ORIGINAL ARTICLE

Asian Pacific Journal of
Allergy and Immunology

APJAI

Real-life efficacy and drug continuation of secukinumab in treating moderate to severe plaque psoriasis in Aegean region of Turkey: a multicenter retrospective study and systematic review of the literature

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Abstract

Background: Secukinumab was demonstrated to be efficient in the treatment of moderate to severe plaque psoriasis in the phase studies. Real-life treatment experiences obtained from patients that do not meet the inclusion criteria of phase studies can provide valuable information on efficacy and safety results. Results may also differ in different ethnic populations.

Objective: To investigate short and long-term efficacy and drug continuation of secukinumab in Turkish population.

Methods: The study conducted in three tertiary care psoriasis centers. Patients' demographic characteristics and week 0 / 4th week / 12th week / 1st year PASI values were analyzed. For systematic review of the literature a PubMed search using the keywords "secukinumab and real and psoriasis" from inception to April 2021 was performed.

Results: Mean PASI scores improved the compared to baseline at all assessment weeks (p = 0.000). In multivariate model, we found that bioexperience have negative influence on the PASI90 response at week 4. Univariate analysis showed significant relationship only between PASI90 response rate and gender at week 12 and year 1. Approximately 85% of patients remained on secukinumab treatment at the end of one year.

Conclusions: Secukinumab seems to be an effective treatment option for plaque psoriasis. According to our knowledge, this is the first study concerning about long-term efficacy and drug continuation of secukinumab from Turkey.

Key words: real, real-life, real-world, psoriasis, treatment, secukinumab, biologics, anti-IL17

Citation:
Kaçar, N., Balcı, D. D., Doğan, S., Türkmen, M., Gönülal, M., Çınar, G. (2025). Real-life efficacy and drug continuation of secukinumab in treating moderate to severe plaque psoriasis in Aegean region of Turkey: a multicenter retrospective study and systematic review of the literature. *Asian Pac J Allergy Immunol*, 43(3), 712-718. https://doi.org/10.12932/ap-241021-1259

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Introduction

Secukinumab is a fully humanized monoclonal antibody that inhibits interleukin-17A. It was approved by the FDA on January 21, 2015 for the treatment of psoriasis.[1] In the main Phase 3 studies, FIXTURE and ERASURE, PASI75, PASI90 and PASI100 responses were achieved in 77% and 82%, in 54% and 59%, and in 24% and 29% of patients at week 12, respectively, in the 300 mg licensed dose group in the treatment of psoriasis. The PASI90 and PASI100 response rates were maintained at 52 weeks in 60% and 39% of patients, respectively. The most common side effects

were nasopharyngitis, headache and upper respiratory tract infections. During the induction period, infections and infestations were found to be more frequently than in the placebo group; but no difference was found in terms of serious side effects and side effects related to other organ systems.[2]

However, there are heterogeneity in patients in terms of disease severity, comorbidities, treatment compliance and so on and also in health care systems in real-life. Therefore, real-life treatment experiences obtained from patients that do not meet the inclusion criteria of Phase 3 studies can provide valuable information on efficacy and safety results. That's why real life studies are so important.

Outcomes may vary in different populations due to racial factors and health policies. There is only one real-life study in the literature about the use of secukinumab in the treatment of psoriasis from Turkey.[3] In our study, we, three reference centers in the field of psoriasis in the Aegean Region of Turkey, aimed to examine the clinical responses, side effects and drug continuation in chronic plaque psoriasis patients treated with secukinumab retrospectively.

Materials and methods

The study was approved by the "Pamukkale University Faculty of Medicine Ethics Committee" (approval date: 19.01.2021 and no: E-60116787-020-9688). We conducted the study in the dermatology departments of three tertiary care psoriasis centers; Denizli Pamukkale University Faculty of Medicine, Izmir Bozyaka Training and Research Hospital and Izmir Tepecik Training and Research Hospital. Retrospective data of chronic plaque psoriasis patients who received secukinumab treatment from May 2018, the date secukinumab received reimbursement in Turkey. Secukinumab is indicated for the treatment of moderate to severe plaque psoriasis in adult patients who do not respond to, intolerant of, or contraindicated to systemic conventional therapies such as cyclosporine, methotrexate or PUVA at a posology of 300 mg at weeks 0, 1, 2, 3, 4 and then at every 4 weeks in our country.[4] So all of our patients met these criteria.

