ISSN Online: 3006-4708
ISSN Print: 3006-4694

SOCIAL SCIENCE REVIEW ARCHIVES
https://policyjournalofms.com

Knowledge, Attitudes, and Practices Regarding Alopecia Areata Among the General Adult Population in Lahore, Pakistan: A Cross-Sectional Study

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DOI: https://doi.org/10.70670/sra.v4i1.2055

Abstract:

Background Alopecia Areata (AA) is a psychosocially important, non-scaring, chronic, immune-mediated, hair-loss disease. Stigma may be influenced by the general population and their attitudes towards AA. The objective of the research was to assess the knowledge, attitudes, and practices (KAP) of AA among the general adult population living in Lahore, Pakistan.

Methods It is a cross-sectional study with a community-based design that was conducted on a sample of adults residing in Lahore, Pakistan, on 22 December 2025, through 26 March 2026. A population of 603 questionnaires was used to help gather the necessary data; the questionnaire was borrowed without any modifications but was used to gather the data manually. After the eligibility and completeness check and data-quality screening 545 valid questionnaires were included in the final analysis.

Results: The final analysis was done using results 545 of the 603 questionnaires that gathered data and the proportion of valid response was determined to be 90.4. The mean PSS, knowledge, attitude, and practice scores were 41.21 +/- 5.67 (possible scores 14-70; 58.87%), 10.91 +/- 5.78 (possible scores 0-28; 38.95%), 31.68 +/- 4.14 (possible scores 10-50; 63.37%), and 25.42 +/- 6.32 (possible scores 10-50; 50.84%), respectively. Using the <70% threshold, most participants had suboptimal knowledge (507/545, 93.0%), attitude (404/545, 74.1%), and practice (500/545, 91.7%) scores. Knowledge was positively correlated to attitude and practice scores and item-level latent SEM/path analysis boosted knowledge as a significant predictor of practice-related behavior.

Conclusion A general lack of knowledge, bad practice habits and negative attitudes towards alopecia areata had been exhibited in the overall adult population in Lahore. Since knowledge was positively associated with attitude and practice, community-level interventions can result in better knowledge, fewer misconceptions, and the correct behavior of seeking care.

Keywords: Alopecia areata; Knowledge; Attitude; Practice; Perceived stress; Cross-sectional study; Lahore; Pakistan.

Background

Alopecia areata (AA) is a non-scarring, immune-mediated, chronic, and hair-loss condition that may occur on the scalp, eyebrows, eyelashes, beard, and other parts of the body with hair. It has unpredictable clinical courses and may freely develop in certain individuals and persists or reappears in others. Based on recent reviews, AA is a disease with a high burden because of its manifested symptoms, unpredictable course, and effect on the quality of life, but it is not linked to an immediate risk of mortality [1, 2].

Hair loss is not the only effect of AA. Recent literature has shown that AA is correlated with low quality of life, emotional distress, anxiety, depressive symptoms, social withdrawal and stigma. However, the degree of illness does not define psychosocial burden, which is interesting. Perceptions of illness and perceived stigma might mediate visibly involved distress and interaction with healthcare as much as clinical severity [3-7].

Recent discoveries about AA pathogenesis have confirmed a multifactorial theory where the genetic predisposition, immune dysregulation and environmental or psychological stimuli interplay to compromise immune privilege of hair-follicles. Stress-related neuroimmune pathways (substance P), corticotropin-releasing hormone mediators have also been identified to play a role in the disease activity. Biomarkers' studies have demonstrated the presence of inflammatory abnormalities in AA that substantiate the view that it is not a cosmetic disease, but rather a medical one [8, 9].

The broader context of comorbidity in which AA takes place is also present. Recent epidemiologic and meta-analytic data indicates that it is associated with immune mediated disease like autoimmune thyroiditis, vitiligo, inflammatory bowel disease, systemic lupus erythematosus and atopic disease [2, 10].Such associations support the significance of social awareness that transcends the topic of hair regrowth and involves the knowledge of AA as a medical condition that has psychosocial and global implications.

The landscape of therapeutics in AA has changed over the last few years. Besides the topical, intralesional and traditional types of systemic therapy, there are other newer targeted forms of treatment that have altered the treatment expectations of moderate and severe disease. The selection of treatment options should be made according to a clear idea of the disease severity, expected outcomes, risk of relapse, and safety monitoring and the relevance of systemic treatment in the selected patients, according to recent reviews, and expert consensus statements [11, 12].

Of particular interest in this instance is the knowledge, attitude and practice (KAP) framework. KAP studies help in finding out what people know about a disease, their perceptions towards the disease and the effects of these perceptions on their care-seeking and self-management [14]. The perceived cause can result in confusion, negative consultation, informal consultation, and stigma-related avoidance of care which can result in avoidable psychosocial and clinical burden in AA. A recent cross-sectional study carried out in Hebei, China, showed that there were low levels of knowledge and negative attitude towards alopecia as well as that knowledge was positively related with attitude and practice [13]. However, the same evidence in Pakistan is not as widespread particularly at the level of the community. The present study was therefore aimed at assessing the knowledge, attitude and practice on alopecia areata among general adult population in Lahore, Pakistan. It also attempted to examine the interconnection between demographic and chosen backgrounds variables and these domains. The research has the potential to fill the gap in awareness and behavioral patterns toward educated community, counseling interventions, stigma-reduction programs, and past health care usage regarding AA.

