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INVESTIGATIVE REPORT

A Nationwide Study of Acne Treatment Patterns in Korea: Analysis of Patient Preconceived Notions and Dermatologist Suggestion for Treatment

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Patients often have preconceived notions about acne treatments before visiting dermatologists. The aim of this study was to explore the association between patients' beliefs regarding acne and physicians' suggestion for treatment modality in dermatology clinics. A cross-sectional, nationwide multicentre study was conducted. A total of 1,370 patients completed questionnaires about beliefs about acne treatment before seeking medical care, and 101 dermatologists assessed their acne severity and proposed treatment methods. We found that patients had preconceptions in understanding disease characteristics, assessing subjective acne severity and preferring specific treatment modalities. Dermatologists' determination of topical agents as first-line treatment was affected by disease severity and patients' preferences. They were also more likely to prescribe isotretinoin even in moderate acne compared to oral antibiotics and topical agents. Selections of physical treatments and light-based therapies were affected by patients' preferences, subjective self-evaluation and dermatologists' assessments. Thus, we suggest that acne treatment strategies should incorporate both patients' subjective perceptions and objective clinical practices into a management paradigm. *Key words: acne; epidemiology; guideline; patient's preference; physician's selection; treatment modality; treatment pattern*.

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Although topical and oral treatments for acne have been widely used under well-established, global guidelines (1–4), the choice of acne treatment depends not only on the interaction of disease severity and its impact on the patient, but also upon issues concerning patient selection. Patients often have preferences for specific treatment methods based on their preconceived notions. Furthermore, with the increase in in-office procedures and new technologies, adjuvant therapies including physical treatments and light-based therapies (5–8) have also been actively introduced as acne treatment options in Korea. Although they provide a variety of therapeutic options for acne treatment, evidence is generally lacking for both objective validity and cost-effectiveness compared with well-established medications (5–8).

Therefore, the Korean Society for Acne Research (KSAR) recently decided to establish acne treatment guidelines reflecting our domestic medical practices. Before establishing these new guidelines for Korea, we conducted a nationwide postal investigation of patients' perceptions and beliefs regarding acne treatments and physicians' treatment patterns in dermatology clinics to gain basic information from both patients and dermatologists. Since patients' subjective assessment of disease severity and preconceived notions about treatment were expected to be important in selecting treatment modalities (9–11), we first investigated patients' general recognition of acne treatments, and then analysed possible causative factors contributing to physician's first-line treatment selection through multivariate analysis.

Although this study was conducted only in medical practices in Korea, we believe that the results of this research might provide valuable information to other medical communities.

MATERIALS AND METHODS

Study design

An observational, analytical, cross-sectional, multicentre study evaluating patients' general recognition and treatment patterns of acne in Korea was carried out from December 2008 to January 2009. A total of 101 board-certified dermatologists working in different regions of Korea participated in this study. To obtain a representative distribution, dermatologists were selected on the basis of geographical distribution for the country and their working places (Fig. 1). They were required to

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ask their visiting patients to complete patients' questionnaires before medical examination. The survey was completed for all consecutive patients agreeing to participate in the study. In addition, dermatologists themselves were also asked to supply a detailed objective assessment and treatment plan for every patient completing a questionnaire. The patient questionnaire included information regarding sex, age, occupation, affected body parts, period of recurrence, up-to-the minute occurrence of acne lesions, acne severity self-rating, perceptions and beliefs of provoking factors, expected treatment period, favoured and unfavoured treatment modalities, attributed reasons for their choices, past treatment history, and priorities in choosing treatment options. For each patient, a dermatologist determined the objective acne severity and a primary treatment method based on clinical assessment. Acne severity was evaluated based on the Korean Acne Grading System (KAGS), as follows: Grade 1: papules ≤ 10, Grade 2: papules 11–30, Grade 3: papules ≥ 31, nodules ≤ 10, Grade 4: nodules 11–20 or mild ongoing scars, Grade 5: nodules 21–30 or moderate ongoing scars and Grade 6: nodule ≥ 31 or severe ongoing scars or sinus tracts.

Demographic data

The subjects of this survey were 1,370 consecutive new patients presenting to 22 referral hospitals and 46 private dermatology offices between December 2008 and January 2009. Full data are shown in Table I.

Statistical analysis

Pearson's χ^2 test was used to analyse categorical variables. Categorical values were denoted as frequencies and percentages. Kendall's rank correlation was used for acne severity comparisons between patients and dermatologist-assessed scores. Both univariate and multivariate logistic regression analysis were used to explore causative factors for dermatologists' determination of treatment options. A p-value of < 0.05 was considered statistically significant. The data were analysed using SPSS® (version 17.0, SPSS Inc., Chicago, IL, USA).

