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# Clinical Severity and Age as Correlates of Quality of Life, Anxiety, and Depression in Adults with Alopecia Areata: A Cross-Sectional Study

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# Abstract

**Background:** Alopecia areata (AA) is a chronic organ-specific autoimmune disease with a pronounced adverse effect on patients' emotional wellbeing and quality of life (QoL). Although the psychosocial consequences of the disease have been examined in numerous studies, age-related differences in how the clinical severity of alopecia areata affects QoL, anxiety and depressive symptoms, and the subjective experience of illness remain insufficiently studied.

**Objective.** To examine the influence of alopecia areata severity and patient age on QoL, anxiety and depressive symptoms, and clinical and psychological parameters, and to investigate the interrelationships among these variables.

**Materials and Methods.** A cross-sectional comparative study was conducted in 60 patients with alopecia areata. According to disease severity, patients were allocated to a SALT <50% group ($n$=40) and a SALT ≥50% group ($n$=20), each further divided into age subgroups of 18–29 years and ≥30 years. Anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS), and QoL using the Skindex-29 dermatological questionnaire. Statistical analysis included the Student t-test, the Mann–Whitney U test, the Spearman rank correlation coefficient, comparison of independent correlation coefficients using Fisher r-to-z transformation ($r \rightarrow z$), and effect size estimation (r). Differences were considered statistically significant at $p$<0.05.

**Results.** Regardless of age, severe alopecia areata (SALT ≥50%) was associated with more pronounced depressive symptoms, greater emotional disturbance, and lower QoL than SALT <50%. The most marked psychoemotional disturbances occurred in patients aged 18–29 years with severe disease, who showed higher levels of anxiety and depression, more pronounced emotional and functional impairment, and lower QoLscores than patients older than 30 years. In moderate disease, age-related differences were less evident and involved mainly individual emotional measures. Correlation analysis revealed a close association between QoL and anxiety-depressive symptoms and all Skindex-29 domains, irrespective of age. Among patients aged 18-29 years, increasing clinical severity was accompanied by a statistically significant shift in the structure of factors related to QoL: at SALT <50%, QoL was linked primarily to the subjective severity of disease symptoms, whereas at SALT ≥50% the contribution of functional limitations increased. No comparable shift in the structure of these associations was observed in patients older than 30 years. However, direct comparison of the correlation structure between the age groups showed no statistically significant differences ($p$>0.05).

**Conclusion.** The clinical severity of alopecia areata is associated with poorer QoL and greater psychoemotional disturbance. The most pronounced QoLimpairment, anxiety and depressive symptoms, and psychosocial burden were found in young patients with severe disease (SALT ≥50%). These findings suggest that in severe alopecia areata the objective clinical severity of the disease is accompanied by a more intense subjective experience of its consequences in young patients, manifested as higher levels of anxiety and depression, more pronounced emotional and functional impairment, and a greater reduction in QoL. At the same time, the observed age-related features in the structure of associations

between clinical and psychological parameters and QoL did not reach statistical significance on direct comparison of the age groups and require further confirmation in studies with larger samples. These data support the need to assess not only clinical disease severity but also QoL, emotional state, and the subjective experience of illness when planning personalized management of patients with alopecia areata.

# 1. Introduction

Alopecia areata (AA) is a chronic organ-specific autoimmune disease characterized by non-scarring hair loss resulting from immune-mediated damage to the hair follicle. It follows an unpredictable course, tends to recur, and shows considerable variability in clinical presentation, ranging from single patches of hair loss to complete loss of scalp hair (alopecia totalis) and a universal form with total loss of body hair (alopecia universalis) [1, 2].

According to systematic reviews, the lifetime risk of alopecia areata is approximately 2%, making it one of the most common human autoimmune conditions and the second most frequent cause of non-scarring hair loss after androgenetic alopecia. The disease occurs across all age groups regardless of sex or ethnicity [2–4]. Despite its substantial global prevalence, epidemiological data for the countries of Central Asia, including the Republic of Kazakhstan, remain very limited. Moreover, alopecia areata is not subject to mandatory reporting in national registries, so reliable information on its prevalence and patient numbers is lacking, and practitioners must rely largely on findings from studies conducted abroad. This underscores the need to study not only the clinical features of the disease but also its psychosocial consequences in the local population.

