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ORIGINAL RESEARCH

Knowledge, Attitudes, and Practices of Patients with Moderate to Severe Acne Regarding Oral Medication Therapy: A Structural Equation Modeling Analysis

Jiejun Wang[1], Dou Bai[1], Xiaoyuan Yao[1], Xinze Song[1], Xufei Yang[1], Yanli Yuan[2]

[1]Department of Dermatology, Dingxi People's Hospital, Dingxi, Gansu, 743000, People's Republic of China; [2]Department of Dermatology, Jiuquan People's Hospital, Jiuquan, Gansu, 735000, People's Republic of China

Correspondence: Yanli Yuan, Department of Dermatology, Jiuquan People's Hospital, Jiuquan, Gansu, 735000, People's Republic of China, Tel +86-15209378030, Email 710852894@qq.com

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Purpose: Acne affects up to 9% of the global population, with rising prevalence among Chinese urban youth, leading to significant physical and psychological impacts.

Patients and Methods: A cross-sectional study was conducted at the Dingxi People's Hospital. Data on the demographics and knowledge, attitudes, and practices (KAP) of patients with moderate to severe acne were collected through questionnaire distribution.

Results: A total of 561 patients were included in the study, of them 58.65% females, The majority of participants believed that they have sufficient knowledge of routine acne management and 72.72% reported that they are satisfied with the current effectiveness of medication treatment. However, predominant answer for all questions regarding the oral treatment of acne (40.29%-58.82%) or combination therapy (23.89%-41.53%) was "unsure". Knowledge score was positively correlated with attitude score ($p < 0.001$) and practice score ($p < 0.001$), and higher knowledge scale scores were associated with higher practice scores according to logistic regression analysis ($p = 0.002$). According to the Structural equation modelling knowledge influenced practice directly and indirectly.

Conclusion: This study found that patients with moderate to severe acne in China might overestimate their knowledge of oral medication therapy and ability to manage acne. Targeted healthcare education is needed to address the identified gaps, ultimately optimizing acne management strategies and enhancing patient outcomes.

Keywords: acne vulgaris, medication adherence, psychological well-being, health knowledge, attitudes, practice, surveys and questionnaires

Introduction

Acne is a common chronic inflammatory skin condition that primarily involves irregular sebum production, *Cutibacterium acnes colonization*, and inflammation.[1] It affecting up to 9% of the world's population, with a prevalence ranging between 40% and 70% in adolescents.[2,3] According to the data from the World Health Organization, risk of acne and other skin disorders is growing globally due to air pollution; in China, the incidence of acne is also increasing annually, especially among urban adolescents.[4,5] Moderate to severe acne patients, in particular, bear significant physical and psychological burdens due to the scarring, dyspigmentation, and low self-esteem.[6,7]

Various treatment methods for acne have been proposed over the years, including abundant topical medications, oral medications, laser therapy, and others.[8] In particular, oral medication therapy is often preferred for patients with moderate to severe acne.[9] Although Isotretinoin, antibiotics and oral contraceptives are widely used in clinical practice, recent studies showed some issues in their use, such as lowering efficacy and increasing antibiotic resistance worldwide.[10,11] Moreover, with many psychological issues related to the acne problem, methods for patient selection and motivation for adherence towards above medications still need further investigation.[7,12]

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Understanding the level of patient knowledge, attitudes, and actual practices regarding oral medication therapy is of great significance for improving treatment outcomes and patient compliance.[13] Few previous studies showed a moderate knowledge, attitudes, practices (KAP) towards acne treatment among healthcare professionals,[14,15] results have shown more variability among the general public, ranging from good[16] to poor.[17,18] In East and Southeast Asia, studies from Singapore and Hong Kong have indicated high prevalence of acne and significant psychological burden among students and adolescents, accompanied by widespread misconceptions and low awareness of proper treatment options.[19,20] Although previous studies have examined treatment awareness among general populations and healthcare professionals, few have focused on patients who require long-term oral therapy for moderate to severe acne. However, there is currently relatively little research on the KAP of patients with moderate to severe acne towards oral medication therapy, especially in Asia, indicating a research gap. Therefore, conducting research in this direction is of vital importance for gaining a deeper understanding of patient needs and improving clinical practice.

This study aims to investigate the knowledge, attitudes, and practices of patients with moderate to severe acne towards oral medication therapy, to explore the shortcomings of current treatment regimens, and to propose improvement suggestions. By gaining insight into patient needs and concerns, the findings may support clinicians in developing more scientific and personalized treatment strategies, thereby better meeting patient needs and improving treatment success rates and compliance.

Materials and Methods

Study Design and Participants

The cross-sectional study was conducted From March 1 to June 29, 2024, at the Dingxi People's Hospital, focusing on patients with moderate to severe acne. The study was approved by the Institutional Review Board of Dingxi People's Hospital Medical ethics (Dingyi Ethics 202401). All participants were informed about the study protocol and provided written informed consent to participate in the study.

