons (Jha and Gurung, 2006; Maraki and Tselentis, 2000). Moreover, viral infections were more prevalent during the winter in our study.

Similar to other infectious diseases, seasonal alteration in host immunity (including vitamin D level) has been reported in infectious skin disorders (White, 2012). Despite the results of the study by Jha and Gurung (2006), scabies made up only a small proportion of visits and did not show seasonality in our patients. Psoriasis did not have significant seasonal variation in our study either. However, some studies reported an increased prevalence of psoriasis during cold weather (Osmani et al., 2015). Lichen planus cases peaked in summer. In contrast, no seasonal trend was observed in a prospective study in the United Kingdom (Pannell et al., 2005).

In addition, in subtropical countries such as Iran, there is a type of lichen planus called *lichen planus actinicus*, which is shown to have summertime exacerbation (Weston and Payette, 2015). Seborrheic dermatitis showed a remarkable peak in winter, which was in accordance with the findings by Hancox et al. (2004) and Saçar and Saçar et al. (2010). This can be explained by the inhibitory effect of ultraviolet radiation during warm seasons on *Pityrosporum ovale* as a possible etiology in seborrheic dermatitis (Bergbrant and Faergemann, 1990). Similar to previous studies, atopic dermatitis and eczematous dermatosis were most frequently observed

Table 2
Seasonal changes in the number of patients with skin disorders visiting outpatient clinics at Razi hospital in Iran (2019–2020)

Skin disorder	Spring	Summer	Autumn	Winter	Total	Percentage	p-value
Disorders of pigmentation	69	119	79	141	408	14.09	.001
Adnexal disease	106	135	109	184	534	18.44	.001
Neoplasms of skin	25	54	24	54	157	5.42	.8
Alopecia	42	46	34	52	174	6.01	.26
Urticaria, erythematous-purpuric	38	14	6	28	86	2.97	.001
Papulosquamous and eczematous dermatoses	205	229	167	329	930	32.12	.001
Vesiculobullous diseases	2	3	2	6	13	0.44	NC
Connective tissue disease	10	14	11	27	62	2.14	.008
Disorders of Langerhans cells and macrophages	2	5	0	0	7	0.24	NC
Viral infection	49	64	68	111	292	10.08	.001
Bacterial infection	6	4	6	22	38	1.31	.001
Fungal infection	19	30	26	51	126	4.35	.001
Cysts	3	4	2	6	15	0.51	NC
Leishmaniasis	5	6	12	4	27	0.93	.12
Scabies	6	6	4	10	26	0.89	.4

NC = not calculable (due to limited number of patients)

Table 3
Seasonal frequencies of the most prevalent disease in outpatient visits at Razi hospital in Iran (2019–2020)

Disease	Spring	Summer	Autumn	Winter	Total	Percent	p-value
Acne	94	109	98	155	456	14.62	.001
Psoriasis	55	58	51	62	226	7.24	> .05
Eczema	28	43	28	76	175	5.61	.001
Wart	16	39	35	60	150	4.81	.001
Seborrheic dermatitis	28	25	28	64	145	4.65	.001
Androgenetic alopecia	37	38	29	34	138	4.42	> .05
Lichen planus	31	44	19	38	132	4.23	< .05
Nevus	17	37	21	50	125	4.01	.001
Vitiligo	18	29	22	37	106	3.40	< .05
Wart (genital)	28	23	20	35	106	3.40	> .05
Dermatitis	32	20	15	34	101	3.24	< .05
Cosmetic	30	31	21	15	97	3.11	> .05
Dermatophytosis	17	21	15	37	90	2.88	.01
Melasma	14	25	16	12	67	2.15	> .05
Actinic keratosis	5	33	10	17	65	2.08	.001
Other alopecia	27	7	16	14	64	2.05	< .001
Urticaria	21	9	6	25	61	1.96	.001
Freckles	12	15	8	17	52	1.67	> .05
Basal cell carcinoma	10	10	6	14	40	1.28	> .05
Folliculitis	9	13	5	11	38	1.22	> .05
Lentigo	6	7	7	18	38	1.22	< .05
Atopic dermatitis	13	8	2	12	35	1.12	< .05
Onychomycosis	7	5	6	14	32	1.03	> .05
Xerosis	6	8	6	12	32	1.03	> .05
Leishmaniasis	5	6	12	4	27	0.87	> .05
Other	94	118	104	206	522	16.7	
Total	660	781	606	1073	3120		

in spring and winter visits (Henriksen et al., 2015; Uenishi et al., 2001). Low humidity and temperature have been suggested to weaken the integrity of the stratum corneum during the winter, leading to epidermal barrier damage and making the skin more vulnerable to fissuring (Jha and Gurung, 2006).

