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ORIGINAL ARTICLE

Epidemiological survey of the psoriasis patients in the Japanese Society for Psoriasis Research from 2013 to 2018

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Abstract

In Japan, the Japanese Society for Psoriasis Research (JSPR) has been conducting annual epidemiological surveys of patients with psoriasis since 1982. The aim of this study was to conduct a recent epidemiological analysis of the psoriasis patients who were enrolled in the JSPR from 2013 to 2018. A total of 15 287 cases were enrolled from 132 medical institutions, out of which 65.3% (9989 cases) were male and 34.7% (5298 cases) were female. Approximately 50.0% of the cases had past history and comorbidities, such as hypertension (42.0%), dyslipidemia (30.0%), diabetes mellitus (23.7%), hyperuricemia (15.1%), cardiovascular disease (6.0%), and cerebral vascular disorders (6.0%). There was a yearly increase in the use of corticosteroid/vitamin D_3 combinations and apremilast for treating psoriasis. In contrast, the use of phototherapy gradually decreased. From 2013 to 2018, approximately 18.6% of the cases were treated with biologics, such as infliximab (17.6%), adalimumab (23.3%), ustekinumab (21.4%), secukinumab (11.6%), ixekizumab (7.6%), brodalumab (6.3%), and guselkumab (4.3%). In the past decade, the biologics have changed the treatment and management of psoriasis. This survey includes significant information regarding the recent perspective of psoriasis in the Japanese Society, especially focusing on the treatment trends after the introduction of biologics.

KEYWORDS
epidemiology, dermatology, Japan, psoriasis, survey

1 | INTRODUCTION

Psoriasis is one of the most frequent chronic inflammatory skin diseases.[1,2] It is a well-known fact that race, genetic background, and environmental factors affect the onset of psoriasis.[3] The prevalence of psoriasis varies with country, and psoriasis can appear at any age. The Japanese Society for Psoriasis Research (JSPR) has conducted annual epidemiological surveys of patients with psoriasis since 1982.[4–6] Kawada et al.[4] reported 28 628 cases that were enrolled during 1982–2001, Takahashi et al.[5] reported 11 631 cases during 2002–2008 while Ito et al.[6] reported 9290 cases during 2009–2012. These results have provided significant information, such as changes in the age at onset, comorbidities, and treatment trends. In the past decade, biologics were developed and approved for the treatment of psoriasis. As of 2018, seven biologics were available in Japan: two tumor necrosis factor-α inhibitors, infliximab and adalimumab; one anti-interleukin (IL)-12/23p40 antibody, ustekinumab; three IL-17 inhibitors, secukinumab, ixekizumab, and brodalumab; and one anti-IL-23p19 antibody, guselkumab. Biologics have dramatically changed the treatment and the management of psoriasis. The purpose of this study was to conduct the recent epidemiological analysis of the patients with psoriasis who were enrolled in the JSPR from 2013 to 2018.

2 | METHODS

The JSPR partners with medical institutions throughout Japan. It uses its own questionnaire to perform annual surveys and collect

data regarding newly diagnosed psoriasis cases (from April of the previous year to March of the survey year). A total of 132 medical institutions participated in the surveys for the present study, conducted from 2013 to 2018. The survey was designed to acquire information about patients' characteristics, lifestyle habits, disease severity, family history, past history, comorbidities, exacerbating factors, focal infection, distribution of lesions, and current treatments. Only data from completed surveys were included. This study was approved by the ethics committee of Kindai University for the data obtained from 2013 to 2016 and Jichi Medical University for the data from 2017 to 2018 as they acted as the central institutes overseeing the entire survey.

3 | RESULTS

3.1 | Population

This study included all types of psoriasis, such as psoriasis vulgaris, guttate psoriasis, psoriatic arthritis, erythrodermic psoriasis, and generalized pustular psoriasis. A total of 15 287 cases were enrolled from 2013 to 2018, out of which 65.3% (9989 cases) were male and 34.7% (5298 cases) were female. The age at which the patients were initially diagnosed varied from 0 to 100 years. The mean ± standard deviation (SD) age of the patients was 53.8 ± 17.2 years (males, 54.1 ± 16.5; females, 53.2 ± 18.5). The age distributions were 119 patients aged 0–9 years (0.8%; 62 boys [0.6%] and 57 girls [1.1%]), 274 aged 10–19 years (1.8%; 125 boys [1.3%] and 149 girls [2.8%]), 947 aged 20–29 years (6.2%; 539 men [5.4%] and 408 women [7.7%]), 1836 aged 30–39 years (12.1%; 1208 men [12.1%] and 628 women [11.9%]), 2915 aged 40–49 years (19.1%; 2028 men [20.4%] and 887 women [16.8%]), 3030 aged 50–59 years (19.9%; 1912 men [19.2%] and 1118 women [21.2%]), 3139 aged 60–69 years (20.6%; 2211 men [22.2%] and 928 women [17.6%]), 2123 aged 70–79 years (13.9%; 1383 men [13.9%] and 740 women [14.0%]), 768 aged 80–89 years (5.0%; 455 men [4.6%] and 313 women [5.9%]), and 80 aged 90 years or older (0.5%; 29 men [0.3%] and 51 women [1.0%]) (Figure 1).

3.2 | Age at onset

The ages at disease onset were 0–9 years for 266 patients (2.0%; 120 boys [1.4%] and 146 girls [3.1%]), 10–19 years for 1103 patients (8.1%; 580 boys [6.5%] and 523 girls [11.1%]), 20–29 years for