The inclusion criteria for this study were as follows: participants had to be diagnosed with moderate to severe acne based on the Chinese Acne Treatment Guidelines (2019 revised edition), which defines moderate acne as having numerous inflammatory papules and pustules with occasional nodules, and severe acne as having widespread inflammatory lesions including multiple nodules and cysts. Eligible participants also presented with active inflammatory lesions primarily located on the face and agreed to participate voluntarily after being fully informed about the study.

Exclusion criteria included participants who, despite consenting, failed to cooperate during data collection (providing inconsistent or inattentive responses), those with significant cognitive or language comprehension impairments preventing them from understanding and accurately completing the questionnaire, and those who submitted responses with durations below 140 seconds or above 1800 seconds. Incomplete questionnaires were also excluded from the analysis. The lower limit for response time was set at 140 seconds. This threshold was determined based on the total number of questionnaire items (approximately 70), assuming a minimum average of 2 seconds per single-choice item. Participants completing the questionnaire in less than 140 seconds were considered likely to have provided inattentive or careless responses, as such completion times would not allow adequate reading and consideration of all questions. This approach is consistent with prior research that identified extremely short completion times as indicative of insufficient-effort responding in online surveys.[21,22]

Questionnaire Introduction

The questionnaire design was based on the Chinese Guidelines for the Management of Acne Vulgaris (2019 Edition),[23] most recent National Institute for Health and Care Excellence (NICE) guidelines for management of Acne vulgaris (2023)[23] and previous KAP studies on acne treatment.[16,18,24] After the initial design, the questionnaire was evaluated by two senior dermatologists with substantial experience in acne management. They assessed the relevance, coverage, and clarity of each item across knowledge domains. Based on their feedback, certain items were reworded to improve patient comprehension, and core concepts were confirmed to be adequately covered. The reliability coefficient, measured by Cronbach's alpha, was determined to be 0.860, indicating good internal consistency ($0.8 \le \alpha < 0.9$ is considered good).[25]

The final questionnaire was in Chinese and consisted of four dimensions of information collection.

1. Basic Information section included 16 questions.
2. Knowledge section: 10 items, with items 2, 4, 5, 6, 7, 8, and 10 having multiple sub-items. Each correct answer scored 1 point, incorrect or unclear answers scored 0 points. The total score ranged from 0 to 40.
3. Attitude section: 10 items, with item 4 having multiple sub-items and items 7 and 8 being open-ended topics. The remaining items used a five-point Likert scale, ranging from a. Strongly Agree, b. Agree, c. Neutral, d. Disagree, to e. Strongly Disagree. The total score ranged from 10 to 50, with higher scores indicating a more positive attitude towards acne and oral medication therapy.
4. Practice Dimension: 6 items, with item 2 having multiple sub-items and item 6 being an open-ended topic. All items used a five-point Likert scale, ranging from a. Always, b. Usually, c. Sometimes, d. Rarely, to e. Never. The total score ranged from 8 to 40, with higher scores indicating better behavior and practices regarding acne and oral medication therapy. Details of the questionnaire are provided in Figure S1. Higher scores indicating greater knowledge of acne and oral medication therapy, more positive attitudes toward treatment, and better self-management practices.

The questionnaires were distributed to the research participants via the WeChat messenger platform using the questionnaire star feature.

Sample Size Determination

The sample size was calculated using the following formula:

$$n = \frac{z^2 p(1-p)}{d^2}$$

where z=1.96 at 5% level of significance and 5%acceptable margin of error (d=0.05). The proportion of the expected population based on previous studies or pilot studies is set at 50%. Based on the above, the sample size was calculated as n = 384.[26]

Statistical Analyses

Descriptive analysis was conducted on the demographic data of the respondents and the scores of each dimension with the help of STATA, version 14.0. First, the distribution of scores for each dimension was tested for normality. If the data followed a normal distribution, the mean and standard deviation were used to represent the data. If the data did not follow a normal distribution, the median, 25th percentile, and 75th percentile were used to represent the data. The count data of responses to different demographic characteristics were presented as n (%). Differences in scores for each dimension among respondents with different demographic characteristics were compared. For continuous variables that followed a normal distribution, a *t*-test was used for comparison between two groups, while the Wilcoxon-Mann–Whitney test was used if the distribution was not normal. For three or more groups of continuous variables that followed a normal distribution and had equal variances, ANOVA was used for comparison. If the distribution was not normal, the Kruskal–Wallis analysis of variance was used.

Correlation analysis was conducted on the scores for each dimension. If the data followed a normal distribution, Pearson correlation coefficient was used. If the data did not follow a normal distribution, Spearman correlation coefficient was used. Structural equation modelling (SEM) approach was used to test the hypotheses that (H1) knowledge regarding acne management has effect on attitudes; (H2) knowledge has effect on practices; and (H3) attitude has effect on practices.