Methods

Study design and participants

The study design was a cross-sectional community-based study of a sample of the general population of adults in the city of Lahore, Pakistan on 22 December 2025 to 26 March 2026. The aim of the study was to identify the knowledge, attitudes and practices of alopecia areata among adults residing in Lahore. The data collection was conducted within the community setting where they were easily accessible like markets, parks, schools, and workplaces. Any individual history or clinical diagnosis of alopecia areata was not eligibility criteria since the goal was to assess community-based awareness, attitudes and practice patterns as opposed to prevalence or patient-reported clinical experience.

They were to be aged 18 years and live in Lahore and be able to understand the questionnaire and study guidelines in either English or Urdu and provide informed consent. Those under the age of 18, non-residents of Lahore, those who could not fill in the questionnaire due to severe cognitive or communication problems, dermatologists or health care workers with formal dermatology training, and incomplete questionnaires were eliminated. The convenience sampling was used to recruit the participants. Of the 603 questionnaires collected, 545 questionnaires were eligible, complete, and valid to be included in the final analysis, and 58 were excluded due to lack of eligibility, incompleteness, and poor-quality data.

The Ethical Review Committee, Institutional Review Board, University of Central Punjab, Lahore, Pakistan (Ref.) approved this study. No. ORIC/ERC/IRB/2025/25; approved on 18 December 2025). The respondents were made to volunteer to take part and were made aware of the same prior to filling in the questionnaire.

Questionnaire design

Data was collected using a structured self-administered questionnaire, adopted verbatim from Li et al. [13]. The original item text, answer choices, domain, and scoring process were all retained to allow for meaningful comparison with the reference KAP framework. This tool had five sections, namely; demographic and background traits, perceived stress, knowledge, attitude and practice. Background section was used to capture age, gender, residence, education, marital status, occupation, family history of losing hair and lifestyle and health-related variables of choice that were used to capture awareness of hair-loss related conditions and alopecia.

The questionnaire was replicated in its original version with due reference to its source article. The original article was an open-access article that was published under a Creative Commons Attribution-Noncommercial-No Derivatives 4.0 International License, which allows the sharing and reproduction of the work in non-commercial and needs proper credit; thus, no changes were made to the questionnaire.

The 14 item Perceived Stress Scale (PSS-14) was used to measure perceived stress [15, 16]. All items were rated using a five-point Likert scale and all items that were phrased positively were reverse coded and then the sum of the totals was calculated. The potential PSS score was between 14-70 where a higher score was associated with increased perceived stress. The scale was categorized as low stress (14-28), moderate stress (29-42), high stress (43-56), and very high stress (57-70).

The body of knowledge included 14 questions determining the familiarity of the respondents with the causes of hair loss, the autoimmune processes in alopecia areata, the effect of hormones and thyroid factors, lifestyle effects, medications on hair loss, nutrition, and the impact of stress. The response options included very familiar, somewhat familiar and unclear. To analyze, the responses were coded in such a way that the higher the score, the more knowledge one had, and the potential total score was 0-28.

The attitude domain was composed of 10 statements that assessed beliefs and perceptions relative to alopecia areata and seeking treatment, including perceived seriousness of the condition, confidence in diagnosis, willingness to seek treatment, attitudes toward hair-growth products and hair transplantation, emotional impact, perceived social bias, perceived sense of control, and perceptions of expectations of treatment. Participants recorded their responses on a five-point Likert scale, ranging from "strongly agree" to "strongly disagree". To analyze it, the high total scores represented a more positive attitude and medically appropriate, and their range was 10-50.

The practice domain comprised 10 questions about the health-seeking and self-care behavior related to hair loss, such as seeking professional advice, obtaining medical evaluation, adhering to prescription, considering hair transplantation, using hair-growth products, changing diet and lifestyle, using concealment, engaging in online hair-loss communities, and engaging in mental health-related coping responses. Answers were measured using a five points Likert scale of always-never. To analyze, a higher score meant a more appropriate practice behavior, and a potential score of 10-50. Since the current study was done in the general population, the practice-domain results were self-reported or intended care-seeking and self-management about suspected alopecia areata or hair loss but not as treatment adherence with patients who had been clinically diagnosed. In line with the reference framework, scores less than 70 percent of the possible domain score were considered as poor [13].

Questionnaire distribution and quality control

People were eligible and were welcomed to take part in the study as volunteers after being given a short explanation of the purpose and procedures of the study. The questionnaires were given out and filled out manually during the recruitment process. There was no pre-completion educational explanation about alopecia areata so that the responses would capture pre-existing knowledge, attitudes and practices. No personal data (names, national identity numbers or addresses) was gathered. Questionnaires were assessed regarding eligibility, completeness, and duplicate or inconsistent responses and internal data quality. Out of 603 questionnaires that were collected, 545 were included in the analysis and 58 were eliminated in the screening process leaving a valid-response proportion of 90.4.

Operational definitions

To get interpretation of KAP domains, domain scores were transformed to percentage of the highest possible score. A score of 70% and above constituted adequate/positive/good and a score below 70% corresponded to suboptimal. Therefore, knowledge scores lower than 19.6 out of 28, attitude scores lower than 35 out of 50, and practice scores lower than 35 out of 50 were considered as suboptimal. The categories of the PSS were decoded based on the set score ranges of low stress (14-28), moderate stress (29-42), high stress (43-56), and very high stress (57-70). \

Sample size calculation

The minimum sample size was calculated using the standard single-population proportion formula for cross-sectional studies — $n = Z^2 \times p \times (1 - p) / d^2$ — with a 95% confidence level, an expected proportion of 50%, and a 5% margin of error. This calculation pointed to a minimum of 385 participants. To improve precision and reduce the risk of data loss from unusable responses, 603 questionnaires were distributed. Following data-quality screening, 545 valid responses remained, comfortably surpassing the minimum threshold and forming the basis of the final analysis.