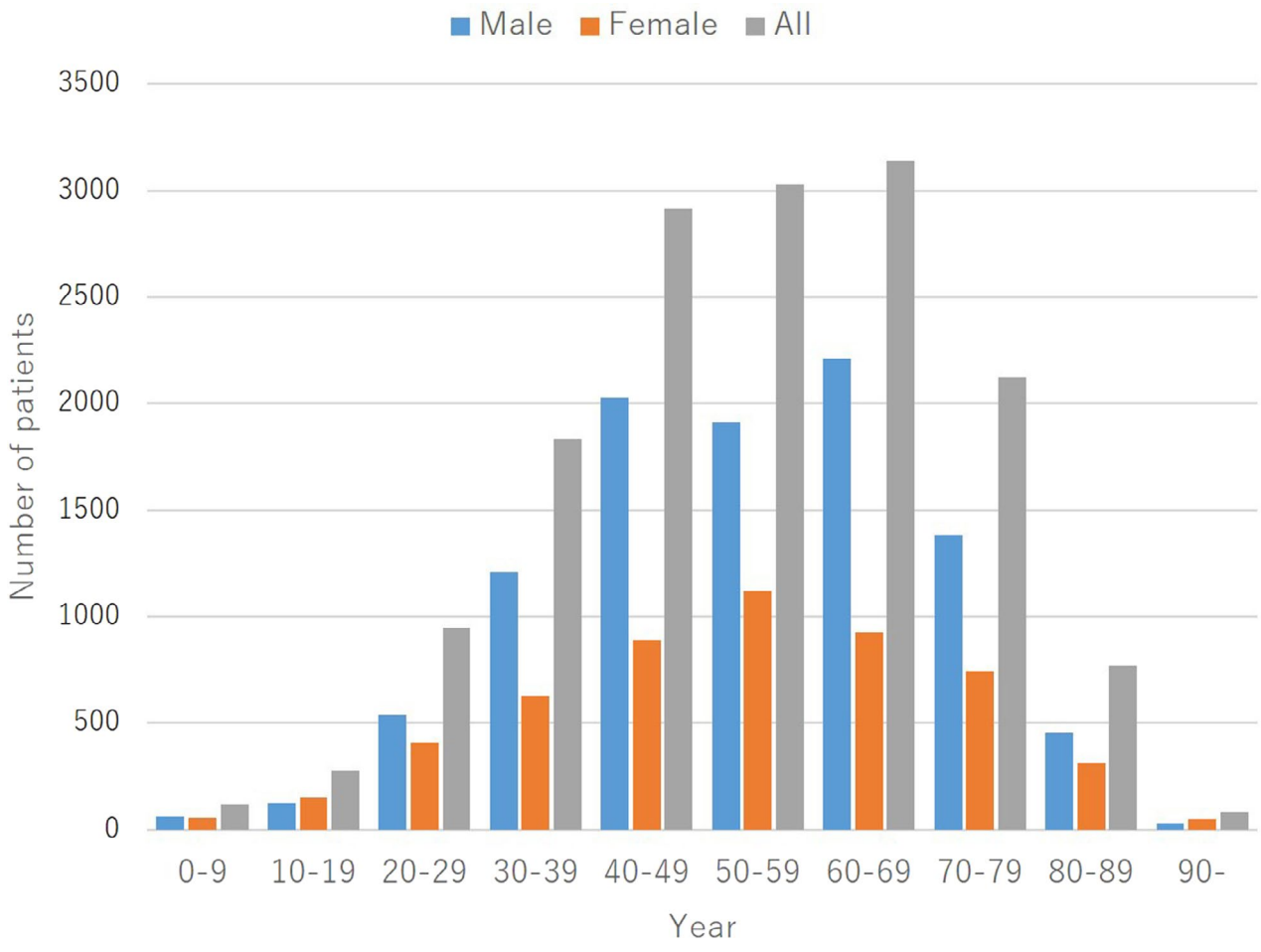

FIGURE 1 Age and sex distribution

2238 patients (16.4%; 1512 men [17.0%] and 726 women [15.3%]), 30–39 years for 2370 patients (17.4%; 1710 men [19.3%] and 660 women [14.0%]), 40–49 years for 2247 patients (16.5%; 1573 men [17.7%] and 674 women [14.2%]), 50–59 years for 2151 patients (15.8%; 1392 men [15.7%] and 759 women [16.0%]), 60–69 years for 1836 patients (13.5%; 1190 men [13.4%] and 646 women [13.7%]), 70–79 years for 1075 patients (7.9%; 646 men [7.3%] and 429 women [9.1%]), 80–89 years for 302 patients (2.2%; 152 men [1.7%] and 150 women [3.2%]), and 90 years and older for 23 patients (0.2%; 5 men [0.1%] and 18 women [0.4%]) (Figure 2).

3.3 | Patient characteristics

The mean ± SD height (cm) of the patients was 163.90 ± 10.84 (males, 168.12 ± 9.26; females, 155.40 ± 8.56). The mean ± SD weight (kg) was 64.44 ± 13.68 (males, 68.31 ± 12.54; females, 56.76 ± 12.58). The mean ± SD body mass index (BMI) was 23.86 ± 4.12 (males, 24.08 ± 3.77; females, 23.43 ± 4.71). Some patients consumed alcohol (24.3%; males, 29.2%; females, 14.7%) and/or smoked (26.1%; males, 32.1%; females, 14.7%). Some patients had an atopic disposition (4.4%; males, 3.8%; females, 5.6%).

3.4 | Severity

Psoriasis patients with less than 5%, 5–10%, and more than 10% of the affected body surface area were 36.6% (males, 32.5%; females, 44.7%), 27.0% (males, 27.0%; females, 26.9%), and 36.3% (males, 40.5%; females, 28.4%), respectively (Table 1). Male patients, usually, had a more severe disease than the female patients.

3.5 | Family history

Approximately 4.6% of the patients had a family history of psoriasis (males, 4.3%; females, 5.1%). The affected family members included fathers (35.6%; males, 36.5%; females, 34.1%), mothers (20.8%; males, 18.7%; females, 24.1%), children (8.9%; males, 9.8%; females, 7.4%), and siblings (28.7%; males, 29.3%; females, 27.8%).

3.6 | Past history and comorbidities

Approximately 50.0% of the cases had past history and comorbidities (males, 52.8%; females, 44.9%). The patients' past histories and

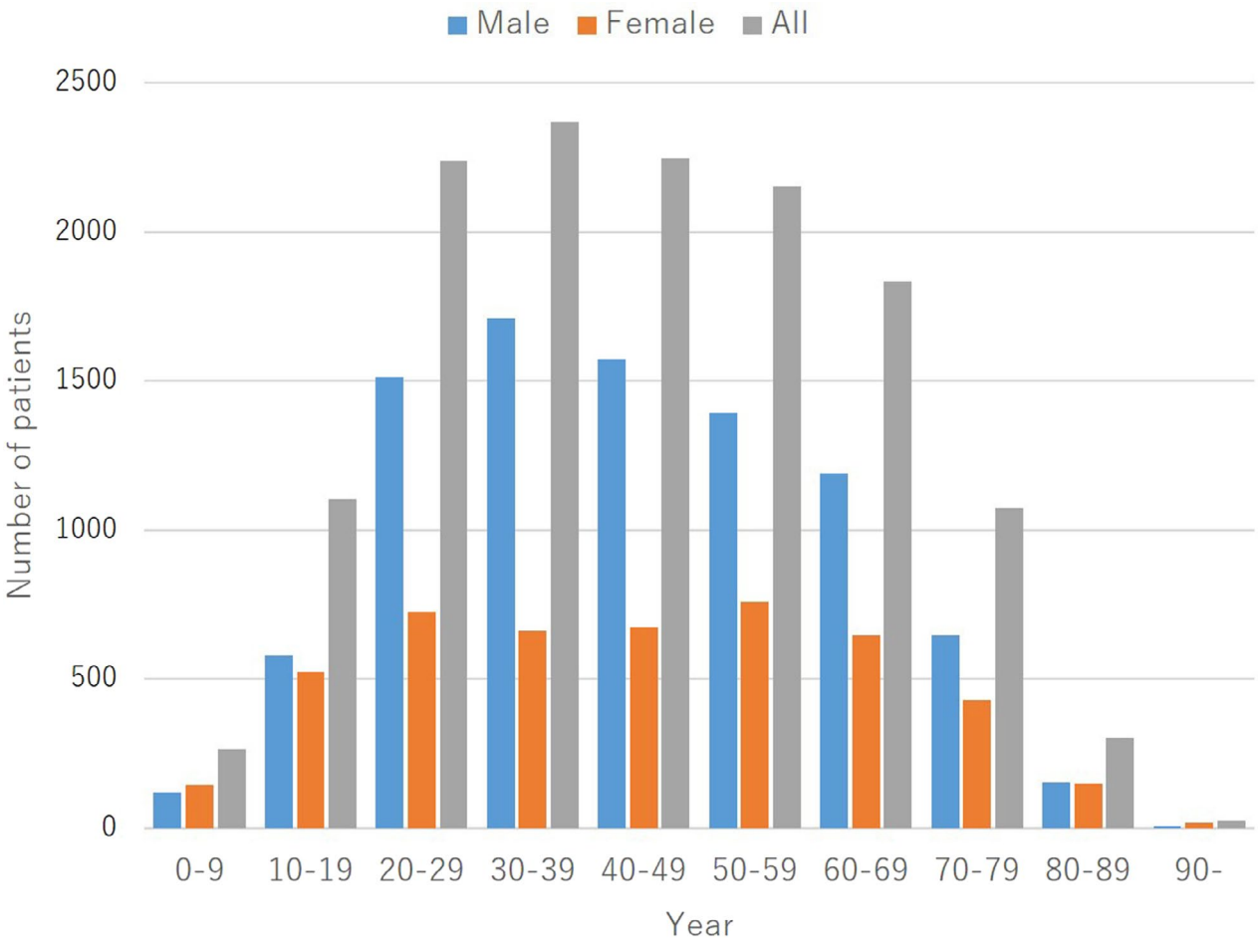

FIGURE 2 Age at onset

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TABLE 1 Severity

	Male (%)	Female (%)	All (%)
BSA < 5%	32.5	44.7	36.6
BSA 5%–10%	27.0	26.9	27.0
BSA > 10%	40.5	28.4	36.3

Abbreviation: BSA, body surface area.