Scores for each dimension were treated as dependent variables in single-factor and multi-factor regression analyses, the median scores for each dimension were used for classification. Variables were included in the multi-factor regression analysis based on single-factor variables with P<0.1 and P<0.25. In this analysis, P-values were retained to three decimal places, and P<0.05 was considered statistically significant.

Patient and Public Involvement

No patient involved.

Results

Summary of Basic Information

We collected a total of 605 cases, of which 2 were excluded due to refusal to participate, leaving 603 cases. Subsequently, we removed the following invalid samples: 15 cases with response times shorter than 140 seconds, 4 cases that selected all options for questions 2–10 in the knowledge section, and 23 cases that consistently chose neutral responses in the attitude section. Ultimately, 561 valid cases were obtained for analysis. The overall Cronbach's α coefficient for the questionnaire was 0.890, indicating excellent internal consistency.

A total of 561 patients were included in the study, of them 41.35% males and 58.65% females, 66.84% aged under 24 years old, 60.25% urban residents and 60.61% students. Majority had no history of liver, kidney or gastrointestinal diseases (94.12%), reported no history of photosensitivity (96.26%) or adverse drug reactions (93.94%). The number and proportion of individuals in each demographic category are and their KAP scores are presented in Table 1.

Table 1 General Characteristics of Acne Patients Included in the Study

	n (%)	Knowledge		Attitude		Practice	
		Median [P0.25, P0.75]		Median [P0.25, P0.75]		Median [P0.25, P0.75]	
Total Score	561(100)						
Gender			0.062		0.614		0.172
Male	232(41.35)	25.5 [19.0, 31.0]		28.0 [26.0, 30.0]		34.5 [30.5, 40.0]	
Female	329(58.65)	27.0 [21.0, 32.0]		28.0 [26.0, 30.0]		33.0 [29.0, 39.0]	
Age (years)			0.480		0.731		0.485
<24	375(66.84)	26.0 [20.0, 31.0]		28.0 [26.0, 30.0]		34.0 [30.0, 39.0]	
25-35	150(26.74)	27.5 [20.5, 32.0]		28.0 [26.0, 30.0]		33.0 [29.0, 39.0]	
36-50	33(5.88)	23.0 [20.0, 30.0]		28.0 [27.0, 30.0]		32.0 [27.0, 39.0]	
≥50	3(0.53)	26.0 [22.5, 26.5]		27.0 [27.0, 30.0]		28.0 [23.0, 34.0]	
Marital Status			**0.021***		0.482		**0.002***
Unmarried	440(78.43)	27.0 [21.0, 32.0]		28.0 [26.0, 30.0]		34.0 [30.0, 40.0]	
Married	120(21.39)	24.5 [17.5, 30.5]		28.0 [26.0, 30.0]		32.0 [26.0, 38.0]	
Divorced or Widowed (not grouped)	1(0.18)						
Education Level			**0.001***		0.488		**0.004***
Junior high school and below	79(14.08)	21.0 [14.0, 29.0]		28.0 [26.0, 29.0]		32.0 [28.0, 36.5]	
High school and vocational school	133(23.71)	23.0 [17.0, 29.0]		28.0 [26.0, 30.0]		32.0 [27.0, 38.0]	
College and undergraduate	332(59.18)	28.0 [22.5, 32.0]		28.0 [26.0, 30.0]		34.0 [31.0, 40.0]	
Master's degree and above	17(3.03)	30.0 [20.0, 32.0]		28.0 [28.0, 30.0]		38.0 [31.0, 40.0]	
Residential Type			0.969		0.114		0.833
Urban area in the local region	338(60.25)	26.0 [20.0, 31.0]		28.0 [26.0, 30.0]		34.0 [30.0, 39.0]	
Rural area in the local region	223(39.75)	26.0 [20.0, 32.0]		28.0 [26.0, 29.0]		33.0 [29.0, 40.0]	
Occupation Type:			**0.001***		0.666		0.130
Student	340(60.61)	26.0 [20.0, 31.0]		28.0 [26.0, 30.0]		34.0 [30.0, 39.0]	
Outdoor manual laborer	9(1.6)	24.0 [21.0, 28.0]		28.0 [27.0, 31.0]		31.0 [29.0, 37.0]	
Office staff/leader	80(14.26)	29.5 [23.0, 33.0]		28.0 [26.0, 29.0]		34.0 [30.0, 40.0]	
Free Ocupation	96(17.11)	25.0 [15.5, 30.0]		28.0 [25.5, 30.0]		32.0 [28.0, 38.5]	
Self-employed	14(2.5)	21.0 [13.5, 26.5]		26.5 [25.5, 28.5]		29.5 [26.0, 35.5]	
Retired (not grouped)	1(0.18)						
Other: Specific value	21(3.74)	30.0 [22.0, 33.0]		29.0 [27.0, 31.0]		36.0 [31.0, 40.0]	
Medical Payment Method:			**0.019***		0.644		**0.022***
Medical insurance	172(30.66)	28.0 [21.5, 32.0]		28.0 [26.0, 30.0]		35.0 [30.0, 40.0]	
Out-of-pocket payment	389(69.34)	26.0 [20.0, 31.0]		28.0 [26.0, 30.0]		33.0 [29.0, 39.0]	