Disorders of pigmentation (lentigo, nevus, and vitiligo) demonstrated seasonality, with a peak in winter, which might be due to the late referral of patients because their pigmentary changes might occur earlier in warmer seasons. Meanwhile, skin neoplasms did not present to our clinics with a significant seasonal trend. On the contrary, Bianconi et al. (2016) reported a significant seasonal prevalence in skin neoplasms during autumn, which might happen due to the latent effect of higher exposure to the sun during summer.

Regarding the observational and retrospective nature of our study, the increased frequency of skin diseases in different seasons may be confounded by patient-related factors. The exact etiology of exacerbation of skin conditions in seasons cannot be investigated because information on other contributing factors (e.g.,

patient comorbidity data) was not available. Also, it is not clear whether the pattern of seasonality in our study is affected by factors that affect patient referral and utilization of health care services.

Conclusion

This study provides an overview of the seasonal distribution of dermatology visits at our referral hospital. The majority of patients referred to the clinic were young women. More prospective studies in different parts of the country are needed to better understand patients' and general practitioners' skin care demands in Iran.

What is known about this subject in regard to women and their families?

- The frequency of skin diseases can be affected by climate change in various regions.
- The seasonal pattern of skin diseases may vary in different genders and ages.

- Reports on the seasonal pattern of skin diseases from Iran are scarce.

What is new from this article as messages for women and their families?

- Some skin diseases demonstrated seasonal patterns in Iran (e.g., acne, eczema, actinic keratosis, and lichen planus)
- The majority of patients were young adult women during all seasons.
- Acne was the most prevalent diagnosis at annual visits.

Conflicts of interest

None.

Funding

None.

Study approval

The author(s) confirm that any aspect of the work covered in this manuscript that has involved human patients has been conducted with the ethical approval of all relevant bodies.

References

- Bergbrant IM, Faergemann J. The role of *Pityrosporum ovale* in seborrheic dermatitis. *Semin Dermatol* 1990;9:262–8.
- Bianconi F, Masanotti GM, Liso A, La Rosa F, Duca E, Stracci F. Seasonal variation in skin cancer diagnosis. *Front Public Health* 2016;4:78.
- Hancox JG, Sheridan SC, Feldman SR, Fleischer Jr AB. Seasonal variation of dermatologic disease in the USA: A study of office visits from 1990 to 1998. *Int J Dermatol* 2004;43:6–11.
- Henriksen L, Simonsen J, Haerskjold A, Linder M, Kieler H, Thomsen SF, et al. Incidence rates of atopic dermatitis, asthma, and allergic rhinoconjunctivitis in Danish and Swedish children. *J Allergy Clin Immunol* 2015;136:360–6 e2.
- Jha AK, Gurung D. Seasonal variation of skin diseases in Nepal: A hospital based annual study of out-patient visits. *Nepal Med Coll J* 2006;8:266–8.
- Maraki S, Tselentis Y. Survey on the epidemiology of *Microsporum canis* infections in Crete, Greece over a 5-year period. *Int J Dermatol* 2000;39:21–4.
- Osmani F, Hajizadeh E, Mansoori P. Estimation of seasonal effect on the psoriasis recurrence using time dependent coefficient rates model for recurrent events. *J Dermatol Cosmet* 2015;6.
- Pannell RS, Fleming DM, Cross KW. The incidence of molluscum contagiosum, scabies and lichen planus. *Epidemiol Infect* 2005;133:985–91.
- Saçar T, Saçar H. Comparison of the distributions of seborrheic dermatitis, herpes zoster and pityriasis rosea according to seasons. *Turkderm* 2010;44:65–8.
- Uenishi T, Sugiura H, Uehara M. Changes in the seasonal dependence of atopic dermatitis in Japan. *J Dermatol* 2001;28:244–7.
- Weston G, Payette M. Update on lichen planus and its clinical variants. *Int J Womens Dermatol* 2015;1:140–9.
- White JH. Vitamin D metabolism and signaling in the immune system. *Rev Endocr Metab Disord* 2012;13:21–9.