TABLE 2 Past history and comorbidities

	Males (%)	Females (%)	All (%)
Hypertension	43.4	39.0	42.0
Dyslipidemia	30.0	30.0	30.0
Diabetes mellitus	25.2	20.2	23.7
Hyperuricemia	19.1	6.3	15.1
Cardiovascular disease	7.1	3.6	6.0
Cerebral vascular disorders	6.6	4.8	6.0

comorbidities included hypertension (42.0%; males, 43.4%; females, 39.0%), dyslipidemia (30.0%; males, 30.0%; females, 30.0%), diabetes mellitus (23.7%; males, 25.2%; females, 20.2%), hyperuricemia (15.1%; males, 19.1%; females, 6.3%), cardiovascular disease (6.0%; males, 7.1%; females, 3.6%), and cerebral vascular disorders (6.0%; males, 6.6%; females, 4.8%) (Table 2). More male patients suffered from past history and comorbidities like hyperuricemia and cardiovascular disease than the female patients.

3.7 | Exacerbating factors

Approximately 34.7% of the cases had exacerbating factors (males, 34.1%; females, 35.8%). The exacerbating factors included stress (41.9%; males, 43.5%; females, 39.4%), certain seasons (31.2%; males, 32.2%; females, 29.6%), infection (19.7%; males, 18.8%; females, 21.1%), certain drugs (11.4%; males, 12.5%; females, 9.7%), sun exposure (4.7%; males, 4.6%; females, 4.7%), and pregnancy (3.3%; males, 0.3%; females, 8.0%) (Table 3). The percentages of patients with seasonal exacerbations that occurred in spring, summer, autumn, and winter were 22.0% (males, 19.7%; females, 25.8%), 15.7% (males, 13.0%; females, 20.2%), 5.9% (males, 6.3%; females, 5.2%), and 61.7% (males, 68.5%; females, 50.4%), respectively. Approximately 26.7% and 5.3% of the patients had a history of exacerbation due to certain antihypertensive drugs (males, 31.5%; females, 17.3%) and interferon (males, 6.8%; females, 2.5%), respectively.

3.8 | Focal infection

Approximately 4.1% of the cases had some kind of a focal infection (males, 3.7%; females, 4.8%). Of these, 58.6% had tonsillitis (males, 53.4%; females, 66.3%).

TABLE 3 Exacerbating factors

	Males (%)	Females (%)	All (%)
Stress	43.5	39.4	41.9
Seasonal factors	32.2	29.6	31.2
Infection	18.8	21.1	19.7
Drug	12.5	9.7	11.4
Sun exposure	4.6	4.7	4.7
Pregnancy	0.3	8.0	3.3

3.9 | Distribution of skin lesions at first examination

The skin lesions were either located on the scalp (50.4%; males, 54.7%; females, 42.3%), face (30.6%; males, 33.6%; females, 24.9%), ear (19.3%; males, 20.6%; females, 16.8%), neck (18.3%; males, 19.7%; females, 15.8%), chest (38.8%; males, 41.9%; females, 32.8%), abdomen (46.4%; males, 49.5%; females, 40.6%), upper extremities excluding the hand (61.7%; males, 63.2%; females, 58.9%), the hand (30.2%; males, 31.3%; females, 28.3%), lower extremities excluding the foot (71.1%; males, 73.5%; females, 66.7%), the foot (24.2%; males, 25.3%; females, 22.2%), nails (26.5%; males, 29.4%; females, 21.1%), back (52.0%; males, 56.1%; females, 44.4%), buttocks (39.0%; males, 41.5%; females, 34.2%), or genitalia (14.0%; males, 15.5%; females, 11.0%) at the first examination (Figure 3).

3.10 | Treatments

Treatments are summarized in Table 4, and the treatment trends are shown in Figures 4–7 and Figures S1–S4. Approximately 68.9% of the patients received topical therapy (males, 69.1%; females, 68.6%). Topical therapy included corticosteroids (61.7%; males, 62.9%; females, 59.3%), vitamin D_3 (57.6%; males, 58.4%; females, 56.0%), corticosteroid/vitamin D_3 combinations (52.8%; males, 52.2%; females, 53.8%), tacrolimus (0.7%; males, 0.7%; females, 0.6%), and others (4.0%; males, 3.9%; females, 4.2%) (Table 4).

Approximately 9.1% of the cases received phototherapy (males, 8.8%; females, 9.7%). The phototherapy included psoralen and ultraviolet A (PUVA) (1.9%; males, 3.1%; females, 0.0%), narrowband (NB) ultraviolet B (UVB) (86.1%; males, 88.8%; females, 81.7%), broadband (BB)-UVB (0.6%; males, 1.0%; females, 0.0%), and targeted UVB (11.4%; males, 7.1%; females, 18.3%). Only three male patients received PUVA. More female patients received targeted UVB than the male patients.

Systemic therapy can be divided into two groups: oral medication and the biologics. Approximately 26.6% of the cases were treated with oral medication (males, 26.9%; females, 26.1%). Oral medication included etretinate (21.1%; males, 22.2%; females, 19.0%), methotrexate (16.9%; males, 17.6%; females, 15.7%), cyclosporin (27.4%; males, 28.3%; females, 25.6%), apremilast (16.3%; males, 15.8%; females, 17.2%), corticosteroids (8.7%; males, 8.9%;