Statistical analysis

All data were entered and analyzed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were assessed for normality using the Kolmogorov-Smirnov test and are reported as mean ± standard deviation (SD), while categorical variables are expressed as frequencies and percentages. Group comparisons were carried out using independent-samples t-tests for two-group comparisons and one-way ANOVA for comparisons across more than two categories. The chi-square test was applied to categorical data, and Pearson correlation analysis was used to explore relationships among perceived stress, knowledge, attitude, and practice scores. Although Cronbach's alpha was examined for internal consistency, no items were removed, as the questionnaire was deliberately preserved in its original published form to maintain comparability with the reference study.

Variables that demonstrated statistically significant associations in univariate analyses were carried forward into structural equation modeling and path analysis to test hypothesized relationships among demographic, background, and KAP variables. Model fitting was conducted in two stages: the first model identified non-significant paths, which were subsequently removed, and a refined final model was then fitted. Throughout all analyses, a two-sided p-value of less than 0.05 was considered statistically significant.

Results

Characteristics of the participants

The aspects of the participants. The study period saw the collection of 603 questionnaires. Following eligibility and completeness, duplicate and inconsistency checks and data quality screening, 545 valid responses were picked to the final analysis and 58 were discarded, resulting in a valid-response proportion of 90.4%. Table 1 summarizes the characteristics of the participants and a comparison of the perceived stress, knowledge, attitude, and practice scores.

Perceived stress level

The mean PSS score was 41.21 +/- 5.67 (possible scores 14-70; 58.87%). The PSS scores varied significantly by age (P=0.006), hair-loss circumstance following COVID-19 (P=0.019), late-night sleeping status (P<0.001) and perceived stress categories (P<0.001) (Table 1).

Table 1. Characteristics, perceived stress, and KAP scores of the participants

Characteristic	n (%)	PSS	P	Knowledge	P	Attitude	P	Practice	P
Total score		41.21±5.67		10.91±5.78		31.68±4.14		25.42±6.32	
Gender			0.852		0.655		0.851		0.031
Male	255 (46.79)	41.16±5.83		10.79±5.90		31.65±4.17		26.04±6.07	
Female	290 (53.21)	41.25±5.55		11.01±5.68		31.71±4.13		24.87±6.50	
Age			0.006		0.979		0.855		0.483
20-30 years	150 (27.52)	41.55±5.35		10.95±5.94		31.57±3.93		26.10±6.37	
30-40 years	215 (39.45)	40.39±5.74		10.87±5.68		31.58±4.15		25.23±6.46	

Characteristic	n (%)	PSS	P	Knowledge	P	Attitude	P	Practice	P
40-50 years	120 (22.02)	42.54±5.51		11.03±5.73		31.90±4.13		25.09±5.97	
50-60 years	60 (11.01)	40.65±6.09		10.65±5.99		31.92±4.70		25.05±6.41	
Residence			0.914		0.149		0.093		0.394
Rural	150 (27.52)	41.17±5.61		11.49±5.62		32.17±4.18		25.79±6.49	
Urban	395 (72.48)	41.23±5.71		10.69±5.83		31.50±4.12		25.28±6.26	
Education			0.163		0.181		0.417		0.810
Primary school and below	24 (4.40)	43.12±5.02		9.29±5.03		32.21±2.80		25.79±6.80	
Middle school	36 (6.61)	39.39±5.27		11.72±6.57		33.22±3.55		24.75±6.96	
Matriculation	75 (13.76)	41.99±5.50		10.13±5.51		31.65±4.26		25.37±6.52	
Intermediate	28 (5.14)	40.18±5.07		9.46±5.63		31.68±4.03		26.18±6.41	
College/Diploma	75 (13.76)	41.37±5.46		10.35±5.15		31.60±3.75		26.32±5.91	
Bachelor’s	185 (33.94)	40.99±6.07		11.25±5.95		31.49±4.21		25.06±6.08	
Master’s and above	122 (22.39)	41.35±5.57		11.61±5.89		31.48±4.58		25.38±6.58	
Marital status			0.766		0.804		0.331		0.123
Unmarried	165 (30.28)	41.01±5.65		11.25±5.69		31.93±3.94		25.95±6.54	
Married	360 (66.06)	41.34±5.74		10.79±5.75		31.50±4.25		25.18±6.20	
Divorced	15 (2.75)	40.00±5.06		10.27±7.61		32.67±3.94		27.00±6.56	
Widowed	5 (0.92)	41.80±2.77		10.20±6.38		33.80±2.39		20.40±5.13	
Monthly household income, PKR			0.991		0.478		0.912		0.352
<50,000	55 (10.09)	41.35±6.44		10.49±5.25		32.04±3.90		24.96±5.87	
50,000-100,000	150 (27.52)	41.16±5.19		10.31±5.74		31.57±4.24		25.43±6.57	
100,000-200,000	190 (34.86)	41.21±5.82		11.04±6.27		31.77±4.53		25.10±6.39	
200,000-300,000	105 (19.27)	41.36±5.57		11.43±5.23		31.45±3.68		25.44±6.11	
>300,000	45 (8.26)	40.87±6.06		11.62±5.59		31.82±3.47		27.22±6.16	
Occupation			0.133		0.369		0.257		0.014
Manual labor dominant	92 (16.88)	40.17±5.71		10.27±5.79		30.93±4.07		25.42±6.70	
Mental labor dominant	235 (43.12)	41.12±5.65		10.73±5.65		31.71±4.02		24.54±6.31	