(*Continued*)

Table 1 (Continued).

	n (%)	Knowledge		Attitude		Practice	
		Median [P0.25, P0.75]		Median [P0.25, P0.75]		Median [P0.25, P0.75]	
Monthly Income:			0.007*		0.510		0.424
<=3000	396(70.59)	25.0 [19.5, 31.0]		28.0 [26.0, 30.0]		33.0 [29.0, 39.0]	
3000-5000	134(23.89)	28.0 [21.0, 32.0]		28.0 [26.0, 30.0]		34.0 [30.0, 40.0]	
5000-8000	26(4.63)	28.5 [26.0, 32.5]		28.0 [26.5, 29.5]		34.0 [30.5, 37.5]	
≥8000	5(0.89)	33.0 [32.0, 34.0]		28.0 [27.0, 29.0]		39.0 [35.0, 40.0]	
History of liver, kidney, gastrointestinal diseases			**0.049***		0.455		0.215
No	528(94.12)	26.0 [20.0, 31.0]		28.0 [26.0, 30.0]		33.0 [30.0, 39.0]	
Yes	33(5.88)	28.0 [24.0, 34.0]		27.0 [26.0, 30.0]		36.0 [32.0, 40.0]	
History of photosensitivity			0.550		0.302		0.501
No	540(96.26)	26.0 [20.0, 32.0]		28.0 [26.0, 30.0]		33.0 [29.0, 39.0]	
Yes	21(3.74)	25.0 [14.0, 29.0]		27.0 [26.0, 28.0]		34.0 [32.0, 38.0]	
History of adverse drug reactions			0.339		0.428		0.583
No	527(93.94)	26.0 [20.0, 31.0]		28.0 [26.0, 30.0]		33.0 [30.0, 39.0]	
Yes	34(6.06)	26.5 [23.0, 32.5]		27.0 [26.0, 29.5]		35.0 [31.5, 38.5]	

Note: *P < 0.05 indicates statistical significance. Bold font indicates that P<0.05.

Distribution of KAP Scores

As shown in Table 2, several knowledge gaps were identified. A large proportion of participants were unsure about key aspects of oral medication therapy, with 40.29% to 58.82% selecting "unsure" on questions related to common oral drugs such as antibiotics and vitamin A derivatives. Similarly, 50.8% were unsure about or unaware of the use of combination oral contraceptives. Awareness of potential side effects was also limited; for example, 44.92% were unclear about the risk of liver dysfunction and 41.35% were unsure about cognitive effects. Notably, 66.13% of participants either denied or were unsure about the role of genetic factors in acne, reflecting a significant misunderstanding of etiology.

Table 2 Distribution of Knowledge Scores Among Participants

Knowledge	n (%)		
	Correct	Incorrect	Unclear
1. Acne is a common _________ skin condition that predominantly affects the face during adolescence.	160(28.52)	4(0.71)	397(70.77)
2. The etiology of acne includes:			
(1) Excessive sebum secretion by sebaceous glands	488(86.99)	6(1.07)	67(11.94)
(2) Inflammation of the pilosebaceous unit	457(81.46)	6(1.07)	98(17.47)
(3) Infection by pathogenic microorganisms	341(60.78)	38(6.77)	182(32.44)
(4) Abnormal levels of androgens	342(60.96)	43(7.66)	176(31.37)
(5) Genetic factors	190(33.87)	193(34.4)	178(31.73)
3. Acne tends to be chronic, recurrent, and often leads to secondary sensitive skin.	491(87.52)	9(1.6)	61(10.87)
4. Factors that can affect the severity of acne include:			
(1) High-fat or high-sugar diet	478(85.2)	18(3.21)	65(11.59)
(2) High-protein diet	348(62.03)	89(15.86)	124(22.1)
(3) Staying up late	522(93.05)	13(2.32)	26(4.63)
(4) Psychological stress	469(83.6)	32(5.7)	60(10.7)
(5) Obesity	329(58.65)	108(19.25)	124(22.1)
(6) Over-washing the face	372(66.31)	83(14.8)	106(18.89)
5. Skincare precautions suitable for acne patients include:			
(1) Using gentle cleansing products without fragrance, alcohol, or soap base	471(83.96)	34(6.06)	56(9.98)
(2) Using foundation and cosmetics to cover pimples	196(34.94)	316(56.33)	49(8.73)
(3) Avoiding squeezing or scratching the acne area	536(95.54)	8(1.43)	17(3.03)
(4) Avoiding excessive sunlight exposure and choosing physical or chemical sunscreen measures	483(86.1)	31(5.53)	47(8.38)
(5) Using potent and stimulating oil-control skincare products	192(34.22)	307(54.72)	62(11.05)

(*Continued*)

Table 2 (Continued).