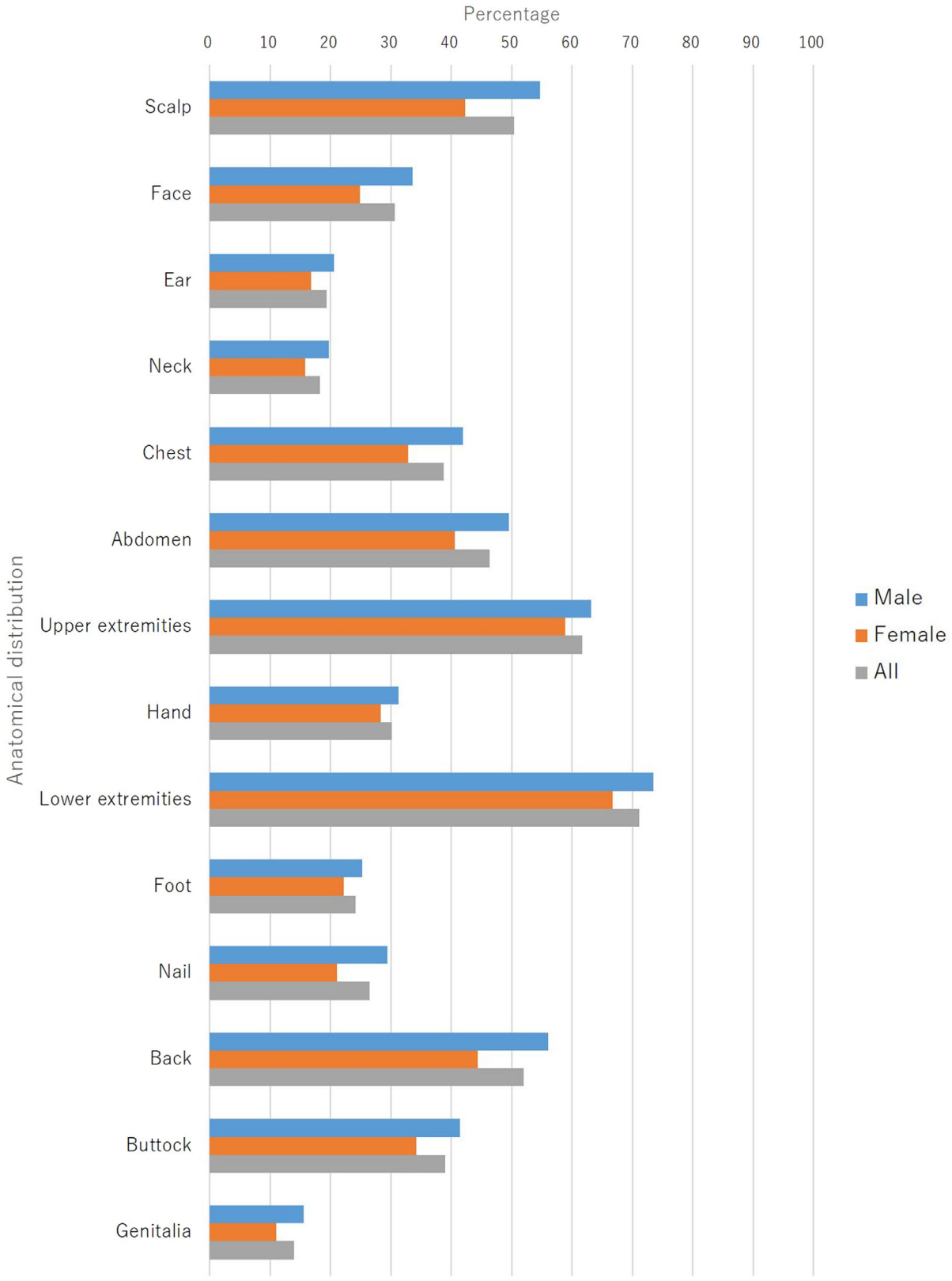

FIGURE 3 Anatomical distribution of the skin lesions at first examination

females, 8.5%), non-steroidal anti-inflammatory drugs (NSAIDs) (4.3%; males, 3.6%; females, 5.7%), and others (19.2%; males, 17.4%; females, 22.8%). Approximately 18.6% of the cases were treated with biologics (males, 20.2%; females, 15.7%). Biologics included infliximab (17.6%; males, 17.6%; females, 17.5%), adalimumab (23.3%; males, 22.7%; females, 24.6%), ustekinumab (21.4%; males, 22.6%;

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TABLE 4 Treatments for psoriasis

Treatment	Males		Females		All	
	No. of patients	%	No. of patients	%	No. of patients	%
Topical therapy	6899	69.1	3637	68.6	10 536	68.9
Corticosteroids	4342	62.9	2155	59.3	6497	61.7
Vitamin D_3	4029	58.4	2036	56.0	6065	57.6
Corticosteroid/ vitamin D_3	3600	52.2	1958	53.8	5558	52.8
Tacrolimus	51	0.7	23	0.6	74	0.7
Others	269	3.9	154	4.2	423	4.0
Phototherapy	98	8.8	60	9.7	158	9.1
PUVA	3	3.1	0	0.0	3	1.9
NB-UVB	87	88.8	49	81.7	136	86.1
BB-UVB	1	1.0	0	0.0	1	0.6
Targeted UVB	7	7.1	11	18.3	18	11.4
Systemic therapy						
Oral medication	2689	26.9	1381	26.1	4070	26.6
Etretinate	597	22.2	263	19.0	860	21.1
Methotrexate	472	17.6	217	15.7	689	16.9
Cyclosporin	760	28.3	354	25.6	1114	27.4
Apremilast	425	15.8	237	17.2	662	16.3
Corticosteroids	238	8.9	117	8.5	355	8.7
NSAIDs	97	3.6	79	5.7	176	4.3
Others	468	17.4	315	22.8	783	19.2
Biologics	2015	20.2	832	15.7	2847	18.6
Infliximab	354	17.6	146	17.5	500	17.6
Adalimumab	457	22.7	205	24.6	662	23.3
Ustekinumab	456	22.6	153	18.4	609	21.4
Secukinumab	225	11.2	104	12.5	329	11.6
Ixekizumab	153	7.6	62	7.5	215	7.6
Brodalumab	122	6.1	57	6.9	179	6.3
Guselkumab	82	4.1	39	4.7	121	4.3
Biosimilar	0	0.0	0	0.0	0	0.0
Others	214	10.6	85	10.2	299	10.5

Abbreviations: BB-UVB, broadband ultraviolet B; NB-UVB, narrowband ultraviolet B; NSAIDs, non-steroidal anti-inflammatory drugs; PUVA, psoralen ultraviolet A.

females, 18.4%), secukinumab (11.6%; males, 11.2%; females, 12.5%), ixekizumab (7.6%; males, 7.6%; females, 7.5%), brodalumab (6.3%; males, 6.1%; females, 6.9%), guselkumab (4.3%; males, 4.1%; females, 4.7%), biosimilars (0.0%; males, 0.0%; females, 0.0%), and others (10.5%; males, 10.6%; females, 10.2%).

4 | DISCUSSION

In the present survey, a total of 15 287 cases were enrolled from 2013 to 2018 from 132 medical institutions. The male : female ratio was 1.89:1 (9989 male patients [65.3%] and 5298 female patients [34.7%]). In the previous JSPR surveys, Kawada et al.[4] reported a ratio of 1.92:1, Takahashi et al.[5] 1.98:1, and Ito et al.[6] 2.08:1. Kubota et al.[7] reported a ratio of 1.44:1 in the previous Japanese claims-based survey. Ogawa et al.[8] reported a ratio of 2.50:1 in the Japanese non-metropolitan regional area survey. In other Asian countries, the ratios have ranged from approximately 1.20:1 to 1.60:1.[9–12] A previous systematic review concluded that there was no difference in the prevalence of psoriasis between sexes.[13] Therefore, it appears that the male predominance is a distinctive feature in Japanese patients with psoriasis.

In age distribution, the proportion of the patients increased gradually after the age of 20 years, peaked in the 60–69-year-old group, and then subsequently decreased (Figure 1). A previous systematic review also revealed that the prevalence of psoriasis increased with age.[13] The peak proportions of both male and the female patients