RESULTS

Beliefs and perceptions of patients regarding acne treatment

Only 7% of patients ($n = 102$) believed that acne was incurable. Twenty-nine percent of patients expected that acne treatment would take less than 1 month, 32% believed it would take less than 3 months, and only 13% believed treatment would take longer than 6 months. Only 24% believed that acne medication had no harmful effect on their health. Related data are shown in Table SI (available from: http://www.medicaljournals.se/acta/content/?doi=10.2340/00015555-1331).

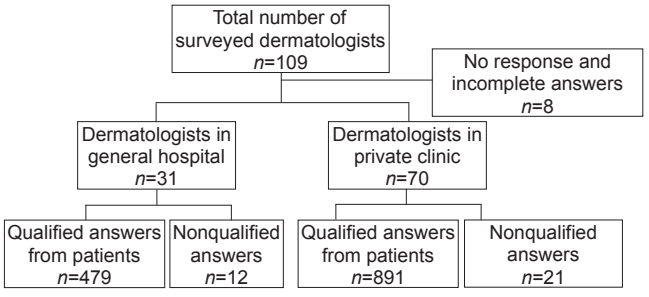

Fig. 1. Flow-chart of participating dermatologists and patients. A total of 101 board-certified dermatologists working in different regions of Korea were included in this nationwide study. These dermatologists were selected on the basis of geographical distribution and working places (general hospital and private clinic) to obtain a representative distribution. The participating dermatologists were required to ask their visiting patients to complete a patient's questionnaire before the medical encounter. A total of 1,370 patients submitted the qualified answers.

Table I. *Demographic and clinical characteristics of the subjects*

Characteristics	Value ($n = 1,370$)[a]
Age, years	
Mean ± standard deviation	23.7 ± 6.0
Range	12–56
Sex, *n* (%)	
Male	489 (35.7%)
Female	881 (64.3%)
Occupation, *n* (%)	
Student	690 (50.3%)
Non-student	680 (49.6%)
Sites of acne[b], *n* (%)	
Forehead	740 (22.7%)
Cheek	1,029 (31.5%)
Chin	624 (19.1%)
Perioral	424 (13.0%)
Chest	176 (5.4%)
Back	218 (6.7%)
Shoulder	53 (1.6%)
Duration of acne, *n* (%)	
Within 1 month	179 (13.1%)
1 ~ 6 months	264 (19.3%)
6 months~1 year	192 (14.0%)
1 ~ 5 years	429 (31.3%)
Over 5 years	306 (22.3%)

[a]Because of rounding, not all percentages total 100.
[b]Since this question was a multiple-answer question, the sum of numbers was > 1,370.

Relationship between subjective self-rating and objective assessment of acne severity

Fifty-eight percent of all patients thought that their acne severity was moderate or severe. In contrast to the self-assessment, only 13% of patients were grade 4 or more according to dermatologists' assessment. No significant correlation between patients' and dermatologists assessments of acne severity was observed (Kendall's tau-b 0.293, $p < 0.001$; Kendall's tau-c, $p < 0.001$) (Table II).

Patients' priorities for treatment modality as first-line therapy for acne

Patients were asked to select 3 favoured treatment modalities in order of preference before consulting with dermatologists, and to give reasons for each of them. Total calculated scores showed that patients preferred topical treatments, physical treatments and light-based therapies (Fig. 2A). The reasons for preferring specific treatment methods were generally different among treatment modalities ($p < 0.05$) (Fig. 2B). Ease was the main reason for the selection of topical treatments, whi-

Table II. *Comparison of acne severity between patient-reported severity score and dermatologist-assessed scores (*n = *1,326). There was no significant relationship between patient- and dermatologist-assessed acne severity (Kendall's tau-b = 0.293; Kendall's tau-c = 0.275)*

		Dermatologist-assessed severity score[a]					
Patient-reported severity score	*n* (%)	Grade 1 *n* = 256 (18.7%)	Grade 2 *n* = 463 (33.8%)	Grade 3 *n* = 434 (31.7%)	Grade 4 *n* = 107 (7.8%)	Grade 5 *n* = 57 (4.2%)	Grade 6 *n* = 9 (0.7%)
Very mild	142 (10.4)	66	33	28	4	3	1
Mild	390 (28.5)	105	158	86	20	10	1
Moderate	578 (42.2)	55	208	223	46	23	2
Severe	214 (15.6)	18	55	78	34	20	5
Unknown	46 (3.4)	12	9	19	3	1	0

[a]Korean acne grading system.

le expected clinical efficacies were the main reasons for the choice of other treatment modalities. Patients were also asked to select 3 unfavoured treatment modalities. Total calculated scores showed that patients disliked light-based therapies, oral antibiotics, and isotretinoin (Fig. S1; available from http://www.medicaljournals.se/acta/content/?doi=10.2340/00015555-1331). The reasons for disliking specific treatment methods were also different between treatment modalities ($p < 0.05$). Expected cost was the main reason for disliking light-based therapies, while possible side-effects were the main reasons for avoiding the two oral medications.