Knowledge	n (%)		
	Correct	Incorrect	Unclear
6. The goals of treating common acne include:			
(1) Eliminating skin lesions and preventing recurrence	474(84.49)	20(3.57)	67(11.94)
(2) Preventing sensitive skin	483(86.1)	17(3.03)	61(10.87)
(3) Reducing post-inflammatory erythema and pigmentation	488(86.99)	10(1.78)	63(11.23)
(4) Ensuring no permanent scarring	469(83.6)	21(3.74)	71(12.66)
7. The following medications are commonly used for oral treatment of acne:			
(1) Macrolide antibiotics	305(54.37)	30(5.35)	226(40.29)
(2) Penicillin antibiotics	216(38.5)	90(16.04)	255(45.45)
(3) Vitamin A derivatives	311(55.44)	11(1.96)	239(42.6)
(4) Tanshinone	198(35.29)	33(5.88)	330(58.82)
(5) Combination oral contraceptives	122(21.75)	154(27.45)	285(50.8)
8. Possible side effects of oral acne medication include:			
(1) Gastrointestinal reactions such as nausea, vomiting, diarrhea, etc.	307(54.72)	52(9.27)	202(36.01)
(2) Vestibular involvement such as dizziness, vertigo, headaches	288(51.34)	53(9.45)	220(39.22)
(3) Dryness of the skin and mucous membranes, such as dry lips	442(78.79)	14(2.5)	105(18.72)
(4) Abnormal liver function	225(40.11)	84(14.97)	252(44.92)
(5) Cognitive dysfunction	147(26.2)	182(32.44)	232(41.35)
(6) Increased pregnancy risk	206(36.72)	104(18.54)	251(44.74)
9. Maintenance therapy can alleviate and prevent acne recurrence, which is an important component of overall acne treatment.	411(73.26)	22(3.92)	128(22.82)
10. Along with oral medication, combination therapy with ________ can also be chosen:			
(1) Topical retinoids	417(74.33)	10(1.78)	134(23.89)
(2) Red-blue light therapy	361(64.35)	24(4.28)	176(31.37)
(3) Salicylic acid	402(71.66)	20(3.57)	139(24.78)
(4) Cosmetic injections	191(34.05)	137(24.42)	233(41.53)
(5) Traditional Chinese medicine or external application of Chinese herbal medicine	390(69.52)	22(3.92)	149(26.56)
(6) Photodynamic therapy	332(59.18)	24(4.28)	205(36.54)

In the attitude section (Table 3) the majority of participants believed that they have sufficient knowledge of routine acne management (64.53%) and 72.72% reported that they are satisfied with the current effectiveness of medication treatment. However, 76.11% of responders expressed worry that the remaining acne scars and marks after treatment will affect their communication with others and 64.35% were worried about the potential side effects of oral medication.

In the practice section, the vast majority of participants (79.68%) reported that after leaving hospital they can effectively manage self-care behaviors, and 12.48% would seldom or never seek the additional information about acne management. Physical treatment methods were unacceptable for 18.18% of participants. Answering questions about adverse reactions to oral medication, 23.89% would continue with reduced dosage and 8.2% would continue with the same dosage (Table 4).

Analysis of Factors Influencing Knowledge, Attitude, and Practice

The results of correlation analysis showed that knowledge score was positively correlated with attitude score (r=0.165, P<0.001) and practice score (r=0.380, P<0.001); attitude was also positively correlated with practice scores (r=0.324, P<0.001).

The median score for knowledge was 27, for attitude – 28 and for practice – 32; to analyze factors associated with higher and lower scores, logistic regression methods have been applied (Tables S1 and S2). It was found that being married (OR=0.57 (95% CI 0.15–1.36), p=0.06) was associated with lower knowledge scores, while being college student (OR=1.69 (95% CI 1.32–6.59), p=0.06), having history of liver, kidney, gastrointestinal diseases (OR=2.05 (95% CI 1.49–6.12), p=0.07), or monthly income (3000–5000 Chinese Yuan, OR=1.68 (95% CI 1.3–7.1), p=0.05; 5000–8000 Chinese Yuan, OR=2.51 (95% CI 1.6–7.07), p=0.05) were associated with higher knowledge scores. Residence in the rural area (OR=0.68 (95% CI 0.56–0.81), p=0.035) was associated with lower attitude scores, while knowledge scores