Current understanding regards alopecia areata as a multifactorial disease arising from a combination of genetic predisposition, dysregulation of immune function, and environmental influences. According to the recommendations of Olsen et al. [5], alopecia areata is an immune-mediated disease marked by pronounced variability in clinical course, with differences in the duration, extent, and pattern of hair loss even within the same patient.

Despite advances in current therapy, alopecia areata poses no immediate threat to life and rarely causes marked physical limitation. The disease nonetheless has a substantial effect on patients' psychosocial state. Systematic reviews indicate that anxiety and depressive disorders, reduced self-esteem, and impaired social adaptation and QoL are considerably more frequent in patients with alopecia areata than in the general population [6–8]. In the meta-analysis by Rencz et al. [9], the greatest QoLimpairment was observed in the domain of mental health, underscoring the predominantly psychosocial nature of the disease burden. QoL is therefore regarded as one of the key criteria for assessing disease severity and treatment efficacy. Unlike objective clinical scales, QoLmeasures capture the patient's subjective perception of the disease, the degree of emotional maladjustment, and the impact of illness on daily activity, social functioning, and psychological wellbeing.

A comprehensive assessment of QoL allows the individual burden of disease to be characterized more fully and the effectiveness of treatment to be evaluated. The most widely used tool for objectively assessing the clinical severity of alopecia areata is the Severity of Alopecia Tool (SALT), which is based on quantifying the area of scalp hair loss [10]. Current thinking, however, indicates that disease severity cannot be defined by the extent of involvement alone. According to the multidimensional framework proposed by King et al. [11], the assessment of alopecia areata severity should take into account not only the SALT score but also the site of involvement (eyebrows, eyelashes, and other areas), disease duration, the pattern of the course and frequency of relapses, treatment response, and the impact of the disease on the patient's QoL and psychosocial functioning. For assessing QoL in patients with dermatological conditions, the validated Skindex-29 questionnaire is widely used, allowing evaluation of the emotional, functional, and symptom-related components of the disease [12–14]. Although a larger area of scalp involvement is known to be linked to poorer QoL and greater anxiety–depressive symptoms and psychological distress, the relationship between objective clinical severity and the subjective perception of illness is not always linear. The systematic review by Lauron et al. (2023), which included 29 studies of depression and 26 studies of anxiety, showed that more than one-third of patients with alopecia areata have clinically significant symptoms of anxiety and depression. Yet the severity of these disturbances does not always vary linearly with the area of hair loss. In several studies, the highest level of psychological distress was found in patients with 21–49% scalp involvement, whereas in total or universal alopecia the severity of depressive symptoms could diminish as a result of gradual psychological adaptation and acceptance of the disease [15].

The influence of age on the psychosocial burden of the disease is of particular interest, although published findings remain inconsistent. In the multicenter study by Shi et al. [16], age between 20 and 50 years was identified as an independent risk factor for reduced QoL, alongside female sex, extensive hair loss, family stress, and job change. In contrast, Mostaghimi et al. [17] did not find age to be an independent predictor of reduced QoL after adjustment for other clinical factors; the main predictors were female sex, the patient's own rating of disease severity, and involvement of the eyebrows and eyelashes. Similar results were reported by Reid et al. [18], who showed that QoL was more closely related to the patient's subjective perception of hair loss than to the physician's objective clinical assessment, whereas age had no independent effect on QoLmeasures. In a nationwide study, Yoon et al. [19] found that female sex, age, clinical disease severity, and longer duration of alopecia areata were associated with more pronounced psychosocial impairment. At the same time, the authors observed no linear relationship between clinical severity and the degree of psychosocial distress, reflecting the complex and multifactorial nature of the disease's impact on QoL. It should be noted that the study included patients of intermediate mean age (about 40 years), which limited the ability to assess the effect of age on the psychosocial consequences of the disease. According to the systematic review by Fricke and Miteva [20], alopecia areata most often begins at a young age, and the mean age at onset across studies ranges from 25 to 36 years. The authors note that youth is characterized by a high value placed on appearance and by the active development of a professional career, interpersonal relationships, and body image. Consequently, even limited hair loss may be accompanied by marked

emotional distress, lowered self-esteem, and impaired social adaptation. At older ages, life experience and established mechanisms of psychological adaptation may support a more stable perception of the disease.