Factors influencing dermatologists' acne treatment decisions

Since sex, age, occupation, acne frequency, patient-reported acne severity, patient's preference for specific treatment, and dermatologist-assessed severity were shown to affect the dermatologist's treatment modality choice in the univariate analysis (data not shown), we included these variables in a multivariate analysis (Table SII; http://www.medicaljournals.se/acta/content/?doi=10.2340/00015555-1331). We also included additional variables, such as expected duration of treatment and duration of acne. According to the multivariate analysis, there was a different pattern of significant variables that affected the treatment decision between medical treatment (topical agent, oral antibiotics, oral isotretinoin) and physical treatment (chemical peeling, comedo extraction, incision and drainage and steroid intralesional injection and light-based therapy). In medical treatment, the only statistically significant factors influencing the treatment decision by dermatologists were sex, dermatologist-assessed severity, and patient's preference. The patients who preferred a more aggressive treatment (oral isotretinoin, physical treatment and light-based therapy) had a reduced chance of receiving topical therapy. However, oral antibiotic treatment had no significant association with patient's preference.

Multivariate analysis revealed that physical treatment and light-based therapies were widely used in acne patients of grade 2 or more, and physical treatment was more frequently used in female patients ($p = 0.005$).

Priority on choosing the treatment options

Patients and dermatologists showed similar patterns of rank orders in the most important factors for deciding treatment options. Efficacy and safety respectively ranked first and second in both patients and dermatologists. Intriguingly, the dermatologists took little account of patients' preferences or comfort (Table III).

DISCUSSION

In this study, we tried to reveal the underlying mechanisms of the decision-making process in the dermatology clinics and provide practical information to establish bet-

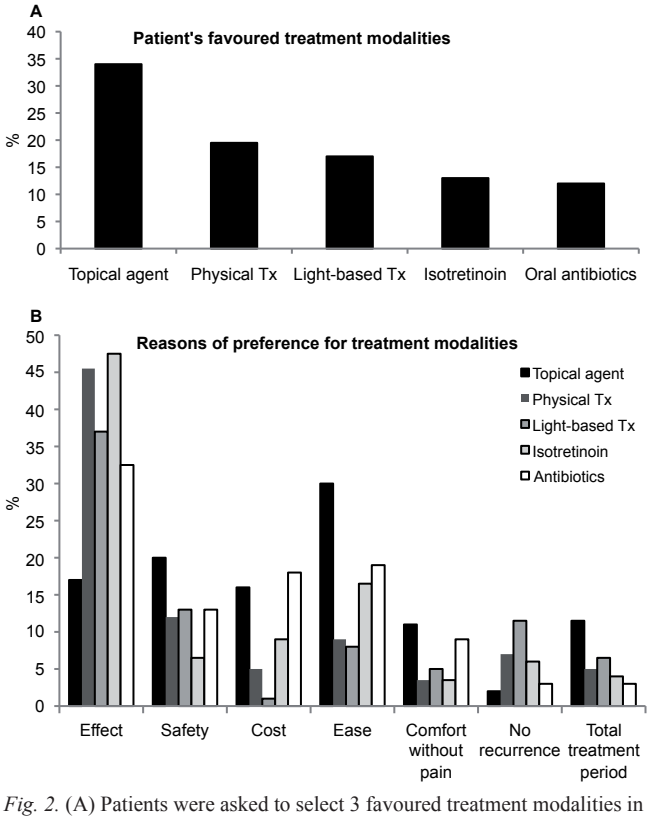

Fig. 2. (A) Patients were asked to select 3 favoured treatment modalities in order of preference before consulting with dermatologists. Total scores were calculated using weight as follows: 1st order, 3; 2nd order, 2; 3rd order, 1. (B) Reasons for preference of 3 highly scored treatment methods are demonstrated in the graph. Distribution of reasons for preferring specific treatment methods was generally different among treatment modalities ($p < 0.05$).

ter acne treatment guidelines. Since we thought a holistic approach was a more reasonable method of studying acne treatment patterns rather than focusing solely on physicians' perspectives, we analysed the contributing factors determining first-line treatment of acne in Korea from the perspectives of both patients and dermatologists.