Characteristic	n (%)	PSS	P	Knowledge	P	Attitude	P	Practice	P
Both manual and mental labor	198 (36.33)	41.83±5.68		11.45±6.01		31.96±4.34		26.51±6.14	
Not currently employed	20 (3.67)	40.85±5.29		10.55±4.75		32.05±3.75		24.90±5.15	
Family history of hair loss			0.326		0.543		0.292		0.823
Yes	300 (55.05)	40.99±5.52		10.77±5.84		31.51±4.17		25.47±6.40	
No	245 (44.95)	41.47±5.86		11.07±5.72		31.89±4.12		25.35±6.24	
Duration of own hair loss			0.330		0.415		0.068		0.013
<1 year	175 (32.11)	41.73±5.90		11.13±5.52		31.85±4.07		26.60±6.24	
1-3 years	160 (29.36)	41.06±5.37		10.27±5.67		30.99±4.45		24.44±6.32	
3-4.9 years	100 (18.35)	41.35±5.95		11.33±6.03		31.88±3.98		24.89±6.39	
>=5 years	110 (20.18)	40.48±5.47		11.10±6.10		32.25±3.87		25.45±6.18	
Several hair losses			0.982		0.542		0.720		0.422
Mild	465 (85.32)	41.21±5.67		10.96±5.82		31.64±4.21		25.27±6.18	
Moderate	60 (11.01)	41.28±5.81		10.97±5.49		31.75±4.05		26.23±7.48	
Severe	20 (3.67)	41.00±5.53		9.50±5.68		32.40±2.85		26.40±5.95	
COVID-19 infection history			0.666		0.426		0.340		0.029
Yes	470 (86.24)	41.25±5.64		10.83±5.72		31.61±4.16		25.18±6.34	
No	75 (13.76)	40.95±5.88		11.40±6.18		32.11±4.07		26.89±6.07	
Hair-loss situation after COVID-19			0.019		0.295		0.346		0.192
Worsened	125 (22.94)	41.17±5.46		10.31±5.81		31.86±4.16		26.32±6.99	
Improved	18 (3.30)	44.89±5.58		12.22±5.11		30.33±3.93		25.28±7.25	
No change	402 (73.76)	41.06±5.70		11.03±5.79		31.69±4.15		25.14±6.05	
Late-night sleeping			<0.001		0.567		0.410		0.627
Yes	345 (63.30)	40.49±5.64		11.01±5.66		31.57±4.20		25.52±6.36	
No	200 (36.70)	42.45±5.53		10.72±5.99		31.88±4.04		25.25±6.26	
Dyeing or curling			0.131		0.973		0.508		0.453

Characteristic	n (%)	PSS	P	Knowledge	P	Attitude	P	Practice	P
Yes	205 (37.61)	40.74±5.65		10.92±5.45		31.83±4.34		25.16±6.51	
No	340 (62.39)	41.49±5.68		10.90±5.98		31.59±4.02		25.58±6.22	
Thyroid disease			0.720		0.803		0.790		0.548
Yes	65 (11.93)	41.45±5.46		10.74±6.13		31.55±4.88		25.86±6.08	
No	480 (88.07)	41.18±5.71		10.93±5.74		31.70±4.04		25.36±6.36	
Polycystic ovary syndrome (PCOS)			0.856		0.462		0.982		0.078
Yes	22 (4.04)	41.86±5.65		9.64±5.11		31.73±4.23		25.77±5.68	
No	268 (49.17)	41.20±5.54		11.12±5.72		31.71±4.13		24.80±6.57	
Male	255 (46.79)	41.16±5.83		10.79±5.90		31.65±4.17		26.04±6.07	
Taken medicines known to cause hair loss			0.638		0.008		0.176		0.125
Yes	60 (11.01)	40.88±5.23		12.78±5.46		31.00±4.51		26.60±6.00	
No	485 (88.99)	41.25±5.73		10.67±5.78		31.77±4.09		25.27±6.35	
Perceived stress level (PSS)			<0.001		0.568		0.581		0.406
Low stress	5 (0.92)	27.20±1.10		11.60±3.21		31.60±4.45		29.60±4.28	
Moderate stress	314 (57.61)	37.56±3.34		11.19±5.91		31.59±4.19		25.56±6.53	
High stress	225 (41.28)	46.52±3.07		10.49±5.65		31.79±4.08		25.14±6.06	
Very high stress	1 (0.18)	61.00		11.00		37.00		23.00	

Note. The values are given in the form of n (%) or mean+/-SD. Independent-samples t-test was used to compute p-values when the variables were two categories and one-way ANOVA when the variables consisted of more than two categories. PSS, Perceived Stress Scale; KAP, Knowledge, Attitude and Practice; PCOS, polycystic ovary syndrome. A P-value of less than 0.05 was taken as a significant value.

Hair-loss type and treatment preferences

Fig. 1 shows the distribution of the reported types of hair loss. Androgenetic alopecia was the most frequently reported type (260/545, 47.7%), followed by alopecia areata (105/545, 19.3%) and unclear hair loss (85/545, 15.6%).