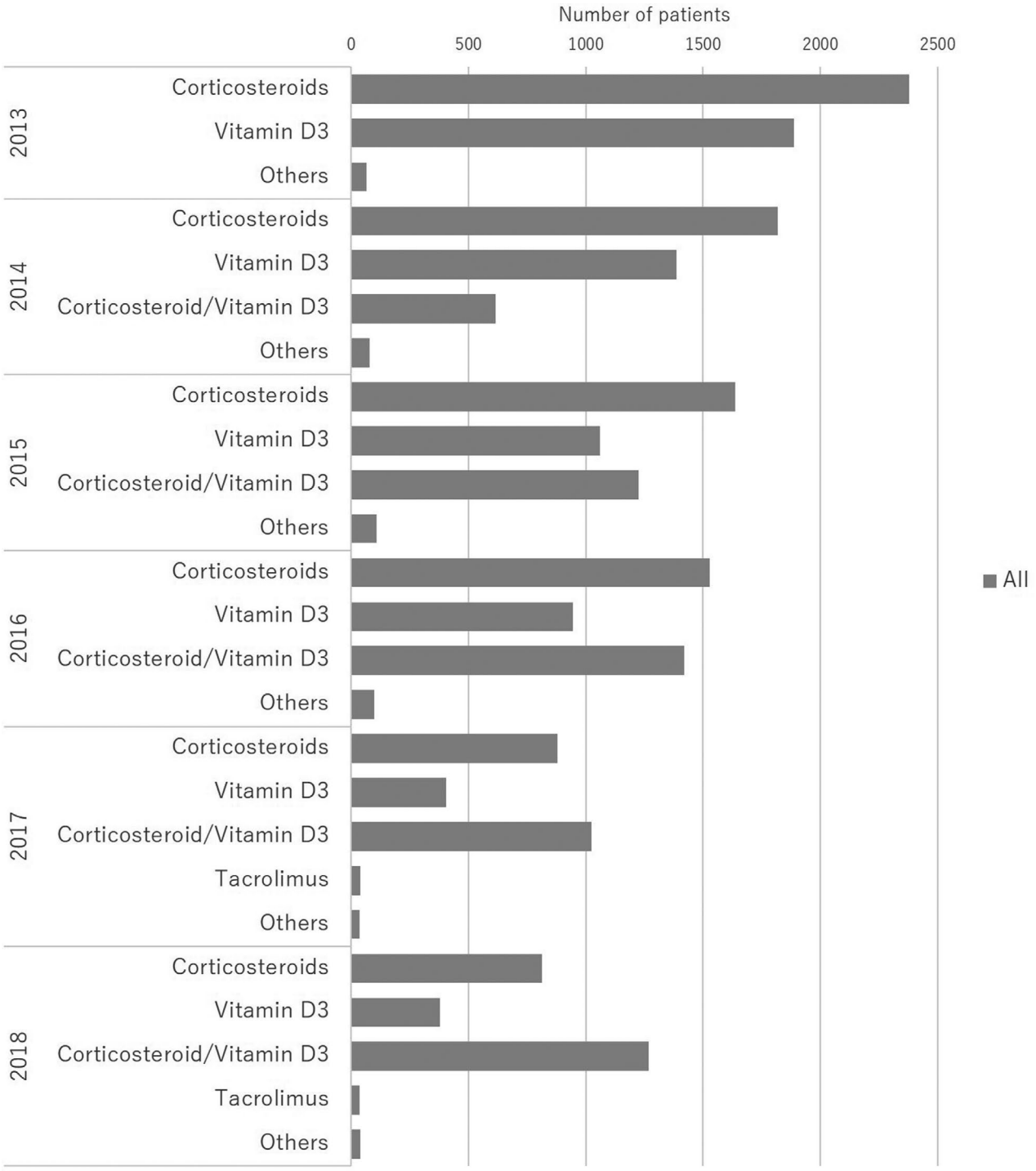

FIGURE 4 Treatment trends in topical therapy

were in the 50–59-year-old group during 2003–2008,[5] and in the 60–69-year-old group during 2009–2012.[6] In the present study, the peak proportion of the patients was in the 60–69-year-old group; however, the peak proportion of the female patients was in the 50–59-year-old group, which was a younger age group than that of the male patients.

Regarding age at onset, the majority of patients were in the 30–39-year-old age group at the onset of the disease (17.4%), followed by the 40–49-year-old (16.5%) and the 20–29-year-old (16.4%) age groups (Figure 2). Most of the male patients had an age at onset of 30–39 years (19.3%), followed by 40–49 years (17.7%) and 20–29 years (17.0%). The distribution of the ages at onset in the male patients was similar to that in a previous survey from 2009 to 2012.[6] Most of the female patients had an age at onset in the 50–59-year-old age group (16.0%), followed by the 20–29-year-old (15.3%) and the 40–49-year-old (14.2%) age groups. The proportion of the female patients, regarding their ages at onset, peaked in two age groups. This trend was

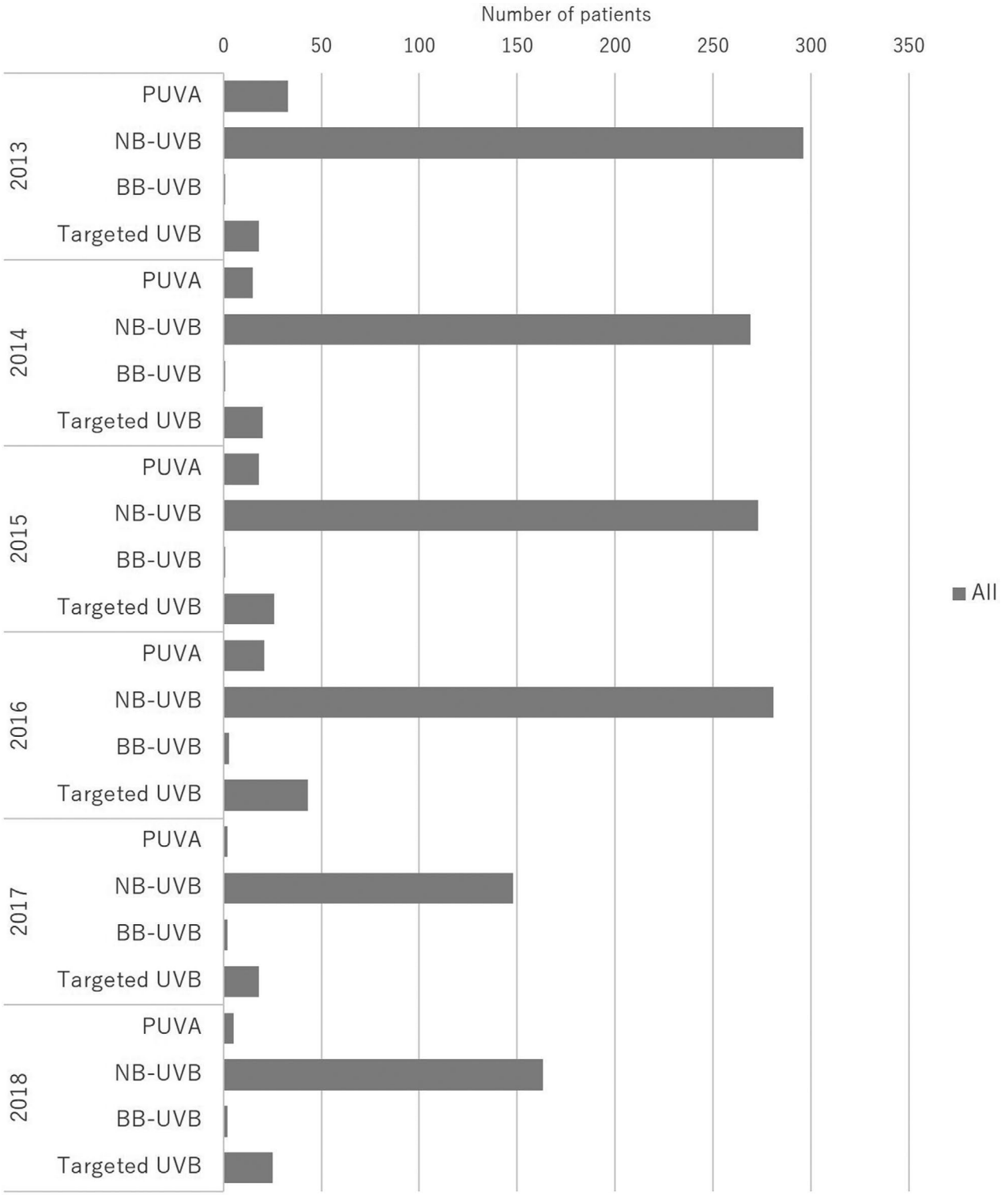

FIGURE 5 Treatment trends in phototherapy. BB-UVB, broadband ultraviolet B; NB-UVB, narrowband ultraviolet B; PUVA, psoralen and ultraviolet A

similar to that seen in the previous surveys during 2003–2008 and 2009–2012.[5,6]