The influence of age on the psychosocial perception of alopecia areata is of particular interest. Young adulthood (18–29 years) is marked by the active formation of personal identity, professional self-definition, the development of romantic relationships, and a high value placed on appearance. Changes in appearance during this period may therefore be experienced especially acutely, contributing to social anxiety, lower self-esteem, and poorer QoL. In the book Social Anxiety in Adolescents and Young Adults: Translating Developmental Science into Practice (Alfano & Beidel, 2011), young adults are highlighted as one of the groups most vulnerable to social evaluation and to the psychological consequences of changes in appearance [21].

Despite the accumulated evidence on the substantial psychosocial impact of alopecia areata, it remains insufficiently understood whether the severity of psychoemotional disturbances differs between younger and older adult patients, and which clinical and psychological factors most strongly determine the reduction in QoL. This prompted the present study, in which patients were divided into two age groups – 18–29 years (young adults) and 30 years and older - to compare the psychosocial impact of the disease at different stages of adult life.

Thus, despite considerable progress in understanding the clinical and immunological aspects of alopecia areata, the psychosocial impact of the disease in adult patients of different age groups remains insufficiently studied.

The aim of the study was to assess the combined influence of age and alopecia areata severity on QoL and the severity of anxiety- depressive symptoms in adult patients, and to analyze the relationships between clinical and psychosocial parameters across different age groups.

The study hypothesized that greater alopecia areata severity is accompanied by poorer QoL and more pronounced anxiety- depressive symptoms, that the magnitude of these changes differs between adult age groups, and that analysis of the relationships between clinical and psychosocial parameters would help clarify how the psychosocial impact of the disease develops.

# 2. Materials and Methods

A single-center analytical cross-sectional study was conducted in 60 adult patients aged 18 to 62 years with clinically and trichoscopically confirmed alopecia areata. The diagnosis was established on the basis of the clinical presentation and trichoscopic findings in accordance with the ICD-10 classification (L63.*).

The inclusion criteria were age ≥18 years, a clinically and trichoscopically confirmed diagnosis of alopecia areata, and written informed consent to participate in the study.

The exclusion criteria were the presence of concomitant dermatological conditions that could affect the scalp, a history of severe psychiatric disorders, and refusal to participate in the study.

All patients were stratified by age into two groups:

group 1 - patients aged 18-29 years (*n* = 30; mean age 24.7 ± 3.36 years);

group 2 - patients aged ≥30 years (*n* = 30; mean age 42.3 ± 1.52 years).

Within each age group, patients were further divided into subgroups according to alopecia areata severity:

subgroup 1 - SALT < 50% (mild to moderate disease);

subgroup 2 - SALT ≥ 50% (severe alopecia areata).

To assess the comparability of the study groups, baseline clinical and demographic characteristics were analyzed (Tables 1-2). The results indicate that the groups were comparable in sex and age, while the expected differences were seen only in disease duration and the extent of scalp involvement (SALT).

**Table 1** Baseline clinical and demographic characteristics of patients aged 18–29 years

| Parameter | SALT <50% (*n*= 20) | SALT ≥50% (*n*= 10) | *p* |
|---|---|---|---|
| SALT, % | 27.11 ± 19.49 | 68.11 ± 16.42 | <0.001* |
| Female sex, *n* (%) | 13 (65) | 6 (60) | 0.78 |
| Male sex, *n* (%) | 7 (35) | 4 (40) | *p*> 0.05 |
| Age, years | 24.7 ± 3.36 | 24.7 ± 3.95 | 0.79 |
| Disease duration, months | 2.5 ± 2.12 | 8.4 ± 5.02 | <0.001* |
| *Note: p - Mann-Whitney test for quantitative variables, $\chi^2$ test for categorical variables; - statistically significant differences (p <0.05).* | | | |