We analyzed the patients' demographic characteristics, comorbidities, psoriasis duration, and week 0 (initial) / 4th week (end of the induction period) / 12th week / 1st year PASI values. Patients that do not have both initial PASI value and at least one of the PASI values in the assesment weeks were excluded from the study. The patients in whom secukinumab treatment was started at least 1 year before 11 March 2020, the date first Covid case was identified in Turkey, were analyzed in terms of drug continuation. Because some of patients had to stop their treatment because of extraordinary measures taken by government due to the pandemic, which can lead to wrong results.

For systematic review of the literature a PubMed search using the keywords "secukinumab and real and psoriasis" from inception to April 2021 was performed (date of access was 26.04.2021). Only English written articles were included. We *a priori* defined the inclusion criteria as follows; (1) the study should give drug survival/continuation rate or one of the efficacy points (PASI75, PASI90 and/or PASI100 response rates at week 4, week 12 and/or year 1). (2) The study should give the results of patients treated with the same regimen as our study (300 mg at 0, 1, 2, 3, 4, and 5 weeks and 300 mg/4 weeks).

Articles focusing other psoriasis clinical types, psoriasis limited to certain body areas such as scalp, nails, genitalia and/or psoriatic arthritis were excluded from the review. Meta-analyses and reviews were not included, as well.

Continuous data were reported as mean ± SD, range (minimum – maximum values) and categorical variables as number and percent. Kolmogorov Smirnov and Shapiro-Wilk tests were used for testing normality. Chi-Squared and Fisher's Exact tests were used for comparison of categorical variables. For pairwise comparisons if parametric test conditions were met paired samples t-test and independent samples t-test, if were not met Mann-Whitney U and Wilcoxon signed rank test were applied depending on distribution of continuous variables. For risk factor determination, we used univariate and multiple logistic regression models. All statistical analyses were performed using SPSS 25.0 software (IBM SPSS Statistics 25 software [Armonk, New York: IBM Corp.]). $P < 0.05$ was considered statistically significant.

Results

Our real life study results

Data of 175 patients were eligible for retrospective analysis (71, 59 and 45 patients from Bozyaka Training and Research Hospital, Pamukkale University and Tepecik Training and Research Hospital, respectively). Demographic characteristics of the patients are shown in **Table 1**. Bionaive and bioexperienced patients were comparable in terms of age, gender, duration of psoriasis, psoriasis severity, psoriatic arthritis (PsA) and comorbidities other than PsA ($p > 0.05$).

Efficacy

Significant improvements in the mean PASI scores compared to baseline were achieved at all assessment weeks ($p = 0.000$). The mean PASI score declines from baseline were as follows; 74.3%, 84.0% and 84.9% at weeks 4, 12 and year 1, respectively (**Figure 1**). PASI75, PASI90 and PASI100 response rates achieved at week 4 maintained and even slightly increased through year 1 (**Figure 2**).

Bionaive vs. bioexperienced

Mean PASI score improvements compared to baseline were significant at all assessment weeks in both groups ($p = 0.000$). Higher PASI90 and PASI100 response rates were determined in bionaive patients compared to bioexperienced ones at week 4 ($p = 0.022$ and $p = 0.005$, respectively). The difference disappeared at the subsequent assessment weeks ($p > 0.05$).

Table 1. Demographic characteristics of the patients.

Characteristics	Values
Female, n (%)	101 (57.7)
Age, mean ± SD (min-max)	47.4 ± 13.2 years (20-82)
Duration of psoriasis, mean ± SD (min-max)	14.1 ± 10.4 years (1-42)
Concominant psoriasis types, n (%)	17 (9.7)
Palmoplantar plaque	12 (70.6)
Palmoplantar pustular	4 (23.5)
Generalized pustular	1 (5.9)
*PASI, mean ± SD (min-max)	17.7 ± 10.4 (1.5-57)
**PsA, n (%)	18 (10.3)
Comorbidities other than **PsA, n (%)	89 (50.9)
Hypertension	22 (19.3)
Diabetes	21 (18.3)
Hepatitis	11 (9.6)
Dyslipidemia	11 (9.6)
Rheumatological disease	8 (7.0)
Hepatic disease	7 (6.1)
Previous history of malignancy	5 (4.3)
Coronary artery disease	5 (4.3)
Other	25 (21.7)
Total	115 (100)
Previously used biologics, n (%)	75 (42.9)
Anti-TNF	57 (89.7)
Anti-IL12/23	5 (2.9)
Anti-TNF and Anti-IL-12/23	13 (7.4)