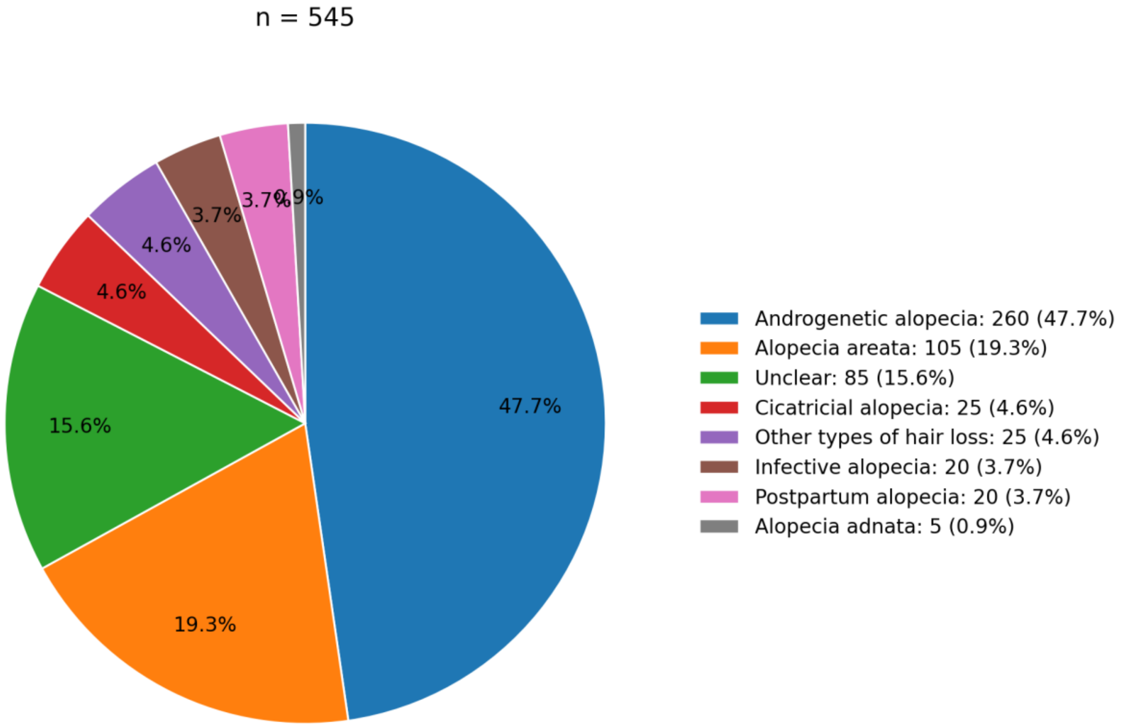

Fig. 1. Distribution of hair-loss types among the participants

Fig. 2 depicts the intentions of the participants to accept various treatment options. The most common type of medication selected was topical (230/545, 42.2%), then oral (115/545, 21.1%).

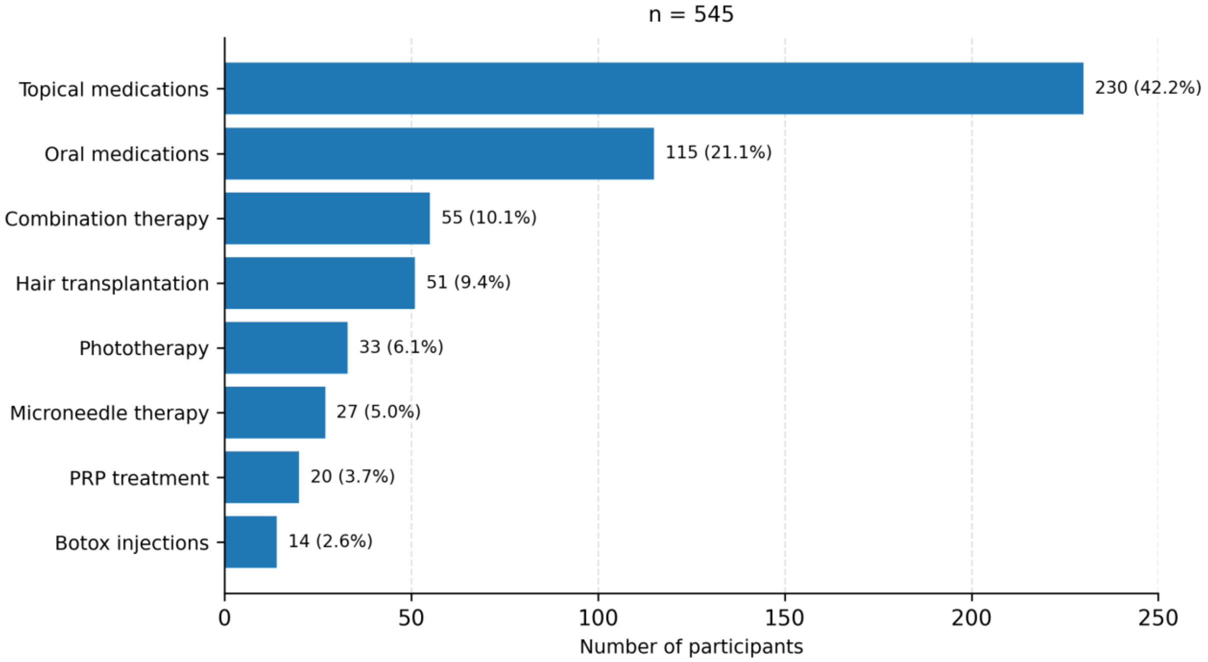

Fig. 2. Patients' intentions to accept different treatment options

Mediation analysis

Table 2 demonstrates the mediation analysis. There were major positive direct effects of knowledge on attitude and attitude had major positive effects on practice. Indirect effect of knowledge on practice via attitude was significant.

Table 2. Mediation analysis

Model paths	**Standardized direct effects (95%CI)**	**P**	**Standardized indirect effects (95%CI)**	**P**
Knowledge -> Attitude	0.252 (0.173-0.331)	<0.001		
Knowledge -> Practice	0.246 (0.159-0.329)	<0.001		
Attitude -> Practice	0.107 (0.019-0.194)	0.012		
Knowledge -> Practice			0.027 (0.005-0.053)	0.018

Note. Values are standardized effects with 95% bootstrap confidence intervals based on 5,000 resamples. P<0.05 was considered statistically significant.