Table 3 Distribution of Attitude Scores Among Participants

Attitude	Strongly Agree	Agree	Normal	Disagree	Strongly Disagree
1. I am worried that I will not be cured and it will disfigure me.	145 (25.85)	124 (22.1)	171 (30.48)	90 (16.04)	31 (5.53)
2. I am concerned about the prolonged duration of oral medication treatment.	131 (23.35)	200 (35.65)	157 (27.99)	54 (9.63)	19 (3.39)
3. I am worried about the potential side effects of oral medication.	149 (26.56)	212 (37.79)	139 (24.78)	45 (8.02)	16 (2.85)
4. I believe that ________ is crucial for enhancing the effectiveness of oral medication treatment for acne.					
(1) Lifestyle control	237 (42.25)	221 (39.39)	80 (14.26)	10 (1.78)	13 (2.32)
(2) Scientific skincare	340 (60.61)	177 (31.55)	33 (5.88)	8 (1.43)	3 (0.53)
(3) Regular follow-up	274 (48.84)	210 (37.43)	69 (12.3)	5 (0.89)	3 (0.53)
5. I am satisfied with the current effectiveness of medication treatment.	192 (34.22)	216 (38.5)	138 (24.6)	12 (2.14)	3 (0.53)
6. I believe that I have sufficient knowledge of routine care for acne (such as diet, skincare, medication).	184 (32.8)	178 (31.73)	156 (27.81)	33 (5.88)	10 (1.78)
7. I am worried that the remaining acne scars and marks after treatment will affect my communication with others in school/work.	222 (39.57)	205 (36.54)	97 (17.29)	26 (4.63)	11 (1.96)
8. I am concerned that oral medication treatment will bring financial burden.	162 (28.88)	179 (31.91)	164 (29.23)	46 (8.2)	10 (1.78)

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Table 4 Distribution of Practice Scores Among Participants

Practice	Always	Often	Sometimes	Barely	Never
1. I will follow the doctor's medication advice and use oral medication to treat acne.	336(59.89)	165(29.41)	38(6.77)	17(3.03)	5(0.89)
2. I will adhere to the doctor's advice and accept (1) lifestyle adjustments to control acne.	330(58.82)	167(29.77)	45(8.02)	14(2.5)	5(0.89)
(2) scientific skincare to control acne.	316(56.33)	165(29.41)	51(9.09)	19(3.39)	10(1.78)
(3) regular follow-up to control acne	257(45.81)	148(26.38)	99(17.65)	41(7.31)	16(2.85)
(4) combining other treatment methods to control acne.	250(44.56)	132(23.53)	107(19.07)	56(9.98)	16(2.85)
3. After leaving the hospital, I can still effectively manage self-care behaviors (such as diet, skincare, medication use).	260(46.35)	187(33.33)	77(13.73)	29(5.17)	8(1.43)
4. I will accept physical treatment methods such as fractional laser to deal with the sequelae of acne (such as scars, residual erythema, and pigmentation).	218(38.86)	134(23.89)	107(19.07)	62(11.05)	40(7.13)
5. I will seek more information about scar removal products and scar treatment products.	241(42.96)	143(25.49)	107(19.07)	51(9.09)	19(3.39)
6. If there are adverse reactions to oral medication, I will ________.					
a. Stop taking the medication promptly.	396(70.59)				
b. Reduce the dosage and continue using it, waiting for the reaction to disappear.	134(23.89)				
c. Continue using the same dosage and wait for the reaction to disappear.	46(8.2)				
d. Revisit the doctor and seek medical help.	398(70.94)				