*PASI: Psoriasis area severity index, **PsA: Psoriatic arthritis

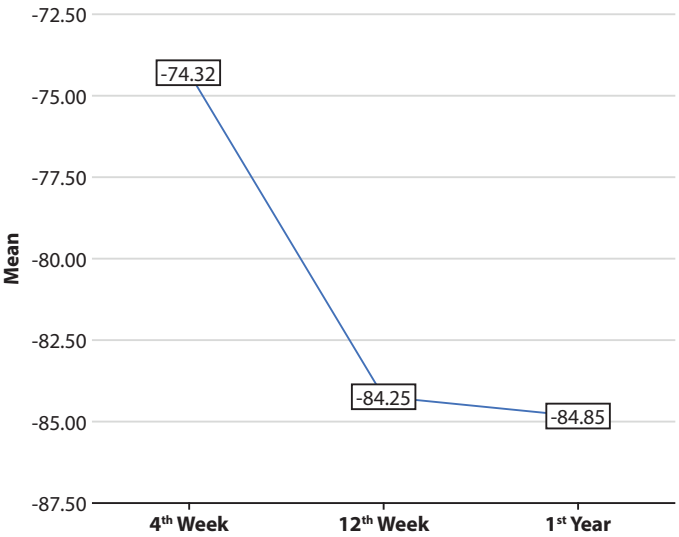

Figure 1. The decrease in mean PASI scores is shown in the graph.

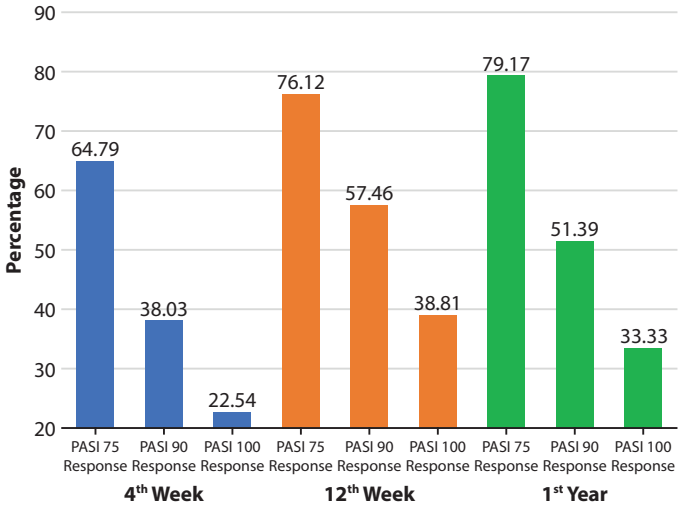

Figure 2. The achieved PASI75, PASI90 and PASI100 response rates at week 4, week 12 and year 1 are demonstrated in the graph.

Clinical variables influencing PASI90 response rates at weeks 4, 12 and year 1

Univariate regression analyses of the clinical variables that can influence treatment response are shown in **Table 2**. Univariate analysis showed that at week 4, PASI90 response was achieved less frequently by female and bioexperienced patients and more frequently in patients having high baseline PASI values (p = 0.022 and OR: 0.446; p = 0.023 and OR: 0.439; p = 0.013 and OR: 1.050, respectively) [OR (95% CI) (0.90–0.99)]. At week 12 and year 1 statistically significant relationship with PASI90 response was determined only with gender. In contrast to the fourth week, female gender was found to be associated with higher PASI90 response at week 12 and year 1 (p = 0.022 and OR: 3.189; p = 0.033 and OR: 2.864, respectively).

In multivariate model including the clinical variables statistically significantly related with PASI90 response in univariate analysis, we found that baseline PASI scores have positive; but bioexperience have negative influence on the PASI90 response at week 4 (p = 0.032 and OR: 1.043; p = 0.045 and OR: 0.471, respectively) (**Table 3**). We did not perform multivariate analysis for week 12 and year 1; because univariate analysis showed significant relationship only between PASI90 response rate and gender.