Structural equation modeling

The latent SEM/path analysis on the item level is summarized in Table 3. In the structural part of the model, medication history was a significant predictor of knowledge, knowledge was a significant predictor of practice and male gender and both manual and mental work were significant predictors of practice. There were knowledge-to-attitude and attitude-to-practice paths which were positive, although they were not statistically significant in the item-level latent factor-score model.

Table 3. Item-level latent SEM analysis

Path	**Estimate**	**S.E.**	**C.R.**	**P**
K1 <--- Knowledge	0.512	0.036	14.200	<0.001
K2 <--- Knowledge	0.576	0.031	18.384	<0.001
K3 <--- Knowledge	0.559	0.034	16.634	<0.001
K4 <--- Knowledge	0.554	0.033	16.803	<0.001
K5 <--- Knowledge	0.521	0.037	14.087	<0.001
K6 <--- Knowledge	0.409	0.043	9.624	<0.001
K7 <--- Knowledge	0.499	0.042	11.888	<0.001
K8 <--- Knowledge	0.534	0.035	15.177	<0.001
K9 <--- Knowledge	0.481	0.040	11.914	<0.001
K10 <---	0.461	0.044	10.468	<0.001

Path	Estimate	S.E.	C.R.	P
Knowledge				
K11 <--- Knowledge	0.554	0.033	16.714	<0.001
K12 <--- Knowledge	0.514	0.036	14.131	<0.001
K13 <--- Knowledge	0.513	0.037	13.898	<0.001
K14 <--- Knowledge	0.585	0.029	20.383	<0.001
A1 <--- Attitude	0.302	0.279	1.081	0.280
A2 <--- Attitude	0.191	0.265	0.719	0.472
A3 <--- Attitude	-0.136	0.312	-0.436	0.663
A4 <--- Attitude	0.438	0.206	2.124	0.034
A5 <--- Attitude	-0.245	0.237	-1.033	0.301
A6 <--- Attitude	0.398	0.233	1.706	0.088
A7 <--- Attitude	0.502	0.218	2.306	0.021
A8 <--- Attitude	-0.388	0.276	-1.405	0.160
A9 <--- Attitude	0.296	0.235	1.259	0.208
A10 <--- Attitude	0.446	0.267	1.667	0.096
P1 <--- Practice	0.602	0.034	17.734	<0.001
P2 <--- Practice	0.539	0.041	13.234	<0.001
P3 <--- Practice	0.513	0.042	12.145	<0.001
P4 <--- Practice	0.395	0.050	7.853	<0.001
P5 <--- Practice	0.546	0.037	14.577	<0.001
P6 <--- Practice	0.613	0.034	18.140	<0.001
P7 <--- Practice	0.458	0.048	9.629	<0.001
P8 <--- Practice	0.564	0.038	14.797	<0.001
P9 <--- Practice	0.476	0.044	10.884	<0.001
P10 <--- Practice	0.408	0.051	7.985	<0.001
Knowledge <--- Taking medicines known to cause hair loss	0.115	0.040	2.874	0.004
Attitude <--- Knowledge	0.120	0.069	1.735	0.083
Practice <--- Knowledge	0.257	0.042	6.138	<0.001
Practice <--- Attitude	0.071	0.048	1.489	0.137
Practice <--- Male gender	0.090	0.043	2.098	0.036
Practice <--- Both manual and mental labor	0.104	0.042	2.482	0.013

Note. Knowledge was represented by K1-K14, attitude by A1-A10, and practice by P1-P10. Estimate

= standardized estimate; S.E. = standard error; C.R. = critical ratio; P<0.05 was considered statistically significant.

Figure 3 presents the structural equation model based on the item-level latent SEM analysis. Knowledge was represented by K1-K14, attitude by A1-A10, and practice by P1-P10. The model indicated that taking medicines known to cause hair loss was a significant predictor of knowledge, while knowledge was a significant predictor of practice. Male gender and both manual and mental labor were also significant predictors of practice. The knowledge-to-attitude and attitude-to-practice paths were positive, although they were not statistically significant in the item-level latent factor-score model.