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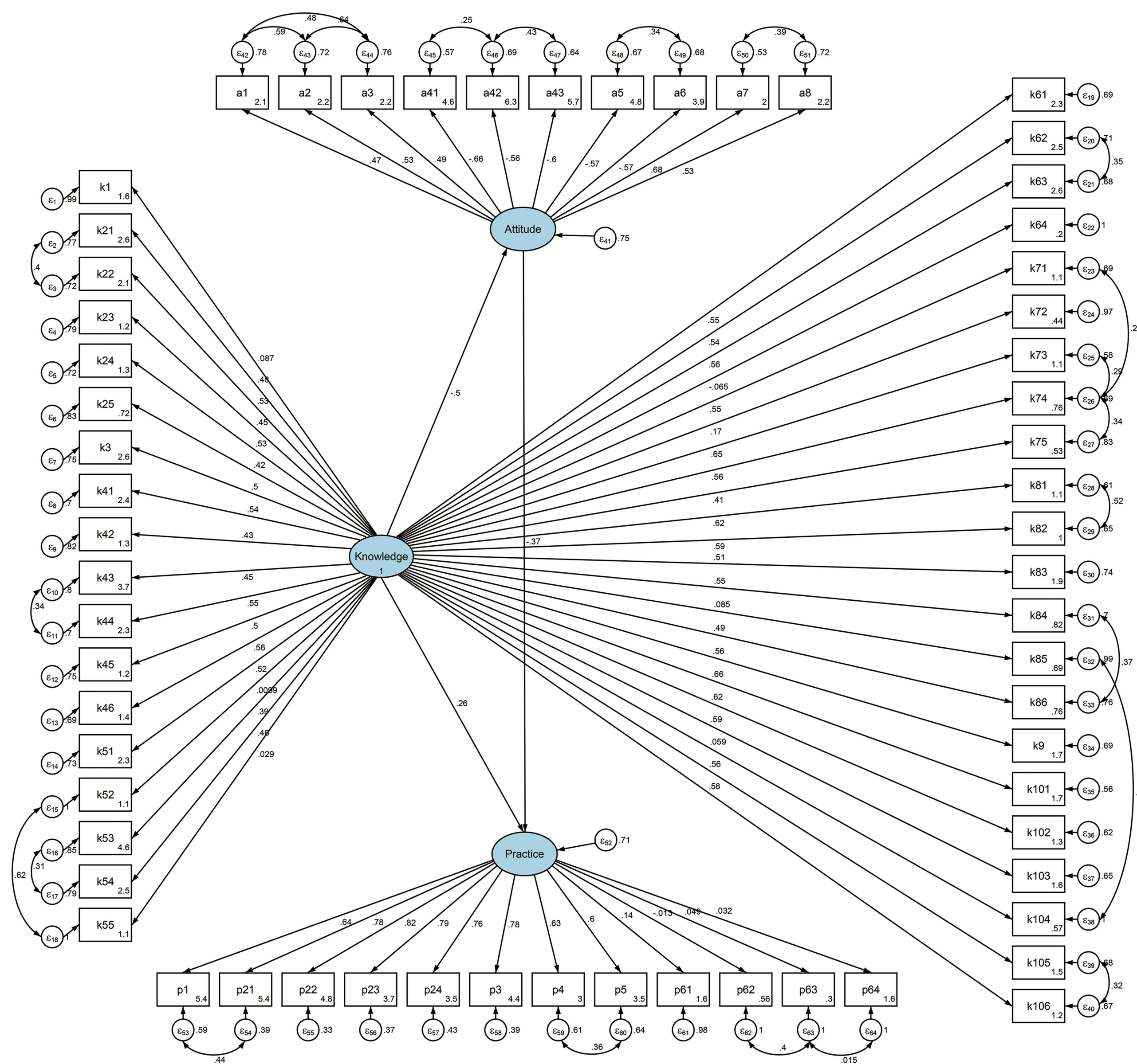

Figure 1 Factors influencing Knowledge, Attitude and Practice of participants according to the results of Structure Equation Modelling and model fit parameters.

(OR=1.04 (95% CI 1.02–1.05), p=0.003) were associated with higher attitude scores. Among all studied factors only Knowledge scores (OR=1.04 (95% CI 1.02–1.05), p=0.002) were associated with higher practice scores.

According to the SEM results knowledge influenced practice directly (β=0.26 (0.16, 0.35), p<0.001) and indirectly (β=0.19(0.12,0.25), p<0.001), while attitude directly influenced practice as well (−0.37(−0.26,-0.47), p<0.001). Model fit indices indicated the acceptable model fit (Figure 1 and Table S3).

Discussion

This study aimed to assess the KAP of patients with moderate to severe acne in relation to oral medication therapy and to explore the factors influencing these dimensions. The findings suggest notable gaps in patient knowledge, especially concerning the genetic basis of acne and the detailed characteristics of common oral treatments, such as the pharmacological roles and risks associated with antibiotics, vitamin A derivatives, and combination regimens.[10,12] Many patients expressed uncertainty regarding medication side effects and exhibited confusion about the rationale for multi-modal therapies. Attitudinal data revealed common concerns surrounding treatment-related scarring and the perceived risks of

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systemic medications.[7,13] In practice, some patients reported inappropriate self-management in response to adverse effects and limited efforts to seek additional information following medical consultations.[13,16]

The insufficient recognition of acne's hereditary aspects represents a central knowledge deficit. Although genetic predisposition plays a substantial role in disease onset and severity,[27] few patients identified this factor accurately. This limited awareness may hinder the development of realistic treatment expectations and reduce the perceived value of early or preventive intervention among individuals with a family history of acne. The underlying causes may lie in the clinical encounter itself, where discussions often prioritize visible symptoms and immediate treatment over foundational disease concepts.[1] Without a clear understanding of heredity, patients may attribute acne to transient lifestyle factors and misinterpret treatment outcomes. This misattribution could lead to frustration or premature discontinuation when expectations are not met.[2]