A family history of psoriasis is often observed, and the proportion of patients with a family history varies according to their race. In Japan, Kawada et al.[4] reported a rate of 4.4%, Takahashi et al.[5] 5.8%, and Ito et al.[6] 6.4%. In the present survey, 4.6% of the patients had a family history of psoriasis (males, 4.3%; females, 5.1%). Bayaraa et al.[14] reported a rate of 6.3% from the Fukuoka University Psoriasis Registry, with the female patients having a higher rate of positive family history (8.7%) than the male patients (5.1%). The difference in

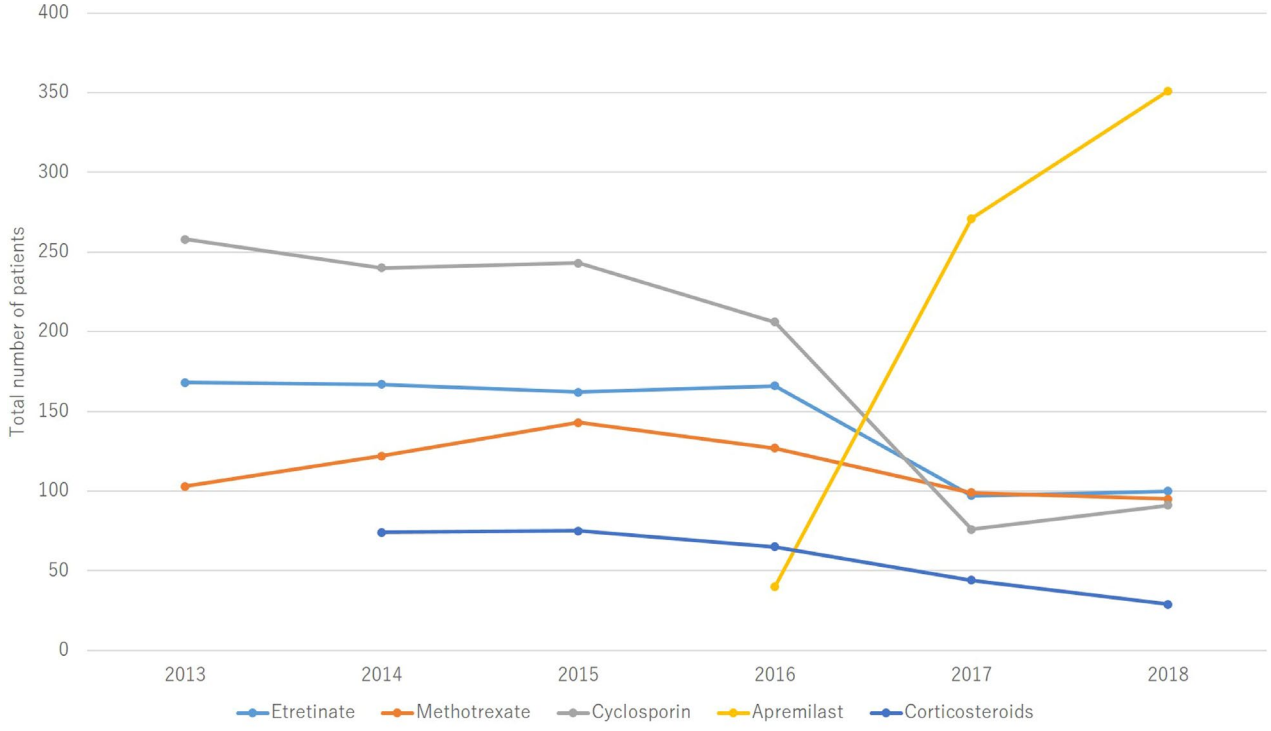

FIGURE 6 Treatment trends in oral medication. NSAIDs, non-steroidal anti-inflammatory drugs

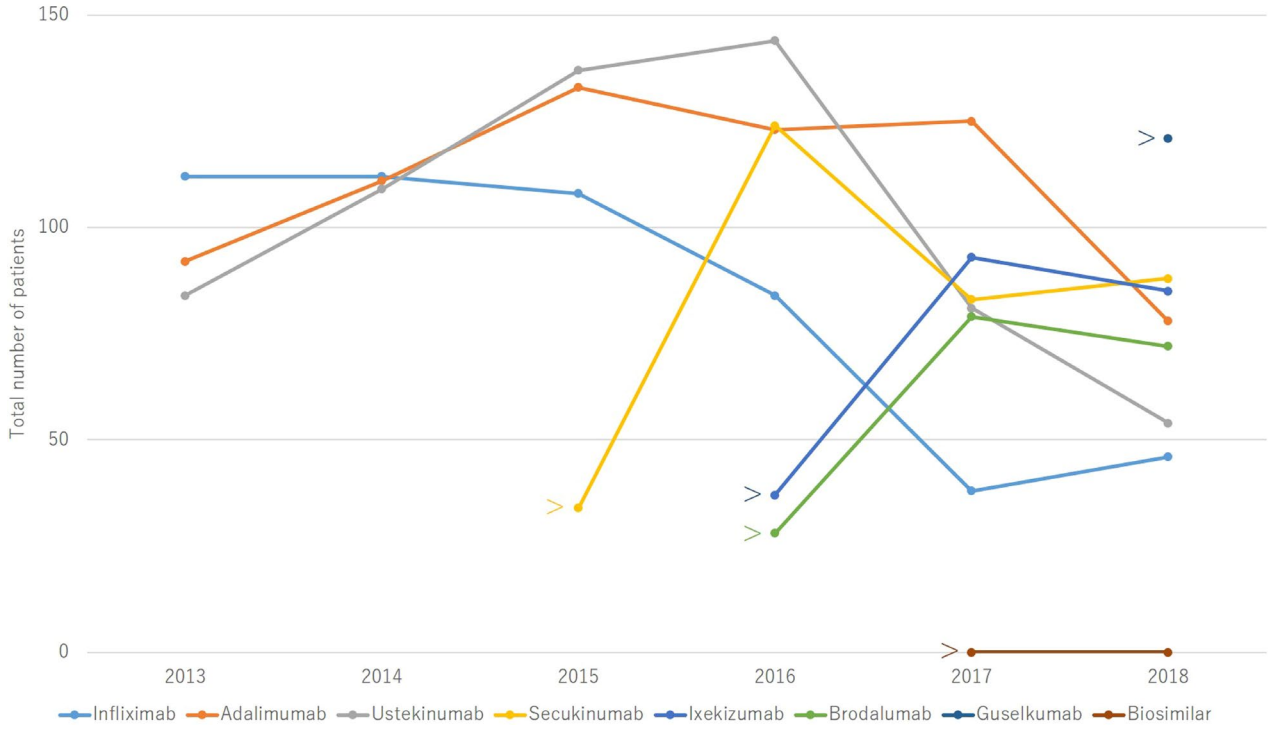

FIGURE 7 Treatment trends in the biologics. Secukinumab became available in 2015. Ixekizumab and brodalumab became available in 2016. Biosimilars became available in 2017. Guselkumab became available in 2018

the rates of a positive family history between the male and the female patients could explain the differences in the proportion of the male and the female patients in different age groups with respect to the prevalence and the onset of psoriasis.

In the present survey, 50.0% of the cases had past history and comorbidities (Table 2). The patients' past history and comorbidities included hypertension (42.0%), dyslipidemia (30.0%), diabetes mellitus (23.7%), hyperuricemia (15.1%), cardiovascular disease (6.0%), and

cerebral vascular disorders (6.0%). The rates were higher compared to the previous surveys.[4–6] Metabolic syndrome is a well-known risk factor for the development of psoriasis, and cardiovascular and cerebral vascular diseases are its serious complications.[3] It is possible that proper knowledge and education contributed to the early diagnosis and treatment of these disorders, leading to their higher rates.