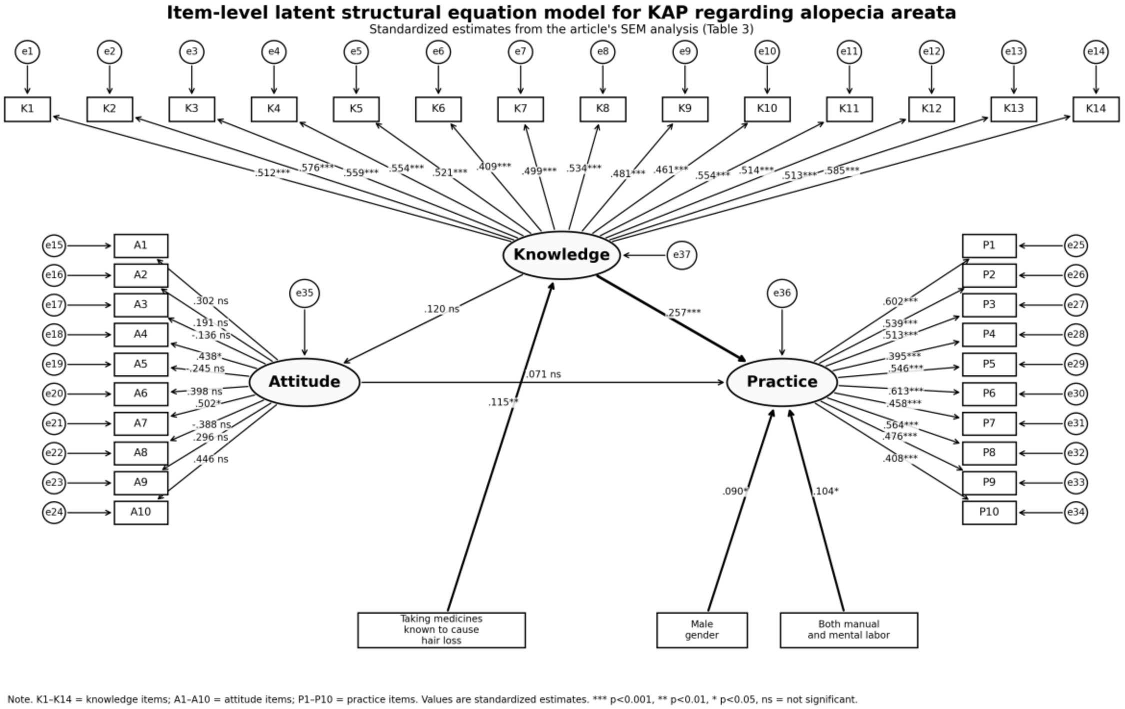

Fig. 3. Structural equation model of knowledge, attitude, and practice regarding alopecia areata

Discussion

The present community-based cross-sectional research determined knowledge, attitudes, practice, perceived stress, hair-loss patterns, and treatment preferences regarding the alopecia areata in adults in Lahore. The primary result was that the level of awareness and self-care behavior was under-satisfactory: most of the participants scored below the 70-percentile on knowledge, attitude, and practice. The mean scores of knowledges and attitude and practice also were not at the optimal level, and the mean PSS score indicated a moderate perceived stress level. These findings suggest that alopecia areata is a little-known disorder in society and that most people may not be adequately placed to recognize the disorder, seek medical attention promptly or make effective treatment decisions (Table 1).

The clinical significance of this level of knowledge is that alopecia areata is not only a chronic and immune-mediated non-scarring loss of hair but also has an unpredictable pathology and a high psychosocial burden [1-3]. Recent epidemiological studies suggest that alopecia areata is a global disease and evidence on middle and low-income environments is limited, which increases the importance of evidence on a local community level [2]. The present findings can therefore add valuable information in Lahore where the burden of disease may be exacerbated by the lack of knowledge, stigma, and late care-seeking among the population. Even though the alopecia areata is not normally life threatening, the exposed hair loss may influence self-esteem, social self-confidence, involvement in work or education and emotional status [3-7].

The current Lahore sample was characterized by an equally low level of knowledge but rather lower scores in attitude and practice, as compared to the reference study by Li et al. that took place among patients with alopecia in Hebei, China [13]. Such variation is not surprising since in the reference study patients were recruited in a hospital environment, but in the current study, they were recruited among community members. It is more probable that patients who are already in a medical facility already have some information regarding the disease provided by clinicians, the internet or prior treatment experiences. A more recent alopecia areata-specific KAP research with patients also confirms that knowledge gaps in disease-management might still exist even in clinical populations, demonstrating that community samples might need more simple and accessible educational interventions [19]. On the other hand, a community may contain non-diagnosed cases of the condition, and this may be mixed with alopecia areata, androgenetic alopecia, telogen effluvium, nutrition hair loss and other scalp diseases. This difference is noteworthy as the current study represents awareness at the level of the population, and not just patient level of knowledge.

The KAP pattern found in this study reflects the theoretical assumption that knowledge is a crucial factor in influencing health-related behavior. The Pearson correlation analysis showed that there was a positive correlation between knowledge and attitude and attitude and practice. Knowledge was also a significant direct predictor of practice in the item-level latent SEM, and the knowledge-attitude and knowledge-practice paths were not significant when latent-item structure and the predictors selected were controlled (Table 3). This means that the knowledge within this dataset may be a more direct and strong factor practice compared to the attitude alone. These findings are consistent with the overall KAP model, which views knowledge as a variable that may affect beliefs, risk perception, and care-seeking behavior [14]. They are also aligned with Li et al. who indicated that knowledge influenced attitude and practice in SEM analysis among patients with alopecia [13].

Knowledge in the SEM model was greatly predictive by medication history. Those that had used medicines that were known to cause hair loss received higher knowledge scores and this could be because of the previous experience of medical counselling, or their personal interest in hair loss brought about by drug use. Another example of knowledge presented in SEM model by Li et al. is the factors that are related to medication [13]. The implication of this finding is that individuals with personal experience of losing their hair or with medication-related issues might be more open to focused education, but those without such experience might not be aware of it until the disease advances or leads to noticeable cosmetic discomfort.

Another pertinent finding was perceived stress. The mean PSS score indicated moderate stress, and PSS varied significantly among age, situation of hair-loss after COVID-19, sleeping late at night and category of stress. Stress is a psychological outcome of apparent hair loss as well as can be biologically applicable in alopecia areata via neuroimmune pathways which implicates inflammatory pathways, immune privilege of hair-follicles and stress-linked mediators [8,17,18]. Recent psychosocial research has likewise demonstrated that the perception of illness and stigma can be used to explain significant differences in quality of life, anxiety and depression among individuals with alopecia areata [4-7]. Clues of alopecia areata about COVID-19 are still developing: a population-based study found that there was a higher risk of alopecia areata following COVID-19, whereas systematic-review evidence on COVID-19 vaccination is mainly composed of observational reports and must be perceived with caution [20,21]. Therefore, the outcomes of this research, stress-related and COVID-related, cannot be perceived as mere cosmetic concerns, as they help to introduce new counselling, reassurance and referral pathways in cases when patients report their distress due to losing their hair.