Table 2. Univariate analyses of clinical variables that can influence PASI90 response response at week 4, week 12 and year 1.

	Week 4				Week 12				Year 1			
	p	O.R.	95%CI for O.R.		*p*	O.R.	95%CI for O.R.		*p*	O.R.	95%CI for O.R.	
			Lower	Upper			Lower	Upper			Lower	Upper
Gender (female)	0.022	0.45	0.22	0.89	0.002	3.19	1.52	6.69	0.033	2.86	1.09	7.52
Age	0.843	0.10	0.97	1.02	0.706	0.10	0.97	1.02	0.861	1.00	0.97	1.04
Psoriatic arthritis	0.599	1.40	0.40	4.81	0.502	1.54	0.44	5.38	0.943	0.94	0.18	5.01
Comorbidities other than arthritis	0.766	0.90	0.46	1.78	0.854	1.07	0.54	2.13	0.814	1.12	0.44	2.82
Psoriasis duration	0.884	0.10	0.96	1.03	0.90	0.10	0.97	1.03	0.742	1.01	0.96	1.06
Bio-experienced	0.023	0.44	0.22	0.89	0.44	0.76	0.38	1.52	0.780	1.14	0.45	2.92
Baseline PASI scores	0.013	1.05	1.01	1.09	0.23	1.02	0.99	1.06	0.408	0.98	0.93	1.03

Table 3. Multivariate analysis of clinical variables found to influence PASI90 response at week 4 in univariate analysis.

Characteristics	*P*	O.R.	95%CI for O.R.	
			Lower	Upper
Gender (female)	0.076	1.92	0.93	3.94
Bio-experienced	0.045	0.47	0.23	0.98
Baseline PASI values	0.032	1.04	1.00	1.09

Safety

Forty-one advers events developed in 34 patients seven of which were serious. In three of them secukinumab was interrupted (orchitis, serious thrombocytopenia and pneumonia); in the remaining four patients secukinumab had to be discontinued [inflammatory bowel disease (IBD) in two patients, severe thrombocytopenia in one patient and acute abdomen in one patient]. Neither death nor MACE occurred; no tuberculosis reactivation, as well.

Dermatological adverse events occurred in seven patients. They included pustular reactions (three events on body and one on palmaplantar region), eczematous lesions (two events), drug rush (one event) and alopecia areata (one event-probably not related to secukinumab treatment).

Drug Continuation

Eighty-eight patients were eligible for drug continuation analysis, 75 of whom remained (84.3%) on secukinumab treatment at the end of first year. The reasons for secukinumab withdrawal at year 1 were as follows; failure to response (3/13; 23.1%), lost-follow-up (3/13; 23.1%), adverse events (2/13; 15.4%) and others (4/13; 30.8%). Adverse events were acute abdomen and IBD. Other reasons included patient's pregnancy plan, health insurance problem, patient's desire and suspicion of thyroid cancer recurrence.

Systematic review results

Literature search was performed by two authors (NK and GÇ) and resulted in 109 articles. A total of 21 studies.[3,5-24] met all eligibility criteria after excluding duplicates, irrelevant studies, and the studies that did not meet inclusion criteria. PASI response rates were reported at week 4 in four (all Europe), at week 12 in nine 6 Europe, 1 Far East, 2 America) and at year 1 in ten (9 Europe, 1 Turkey) studies. Drug survival/drug continuation rates at year 1 were evaluated in nine studies all of which were from Europe. The detailed information about the studies is given in **Table 4**.

Secukinumab was discontinued because of lack of efficacy, adverse events, lost to follow up and other reasons in 3.3-43.7%, 0.3-50.0%, 12.4% and 0.3-6.5% of the patients.

Adverse events were experienced by the 7.1-27.0% of the patients. No new safety concerns were reported. Dermatological adverse events included in situ skin carcinoma (2.4%), basal cell carcinoma (1.2%), erythema and itching (5.6%) and drug reaction (1.4%-28.6%). Drug reaction clinical patterns were as follows; recurrent dermatitis-hypodermatitis, pustules on hands and feet, drug rash with eosinophilia and systemic symptoms and eczematous lesions. IBD developed in one patient,[5,6] and reported as < 5 events in two years.[7]

Table 4. Details of the studies included in systematic review.