Regarding exacerbating factors, stress was the most common (41.9%), followed by certain seasons (31.2%) and infection (19.7%) (Table 3). Among the seasons, winter was the most commonly reported season for the exacerbation of psoriasis (61.7%), followed by the spring (22.0%). These results were similar to those of the previous surveys.[4–6] However, the proportion of the patients reporting exacerbations due to stress or the different seasons appears to increase yearly in Japan. Approximately 26.7% and 5.3% of the cases had a history of exacerbation due to the antihypertensive drugs and interferon, respectively. Exacerbation caused by interferon has decreased since 2015 (data not shown). Exacerbation caused by molecular inhibitors has been observed in a total of eight cases since 2017. Molecular inhibitors have been used for the treatment of malignancies and autoimmune diseases, and these drugs may affect the immune system, leading to the development of psoriasis.[15–17] Exacerbation caused by the molecular inhibitors may continue to increase due to their expanded use for the treatment of various diseases.

The association between psoriasis and streptococcal infection is well established,[18] and tonsillectomy is a potential treatment option for patients with recalcitrant psoriasis associated with episodes of tonsillitis.[19] In the present study, 4.1% of the cases had some kind of a focal infection, among which tonsillitis was the most common. This was similar to the results of the previous surveys.[4–6]

The most common region involved in psoriasis at the first examination was the lower extremities excluding the feet (71.1%), followed by the upper extremities excluding the hands (61.7%), back (52.0%), and scalp (50.4%) (Figure 3). There were no notable differences, in this category, between the male and female patients. These results were similar to those of the previous surveys.[4–6] Lower extremities, that are the most commonly involved region at the first examination of psoriasis, have also been reported to be the most common site of recalcitrant psoriasis in patients treated with biologics.[20]

In the present survey, 68.9% of the patients received the topical therapy (Table 4). The topical therapy included corticosteroids (61.7%), vitamin D_3 (57.6%), and corticosteroid/vitamin D_3 combinations (52.8%). Focusing on the treatment trend in the topical therapy, there was a yearly decrease in the number of patients who received either corticosteroids or vitamin D_3 alone (Figure 4). In contrast, the number of patients who received corticosteroid/vitamin D_3 combinations has been increasing since 2014. This might be due to the introduction of calcipotriol hydrate/betamethasone dipropionate in 2014 and maxacalcitol/betamethasone butyrate propionate in 2016. However, the number of patients who received corticosteroid/vitamin D_3 combinations in 2017 and 2018 was not as high as that in 2016. Introduction of other therapies could have affected this treatment trend.

The number of patients who received phototherapy has gradually decreased (Figure 5). PUVA was the most common phototherapy in the previous surveys conducted during 1982–2001 and 2002–2008.[4,5] However, the number of patients who received PUVA has decreased, and this number has been declining since 2017 (Figure 5). Although NB-UVB was the most common phototherapy during 2013–2018, the number of patients who received NB-UVB has also been decreasing since 2017. Given that the number of patients who received topical therapies has also been declining since 2017, it is possible that the systemic therapies have affected the treatment trends of topical and phototherapy.

In systemic therapy, 26.6% of the cases were treated with oral medication, and 18.6% were treated with biologics (Table 4). Cyclosporin had been the most common oral medicine for the treatment of psoriasis.[4–6] Apremilast was approved for the treatment of psoriasis in December 2016 and that has dramatically changed the treatment trend of the oral medication. In 2017, apremilast was the most common oral medicine (Figure 6). In the present survey, the biologics included infliximab (17.6%), adalimumab (23.3%), ustekinumab (21.4%), secukinumab (11.6%), ixekizumab (7.6%), brodalumab (6.3%), and guselkumab (4.3%). Focusing on the treatment trends in biologics, infliximab, adalimumab, and ustekinumab were equally used during 2013–2015 (Figure 7). In 2016, IL-17 inhibitors became the most commonly used biologic, while in 2018, the number of patients who were treated with guselkumab became the highest. In contrast, the number of patients who were being treated with adalimumab and ustekinumab has decreased. Secukinumab, ixekizumab, brodalumab, and guselkumab had shown superior efficacy compared to adalimumab or ustekinumab.[21–34] These data may affect the therapeutic choices in the clinical setting.

Several limitations of this study are as follows. First, this study was retrospective. Second, this study does not cover all Japanese psoriasis patients. Third, although this study included all types of psoriasis, patients with psoriatic arthritis and generalized pustular psoriasis were not registered during 2017–2018. This is because the JSPR has collected the data about psoriatic arthritis and generalized pustular psoriasis by other questionnaires since 2017.

The present survey evaluated the data from the annual epidemiological surveys of the patients with psoriasis from 2013 to 2018. The results will provide significant information regarding the recent perspective of psoriasis in the Japanese Society, and especially focus on the treatment trends after the introduction of the newly available treatment options.