The pattern of distribution of the types of hair-loss revealed that androgenetic alopecia was the most prevalently reported, with alopecia areata, and unclear hair loss in second and third places respectively (Fig. 1). This result must be viewed with some reservations since the current research was based on self-reported type of hair-loss and not on dermatologist-diagnosis. Nevertheless, it can still be useful since it demonstrates that members of the community can categorize hair loss according to its appearance or preconceived notions. Public surveys are prone to misclassification as a variety of hair-loss disorders may be clinically overlapping or may be confused by layman. Educational messages ought thus to articulately clarify that patchy hair loss, abrupt shedding of hair, patterned thinning, and scarring scalp disease demand varied evaluation and treatment avenues.

The findings of the treatment preferences further justify the importance of community education. Topical medications were chosen as the most common treatment followed by oral medications and combination therapy (Fig. 2). Such a trend can be a bias towards treatments that seem to be available, cheap, well-known, and less invasive. Recent evaluations of the treatment and consensus statements by the experts indicate that the management of alopecia areata should be tailored to the severity of the disease and the area of involvement, age, comorbidity, response to previous treatment, safety profile and patient preference [11,12,18]. The zeal of the oral medicines is also to be seen through the prism of the rapidly developing world of therapy. Randomized trials of ritlecitinib and several new real-world trials of baricitinib, along with network meta-analytic reports on JAK inhibitors, demonstrate that systemic targeted therapies are more applicable to moderate-to-severe alopecia areata, but they need clinician surveillance and counselling regarding benefits, relapse, adverse effects, monitoring, cost and accessibility [22-30]. Consequently, although it is natural that people want to have topical and oral treatments, the choice of treatment is hopefully to be based on dermatological examination instead of self-medication or untested commercial products.

Even absence of meaningful relationships between certain variables in the clinical background and KAP scores should be considered. Indicatively, thyroid disease and PCOS did not have a significant relationship with PSS or KAP scores in this sample, even though there is evidence that alopecia areata may co-exist with an immune-mediated and an endocrine-related condition [9,10]. This does not mean that these conditions were clinically non-significant but rather the correlation of these conditions with knowledge, attitude and practice scores was examined, rather than the cause-effect relationship with alopecia areata. Subgroups are small, self-reporting, and lack clinical validation, which might have resulted in less difference being identified.

The implication in Lahore is mixed with respect to both public health and clinical implications of the findings. First, awareness about alopecia areata there should be an awareness to increase basic awareness of alopecia areata, to dispel the myths that hair loss is always due to aging, use of hygiene or cosmetic products and promptly referral to the qualified healthcare staff. Second, education must be designed in such a manner that it addresses the general population and not only the diagnosed patients because a good percentage of the population can develop symptoms even before seeking the services of a dermatologist. Third, stigma, stress and unrealistic treatment expectation counselling are required since psychosocial burden and perceived stigma are becoming the dominant aspects of alopecia areata care [3-7]. Finally, community-level education should focus on the idea that not every treatment is effective and there should be a professional evaluation prior to the use of oral medicines, injections, intake of supplements, or a procedure.

There are significant strengths of this study. It used a structured KAP questionnaire that was dependent on a recently published reference study, conducted 603 community questionnaires and had a reasonably large final sample of 545 adults following a data-quality screen. It also evaluated perceived stress by means of PSS-14, added correlation and SEM/path analysis to examine the relations between KAP domains, and presented hair-loss distribution and treatment preferences along with KAP results. The face-to-face method of collecting information used in the manual could also have been used to include the participants who could be unresponsive to the strict online survey.

A number of limitations, however, must be noted. The cross-sectional design does not allow us to make a causal inference. The convenience sampling in Lahore restricts the generalization to other cities, rural areas, or even the entire population of Pakistan. Even though 603 questionnaires were first gathered, 58 questionnaires were removed in data screening, and presence of non-useable responses may lead to selection bias. The type and severity of hair-loss, comorbidities, and preferences in terms of treatment were self-reported and not clinically confirmed with dermatologists. The objective severity measures like the Severity of Alopecia Tool (SALT) score were not used in the study. As a result of the retention of the questionnaire and the absence of any modification to enable comparability with the reference study, some of the items may not adequately capture the local sociocultural beliefs regarding the alopecia areata in Lahore. Lastly, self-reported KAP data can be influenced by recall bias and social desirability bias.

In general, the existing study demonstrates the gap in knowledge, negative attitudes, and ineffective patterns of practice towards alopecia areata among Lahore-based adults. Knowledge was identified as the most significant modifiable variable with a positive correlation to attitude and practice as well as a significant direct relationship with practice in the item-level SEM. The findings warrant the development of certain interventions of public education, community-based dermatology-awareness, and counselling interventions, which take not only the medical knowledge, but psychosocial factors related to alopecia areata into consideration.

Declarations and reporting guideline

Reporting rule: The preparation of this manuscript was based on Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations on reporting observational cross-sectional studies [31].

Ethics approval and consent to participate: The Ethical Review Committee, Institutional Review Board, University of Central Punjab, Lahore, Pakistan gave the ethical approval (Ref.). No. ORIC/ERC/IRB/2025/25; approved on 18 December 2025). The informed consent, whether in writing or oral was taken, prior to the completion of the questionnaire, and the study was done in line with the principles of the Declaration of Helsinki [32] of ethics.

Funding: There is no external funding that was provided to this study.

Conflict of interest: The authors do not mention any conflict of interest.

Data access: The anonymized data may be made available to the relevant author upon a justifiable demand and within the constraints of the institutions and ethical restriction.

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