In this context, we first analysed patients' preconceived notions about treatment of acne before initial consultation with dermatologists in the clinic. Firstly, our results showed that patients had some misinformation about clinical aspects of acne. This point is clinically important for appropriate treatments because acne is a chronic disease (12) and preconceived notions that patients have about acne are highly related to adherence with consistent treatment (13–15).

Secondly, our studies showed that there was no significant correlation between subjective acne severity measured by patients and dermatologist-assessed acne severity. Potential discordance between subjective self-satisfaction of patients and objective morphological severity are frequently observed in the treatment of acne (16, 17). Previous studies have even demonstrated that quality of life measured by Acne Quality of Life (AQOL) correlated well with patients' assessment of acne severity, while there was no association with objective acne severity (18–24).

Finally, we also found that many patients had preferred treatment modalities as a first-line therapy before visiting a dermatology clinic. Patients thought that physical treatments and light-based therapies were quite effective, while high costs prevented their common use. Additionally, patients were afraid of side-effects due to oral medication. Oral antibiotics have been recommended as a first-line therapy in moderate acne because of their efficacy and safety profile (2, 3, 25), even though antibiotic resistance is a significant concern for long-term treatment (1). Therefore, we believe that investigation of cost-effectiveness of adjuvant treatments and education on oral medications should be conducted. In addition, supplementing objective means with tools such as patients' self-rating, acne-specific quality of life scales and patient adherence, may resolve associated problems. These might be facilitated by the use of validated questionnaires, such as APSEA (19), ADI (23), SKINDEX (24), and ECOB (26).

Table III. *Patients' and dermatologists' order of the most 3 important factors in the treatment for acne. Total scores were calculated using weight as follows: 1st order, 3; 2nd order, 2; 3rd order 1*

	1st order	2nd order	3rd order	Total scores	Rank
Patients' opinion (n=1354)					
Efficacy	914	243	83	3,311	1
Safety	149	363	249	1,422	2
No recurrence	157	273	358	1,375	3
Cost	81	298	305	1,144	4
Easiness	19	70	105	302	5
Comfort without pain	24	58	111	299	6
Total treatment period	10	49	141	269	7
Dermatologists' opinion (n=131)					
Efficacy	89	18	5	308	1
Safety	11	34	33	134	2
Cost-effectiveness	17	28	22	129	3
Rapid onset of efficacy	7	24	17	86	4
Low recurrence rate	2	15	11	47	5
Preference of the patient	1	7	21	38	6
Easiness	4	4	16	36	7
Frequency of visiting	0	0	5	5	8
Relief without pain	0	1	1	3	9

We found several characteristic patterns of dermatologists' decision-making processes for first-line treatment. Firstly, physicians' prescriptions of topical agents were affected by dermatologist-assessed severity and patients' preferences. In mild to moderate acne, physicians put a higher priority on oral antibiotics, isotretinoin, physical treatments, and light-based therapies, while prescription of topical agents decreased significantly. Physicians were also less likely to prescribe topical agents for patients preferring other treatment methods. Nevertheless, the combination of a topical retinoid and antimicrobial agent remains the preferred approach for almost all patients with mild to moderate acne (2–4), demonstrating excellent efficacy and patients' satisfaction in clinical trials involving more than 16,000 patients (1, 27–30).

Secondly, many physicians prescribed isotretinoin as a first-line therapy for patients with moderate acne. Although the approved indication of oral isotretinoin is severe nodular, treatment-resistant acne, some groups have suggested that isotretinoin should be indicated for all cases of acne that are either treatment-resistant or produce physical or psychological scarring (2, 31). Others still advocate oral isotretinoin as second-line therapy (32, 33).

Finally, our study showed that physical treatments and light-based therapies are preferred by patients who desire better efficacy, quicker onset of action, and no systemic side-effects. This is despite the fact that the evidence for efficacy of these adjunctive therapies is not particularly robust (1, 5, 7, 8). Evidence from controlled clinical trials indicates short-term efficacy from lasers and various light sources for acne vulgaris, with the most consistent outcomes for blue light and photodynamic therapy (PDT) (1, 7). Scientific assessment of these adjuvant therapies is still needed however.

There are some limitations to our study. For example, since costs of physical treatments and light-based therapies are not standardized around the country, this may have affected both patients' preference and dermatologists' selection of treatment modality.

In our study, both patients and dermatologists put high priorities on efficacy and safety as the most important factors to consider in choosing treatment options. Since they share common values in selecting acne treatment methods, the establishment of a new guideline comprising updated and accessible information on various

treatment methods would address many issues found in this study. In formulating new guidelines, we suggest that acne treatment strategies should incorporate both patients' subjective evaluations and objective clinical practices into a management paradigm.

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The authors declare no conflicts of interest.

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