Another area of concern is the widespread confusion surrounding oral pharmacotherapy. Patients frequently struggled to recall or correctly identify common medications, including isotretinoin and oral contraceptives, and had difficulty recognizing their indications and adverse event profiles.[12,28] Misunderstandings about treatment duration and the need for combination therapy were also prevalent.[10] While the current questionnaire may have captured exposure to information rather than comprehension per se, the results point to specific communication breakdowns that warrant intervention. Clinicians may inadvertently assume familiarity with treatment concepts or provide insufficient explanation under time constraints.[11] Addressing this issue requires a deliberate effort to clarify complex terminology and contextualize treatment rationale during consultations. The persistence of misconceptions regarding acne triggers, such as diet or sun exposure, further complicates the knowledge landscape.[19,20] While some dietary influences are being actively investigated, current evidence does not support strict eliminations in most cases.[8] Yet, such beliefs remain widespread and may lead patients to engage in unnecessary behavioral restrictions or forego evidence-based therapies. The role of the healthcare provider in dispelling these myths with accessible, up-to-date information is crucial in helping patients make informed choices.[25]

Attitudinally, while patients often expressed a willingness to comply with medical recommendations, many remained anxious about the potential for disfigurement and systemic side effects.[6,7] These concerns, though understandable, can deter full engagement with treatment regimens. A deeper issue emerges from the discrepancy between self-rated knowledge and actual comprehension. Overestimation of understanding may result in misplaced confidence, reducing receptivity to professional guidance and diminishing the perceived need for follow-up.[14,29] This cognitive bias has been observed in other health contexts and poses a challenge to effective patient education. Behavioral findings highlight additional areas of concern. Some patients reported continuing medication despite experiencing side effects, or stopping treatment without seeking advice, suggesting a lack of trust, access barriers, or insufficient understanding of risk management.[13,16] The limited pursuit of further information after clinical visits suggests a passive approach to disease management. Given the chronic nature of acne and the complexity of its treatment, proactive engagement is essential for achieving favorable outcomes.[6,8]

To address these issues, clinicians should consider re-evaluating their educational strategies. A stronger emphasis on explaining the genetic basis of acne,[27] clarifying the purpose and expected course of oral medications,[9,11] and setting realistic expectations for combination therapies[10,12] is warranted. Information delivery should be tailored to the patient's cognitive and emotional needs, using clear and accessible language. Clinicians should avoid assuming comprehension based on superficial cues and instead incorporate interactive methods to confirm understanding. Individualized communication approaches may prove more effective, especially for younger or less formally educated patients, who might be more responsive to digital formats or peer-driven content.[15,16] Educational materials should be aligned with common misconceptions identified in this study and formatted for clarity and relevance.[19,25] Encouraging patient participation in treatment decisions, when feasible, may also enhance health literacy and treatment adherence. On a broader level, integrating brief KAP assessments into routine dermatology workflows could help identify at-risk patients and inform more responsive care planning.[13,26]

This study's design offers several advantages. By focusing on patients with moderate to severe acne—a group often requiring long-term and complex therapeutic interventions—it highlights an underexamined population in need of targeted educational support. The inclusion of a relatively diverse sample in terms of age and educational background strengthens the applicability of the findings beyond university-based cohorts. This diversity enabled the identification of meaningful associations between KAP dimensions and socio-demographic variables such as income and educational attainment.

Nonetheless, limitations should be acknowledged. The study's reliance on a single clinical site and self-administered online questionnaires may introduce selection and response biases. While internal consistency was acceptable, the questionnaire has not undergone confirmatory factor analysis or more rigorous psychometric validation, which limits the interpretability of the constructs. The integration of satisfaction items within the attitude scale may compromise conceptual clarity, and the behavioral questions may reflect intent rather than actual conduct. Reviewer concerns regarding terminology, such as the previously used "inherited bias," are well-taken; a more accurate phrasing would refer to misunderstanding of genetic predisposition.

Conclusion

In conclusion, this study identified several unique findings. A significant gap was observed in understanding the genetic basis of acne, with more than two-thirds of participants denying or being uncertain about hereditary involvement, reflecting a distinctive cognitive deficit that may hinder realistic treatment expectations. Although many patients reported confidence in their knowledge, their comprehension of pharmacological concepts was limited, indicating a mismatch between perceived and actual understanding. In addition, inappropriate self-management behaviors in response to adverse drug reactions highlighted potential safety risks in unsupervised care. Structural equation modeling further revealed that knowledge influenced practice both directly and indirectly through attitude, underscoring the mediating role of attitude in shaping patient behavior. These findings have clear implications for improving patient education, optimizing communication during consultations, and designing interventions that are responsive to actual, rather than presumed, patient understanding. Future research should aim to refine KAP assessment tools, expand study populations across multiple clinical sites, and test educational interventions that address specific knowledge gaps and behavioral patterns. Exploring the influence of psychological and structural variables on KAP dimensions may further enhance the capacity to support patients in achieving effective and sustainable acne management.

Data Sharing Statement

All data generated or analysed during this study are included in this published article.

Ethics Approval and Consent to Participate

This work has been carried out in accordance with the Declaration of Helsinki (2000) of the World Medical Association. The study was approved by the Institutional Review Board of Dingxi People's Hospital Medical ethics (Dingyi Ethics 202401). All participants were informed about the study protocol and provided written informed consent to participate in the study.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

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