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CONFLICT OF INTEREST

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REFERENCES

1. Nestle FO, Kaplan DH, Barker J. Psoriasis. *N Engl J Med*. 2009;361:496–509. https://doi.org/10.1056/NEJMra0804595
2. Boehncke WH, Schon MP. Psoriasis. *Lancet*. 2015;386:983–94. https://doi.org/10.1016/S0140-6736(14)61909-7
3. Kamiya K, Kishimoto M, Sugai J, Komine M, Ohtsuki M. Risk factors for the development of psoriasis. *Int J Mol Sci*. 2019;20:4347. https://doi.org/10.3390/ijms20184347
4. Kawada A, Tezuka T, Nakamizo Y, Kimura H, Nakagawa H, Ohkido M, et al. A survey of psoriasis patients in Japan from 1982 to 2001. *J Dermatol Sci*. 2003;31:59–64. https://doi.org/10.1016/s0923-1811(02)00142-1
5. Takahashi H, Nakamura K, Kaneko F, Nakagawa H, Iizuka H. Analysis of psoriasis patients registered with the Japanese Society for Psoriasis Research from 2002–2008. *J Dermatol*. 2011;38:1125–9. https://doi.org/10.1111/j.1346-8138.2010.01145.x
6. Ito T, Takahashi H, Kawada A, Iizuka H, Nakagawa H. Epidemiological survey from 2009 to 2012 of psoriatic patients in Japanese Society for Psoriasis Research. *J Dermatol*. 2018;45:293–301. https://doi.org/10.1111/1346-8138.14105
7. Kubota K, Kamijima Y, Sato T, Ooba N, Koide D, Iizuka H, et al. Epidemiology of psoriasis and palmoplantar pustulosis: a nationwide study using the Japanese national claims database. *BMJ Open*. 2015;5:e006450. https://doi.org/10.1136/bmjopen-2014-006450
8. Ogawa E, Okuyama R, Seki T, Kobayashi A, Oiso N, Muto M, et al. Epidemiological survey of patients with psoriasis in Matsumoto city, Nagano Prefecture, Japan. *J Dermatol*. 2018;45:314–7. https://doi.org/10.1111/1346-8138.14101
9. Chang YT, Chen TJ, Liu PC, Chen YC, Chen YJ, Huang YL, et al. Epidemiological study of psoriasis in the national health insurance database in Taiwan. *Acta Derm Venereol*. 2009;89:262–6. https://doi.org/10.2340/00015555-0642
10. Sinniah B, Saraswathy Devi S, Prashant BS. Epidemiology of psoriasis in malaysia: a hospital based study. *Med J Malaysia*. 2010;65:112–4.
11. Ding X, Wang T, Shen Y, Wang X, Zhou C, Tian S, et al. Prevalence of psoriasis in China: a population-based study in six cities. *Eur J Dermatol*. 2012;22:663–7. https://doi.org/10.1684/ejd.2012.1802
12. Mohd Affandi A, Khan I, Ngah Saaya N. Epidemiology and clinical features of adult patients with psoriasis in Malaysia: 10-year review from the Malaysian Psoriasis Registry (2007–2016). *Dermatol Res Pract*. 2018;2018:4371471. https://doi.org/10.1155/2018/4371471
13. Parisi R, Symmons DP, Griffiths CE, Ashcroft DM. Global epidemiology of psoriasis: a systematic review of incidence and prevalence. *J Invest Dermatol*. 2013;133:377–85. https://doi.org/10.1038/jid.2012.339
14. Bayaraa B, Imafuku S. Relationship between environmental factors, age of onset and familial history in Japanese patients with psoriasis. *J Dermatol*. 2018;45:715–8. https://doi.org/10.1111/1346-8138.14321
15. Bonigen J, Raynaud-Donzel C, Hureaux J, Kramkimel N, Blom A, Jeudy G, et al. Anti-PD1-induced psoriasis: a study of 21 patients. *J Eur Acad Dermatol Venereol*. 2017;31:e254–7. https://doi.org/10.1111/jdv.14011
16. Kim DW, Park SK, Woo SH, Yun SK, Kim HU, Park J. New-onset psoriasis induced by rituximab therapy for non-Hodgkin lymphoma in a child. *Eur J Dermatol*. 2016;26:190–1. https://doi.org/10.1684/ejd.2015.2705
17. Guidelli GM, Fioravanti A, Rubegni P, Feci L. Induced psoriasis after rituximab therapy for rheumatoid arthritis: a case report and review of the literature. *Rheumatol Int*. 2013;33:2927–30. https://doi.org/10.1007/s00296-012-2581-3
18. Telfer NR, Chalmers RJ, Whale K, Colman G. The role of streptococcal infection in the initiation of guttate psoriasis. *Arch Dermatol*. 1992;128:39–42.
19. Rachakonda TD, Dhillon JS, Florek AG, Armstrong AW. Effect of tonsillectomy on psoriasis: a systematic review. *J Am Acad Dermatol*. 2015;72:261–75. https://doi.org/10.1016/j.jaad.2014.10.013
20. Hjuler KF, Iversen L, Rasmussen MK, Kofoed K, Skov L, Zachariae C. Localization of treatment-resistant areas in patients with psoriasis on biologics. *Br J Dermatol*. 2019;181:332–7. https://doi.org/10.1111/bjd.17689
21. Thaci D, Blauvelt A, Reich K, Tsai T-F, Vanaclocha F, Kingo K, et al. Secukinumab is superior to ustekinumab in clearing skin of subjects with moderate to severe plaque psoriasis: CLEAR, a randomized controlled trial. *J Am Acad Dermatol*. 2015;73:400–9. https://doi.org/10.1016/j.jaad.2015.05.013
22. Blauvelt A, Reich K, Tsai TF, Tyring S, Vanaclocha F, Kingo K, et al. Secukinumab is superior to ustekinumab in clearing skin of subjects with moderate-to-severe plaque psoriasis up to 1 year: results from the CLEAR study. *J Am Acad Dermatol*. 2017;76:60–9. https://doi.org/10.1016/j.jaad.2016.08.008
23. Thaci D, Puig L, Reich K, Tsai TF, Tyring S, Kingo K, et al. Secukinumab demonstrates sustained efficacy in clearing skin and improving patient-reported outcomes in patients with moderate-to-severe psoriasis through 2 years of treatment: results from the CLEAR study. *J Am Acad Dermatol*. 2019;81:1405–9. https://doi.org/10.1016/j.jaad.2019.04.045
24. Bagel J, Nia J, Hashim PW, Patekar M, de Vera A, Hugot S, et al. Secukinumab is superior to ustekinumab in clearing skin in patients with moderate to severe plaque psoriasis (16-week CLARITY results). *Dermatol Ther*. 2018;8:571–9. https://doi.org/10.1007/s13555-018-0265-y
25. Bagel J, Blauvelt A, Nia J, Hashim P, Patekar M, Vera A, et al. Secukinumab maintains superiority over ustekinumab in clearing skin and improving quality of life in patients with moderate to severe plaque psoriasis: 52-week results from a double-blind phase 3b trial (CLARITY). *J Eur Acad Dermatol Venereol*. 2020;35(1):135–42. https://doi.org/10.1111/jdv.16558
26. McInnes IB, Behrens F, Mease PJ, Kavanaugh A, Ritchlin C, Nash P, et al. Secukinumab versus adalimumab for treatment of active psoriatic arthritis (EXCEED): a double-blind, parallel-group, randomised, active-controlled, phase 3b trial. *Lancet*. 2020;395:1496–505. https://doi.org/10.1016/S0140-6736(20)30564-X
27. Reich K, Pinter A, Lacour JP, Ferrandiz C, Micali G, French Le, et al. Comparison of ixekizumab with ustekinumab in moderate-to-severe psoriasis: 24-week results from IXORA-S, a phase III study. *Br J Dermatol*. 2017;177:1014–23. https://doi.org/10.1111/bjd.15666
28. Paul C, Griffiths CEM, van de Kerkhof PCM, Puig L, Dutronc Y, Henneges C, et al. Ixekizumab provides superior efficacy compared with ustekinumab over 52 weeks of treatment: results from IXORA-S, a phase 3 study. *J Am Acad Dermatol*. 2019;80:70–9. https://doi.org/10.1016/j.jaad.2018.06.039
29. Mease PJ, Smolen JS, Behrens F, Nash P, Liu Leage S, Li L, et al. A head-to-head comparison of the efficacy and safety of ixekizumab and adalimumab in biological-naive patients with active psoriatic arthritis: 24-week results of a randomised, open-label, blinded-assessor trial. *Ann Rheum Dis*. 2020;79:123–31. https://doi.org/10.1136/annrheumdis-2019-215386
30. Smolen JS, Mease P, Tahir H, Schulze-Koops H, de la Torre I, Li L, et al. Multicentre, randomised, open-label, parallel-group study evaluating the efficacy and safety of ixekizumab versus adalimumab in patients with psoriatic arthritis naive to biological

disease-modifying antirheumatic drug: final results by week 52. *Ann Rheum Dis*. 2020;79:1310–9. https://doi.org/10.1136/annrheumdis-2020-217372

31. Lebwohl M, Strober B, Menter A, Gordon K, Weglowska J, Puig L, et al. Phase 3 studies comparing brodalumab with ustekinumab in psoriasis. *N Engl J Med*. 2015;373:1318–28. https://doi.org/10.1056/NEJMoa1503824
32. Blauvelt A, Papp KA, Griffiths CE, Randazzo B, Wasfi Y, Shen Y-K, et al. Efficacy and safety of guselkumab, an anti-interleukin-23 monoclonal antibody, compared with adalimumab for the continuous treatment of patients with moderate to severe psoriasis: results from the phase III, double-blinded, placebo- and active comparator-controlled VOYAGE 1 trial. *J Am Acad Dermatol*. 2017;76:405–17. https://doi.org/10.1016/j.jaad.2016.11.041
33. Reich K, Armstrong AW, Foley P, Song M, Wasfi Y, Randazzo B, et al. Efficacy and safety of guselkumab, an anti-interleukin-23 monoclonal antibody, compared with adalimumab for the treatment of patients with moderate to severe psoriasis with randomized withdrawal and retreatment: results from the phase III, double-blind, placebo- and active comparator-controlled VOYAGE 2 trial. *J Am Acad Dermatol*. 2017;76:418–31. https://doi.org/10.1016/j.jaad.2016.11.042
34. Langley RG, Tsai TF, Flavin S, Song M, Randazzo B, Wasfi Y, et al. Efficacy and safety of guselkumab in patients with psoriasis who have an inadequate response to ustekinumab: results of the randomized, double-blind, phase III NAVIGATE trial. *Br J Dermatol*. 2018;178:114–23. https://doi.org/10.1111/bjd.15750

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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