Study	Nation	n	Age (mean years)	Baseline PASI value (mean)	Psoriasis duration (mean years)	% Bionaive	% PsA	% Comorbidity	% Obesity, % Overweight	% PASI75/PASI90/PASI100 response rates	% DS at year 1
Turkey											
Yıldırım and Hapa [3]	Turkey	121	46.8	20.8	NA	79.7	1.0	43.8	NA	At year 1; 86.1/64.6/7.6	NA
Europe											
Tsentemeidou et al. Sotiriou et al. [5,6]	Greece	42	50.8	6.70	NA	45.2	42.1	NA	NA	At week 4; 100/ 88.1/NA At week 12; 100/92.9/NA At year 1; 82.4/NA/NA	78.6
Yiu et al. [7]	UK and the Republic of Ireland	991	47.0	NA	NA	72.9	22.8	68.6	NA	NA	88.0
Ortiz-Salvador et al. [8]	Spain	158	28.0	12.5	NA	32.9	34.8	NA	44.9, NA	At week 4; 57.0/27.8/NA At week 12; 83.5/62/NA At year 1; 78.5/63.2/NA	82.9
Rompoti et al. [9]	Greece	13	48.0	12.1	16.9	56.3	43.9	49.0	41.6, NA	At year 1; 92.0/86.0/40.0	NA
Chiricozzi et al. [10]	Switzerland, Portugal, Italy	330	52.0	15.3	18.5	46.0	28.3	NA	NA, NA	At week 12; 73.6/38.5/21.5 At year 1; 67.6/48.5/32.1	NA
Galluzzo M, et al. [11]	Italy	107	47.5	17.9	20.3	48.6	15.0	51.3	25.0, NA	At week 4; 57.9/35.5/22.4 At week 12; 80.0/67.5/55.0 At year 1; 92.1/81.6/78.9	NA
Rompotiet al. [12]	Greece	85	48.6	NA	NA	42.9	38.2	78.3	41.0, 37.2	At year 1; 71.6/50.8/40.3	NA
Torres et al. [13]	Italy, Protugal, Switzerland	330	51.9	NA	NA	47.6	21.5	NA	19.6, NA	NA	83.0
Palacios-García et al. [14]	Spain	64	50.5	NA	NA	35.9	53.1	NA	53.1, NA	NA	81.0
Herrera-Acost et al. [15]	Spain	59	48.0	18.1	NA	35.6	33.9	NA	NA, NA	At week 12; 80.7/57.9/42.1 At year 1; 64.4/49.2/42.4	83.1
Carpentieri et al. [16]	France, Italy	120	49.8	12.0	6.1	47.5	38.3	47.5	7.5, NA	NA	85.0
Galluzzo et al. [17]	Italy	151	45.3	17.7	20.5	81.0	NA	NA	22.6, 32.8	At 1 year 82.2/72.3/65.1	73.7
Chatzimichail et al. [18]	German	98	48.9	NA	NA	58.8	42.6	NA	32.4, NA	NA	68.0
López Jiménez et al. [19]	Spain	30	47.5	19.6	NA	31.0	31.0	NA	NA, NA	At year 1; 89.7/82.8/NA	NA
Schwensen et al. [20]	Denmark	69	49.0	10.0	NA	NA	52.8	NA	NA, 63.9	At week 12; 46.7/26.7/NA	NA
Ferreira et al. [21]	Portugal	66	NA	17.0	NA	50.0	36.4	NA	NA	At week 4; 67/37/NA	NA
Far East											
Zhang et al. [22]	Chinese	24	37.1	18.3	9.2	NA	NA	89.0	NA, NA	At week 12; 89.0/67.0/NA	NA
America											
Georgakopoulos et al. [32]	Canada	60	45.3	15.2	19.5	1.7	NA	NA	NA, NA	At week 12; 76.7/NA/15.0	NA
Georgakopoulos et al. [24]	Canadian	47	47.0	14.9	21	NA	70.2	NA	NA, NA	At week 12; 72.3/NA/NA	NA

Discussion

The interleukin-23/T helper 17 pathway has been identified as a critical axis in the pathogenesis of psoriasis. Interleukin-17A is the primary effector of this pathway. IL-17 antagonists have demonstrated efficacy and a favorable safety profile in key phase III clinical trials. In addition to efficacy, IL-17 antagonists have also shown long-term maintenance of treatment response and a quick onset of action. Important side effects of this group include increased risk of mucocutaneous candidiasis, neutropenia, and IBD exacerbations.[25] Since license approval of secukinumab in 2015, many real life studies have been published.

In our study PASI response rates at week 12 and year 1 were consistent with the results of Phase 3 studies of secukinumab, FIXTURE and ERASURE.[2] However, PASI response rates reported in real life studies are extremely different. While some studies found PASI90 response rate 27.8% at week 4, other found 88.1%.[5,8] It may be due to the fact that studies also differ from each other in terms of patient characteristics such as bio-naive rate, PsA rate, comorbidity rate and/or disease severity. This makes it difficult to compare study results. Most of the studies origin from European countries; so it is also almost impossible to compare secukinumab efficacy in different ethnic origin populations.

Different studies including the one from Turkey reported greater effectiveness of secukinumab treatment in bio-naïve patients at weeks 4, 12, 16, 24 and/or 52.[8-12] However, we found higher PASI90 and PASI100 response rates in bio-naive patients at only week 4. Multivariate model also established that prior biologic therapy have negative effect on PASI90 response at week 4. According to our results we suggest that secukinumab acts faster in bionaive patients; but long term effects are not different from bioexperienced ones. Another important finding of our study was that univariate analysis established female gender to be the only characteristic associated with higher PASI90 response at week 12 and at year one. Previous studies, also the one from Turkey, did not find any relationship between gender and secukinumab efficacy.[3,8,11,12] However female sex was reported to significantly increase the risk of anti-IL therapy discontinuation.[26] It is reported as a predictor for treatment discontinuation not only for anti-IL treatments but also for other biologics.[27-29] However little data exist about the reasons of this finding. Zweegers et al. established female sex as a predictor for treatment discontinuation due to side-effects and recently van der Schoot et al. reported that women were slightly less satisfied with treatment regarding side-effects and global satisfaction.[29,30] In our study there was no significant difference in terms of adverse effects between sexes. It can be argued that although being a woman is associated with higher PASI90 responses, women may have higher expectation from treatment probably due to emotational factors. Further research is necessary to come to a conclusion.

Most of the studies included in our analysis reported drug survival rate of secukinumab at year 1 approximately 80% ranging from 68% to 88%.[5,7,8,13-18] It is consistent with the results of a recent meta-analysis of 43 studies which reported drug survival 80% at 12 months.[31] In our series approximately 84% of the patients was still on drug at year 1. We agree with Yiu Z et. al that real-world drug survival of secukinumab is higher than previously reported.[7]

In terms of safety, generally secukinumab treatment was well tolerated in our patients. We did not experience new safety signals. In the open-label study of ixekizumab, UNCOVER-J, eczema was the most common adverse event after nasopharyngitis occurring in 12.1% of the patients.[32] In real-life, it was reported that cutaneous inflammatory reactions might develop in 5.8% of the psoriasis patients during anti-IL17A therapy. The skin eruptions typically occur 3-4 months after treatment initiation and may present as acute eczema, atopic dermatitis-like rash or psoriasiform eruption. Histopathological examination revealed spongiosis in the published series. Personel and/or familial history of atopy may be present in more than half of patients. Anti-IL17A treatment had to be discontinued in approximately 60% of patients.[33] In our patients none of the cutaneous reactions necessitated to stop secukinumab treatment, all resolved with topical and/or systemic treatments including steroids, doxycycline and antihistamines.

There were some limitations of our study. Firstly we did not take body mass index into consideration. However, there are conflicting results about the effect of body mass index on secukinumab efficacy or drug survival; some found negative relationship whereas other found no relationship.[3,6,11-14,26] Secondly, we only included psoriatic patients living in the Aegean part of Turkey; so our data do not represent the whole country. However, we believe that it contributes to the literature; because according to our knowledge, our study is the first study concerning about long-term efficacy and drug continuation of secukinumab from Turkey. As conclusion, based on our and other real-life study results secukinumab seems to be an effective and safe treatment option for chronic plaque psoriasis.

Acknowledgement

We thank Hande Şenol, Assist. Prof., for her helps and comments in statistical analyses.

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