**Table 2** Baseline clinical and demographic characteristics of patients aged 30 years and older

| Parameter | SALT <50% (*n*= 20) | SALT ≥50% (*n*= 10) | *p* |
|---|---|---|---|
| SALT, % | 31.11 ± 16.15 | 69.11 ± 18.12 | <0.001* |
| Female sex, *n*(%) | 11 (55) | 7 (70) | *p*> 0.05 |
| Male sex, *n*(%) | 9 (45) | 3 (30) | *p*> 0.05 |
| Age, years | 40.5 ± 7.6 | 45.8 ± 9.0 | 0.18 |
| Disease duration, months | 2.9 ± 1.86 | 6.5 ± 3.31 | 0.001* |
| *Note: p — Mann-Whitney test for quantitative variables, χ² test for categorical variables; - statistically significant differences (p< 0.05).* | | | |

*Trichoscopic examination.*

All patients underwent trichoscopic examination using a DEIBOYI device with Trichocifns 1.5 software. During the examination, demographic data (age, sex), medical history, comorbidities, and the presence of hair loss at other body sites were recorded.

*Assessment of hair loss severity.*

Clinical severity was assessed using the Severity of Alopecia Tool (SALT), which quantifies the area of hair loss across four anatomical regions of the scalp [5,6].

*Assessment of QoL.*

QoL was assessed using Skindex-29, which comprises three domains - emotions, functioning, and symptoms - and an overall composite score (0–100%). Each item was rated on a scale from 0 to 10 points, after which the values were converted to a 0–100 scale. Higher scores reflected a more pronounced adverse effect of the disease on QoL [10]. In addition to analysis of the individual domains, the overall composite QoLscore was used for between-group comparisons and correlation analysis. The overall QoLscore was calculated as the arithmetic mean of the three Skindex-29 domains (symptoms, emotions, and functioning), expressed on a 0–100 scale. Higher values corresponded to greater impairment of QoL.

Anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS), which comprises 14 items (7 for anxiety and 7 for depression) [12-14]. Each item is rated on a four-point scale (0-3 points). Anxiety and depression were interpreted separately: 0-7 indicated no clinically significant symptoms, 8-10 a subclinical level, and ≥11 clinically significant symptoms.

*Statistical analysis.*

Data were processed using standard methods of descriptive and analytical statistics. Quantitative variables are presented as mean and standard deviation (M±SD). Independent groups were compared for quantitative and ordinal variables using the nonparametric Mann–Whitney U test, chosen because of

the small subgroup sizes and the non-normal distribution of the variables studied. Correlation analysis was performed using the Spearman coefficient (ρ) separately within each age group. The strength of correlations between independent groups was compared using Fisher transformation ($r \rightarrow z$). Differences were considered statistically significant at $p < 0.05$.

*Ethical approval:* All methods were carried out in accordance with relevant guidelines and regulations. The study was reviewed and approved by the Local Bioethics Committee of Semey Medical University, Semey, Kazakhstan (Protocol No. 5, 15 January 2026) and by the Research Ethics Council of the Abai Kazakh National Pedagogical University, Almaty, Kazakhstan (Conclusion No. 4, 27 March 2026). Written informed consent was obtained from all participants prior to inclusion.

# 3. Results

### *3.1. Comparison of clinical, psychological, and QoLparameters in patients aged 18-29 years with different alopecia areata severity (SALT <50% and SALT ≥50%)*

The study group comprised patients aged 18-29 years, divided into two subgroups according to alopecia areata severity: SALT <50% ($n$=20) and SALT ≥50% ($n$=10). The SALT <50% and SALT ≥50% subgroups were comparable in age ($p$=0.790), confirming that they were appropriately formed (Table 3).

**Table 3** Clinical, psychological, and QoL parameters in patients aged 18-29 years with alopecia areata according to disease severity

| Indicator | SALT <50% ($n$= 20), M±SD | SALT ≥50% ($n$= 10), M±SD | $p$ (Mann-Whitney) | $r$ |
|---|---|---|---|---|
| Age, years | 24.65 ± 3.36 | 24.70 ± 3.95 | 0.790 | 0.01 |
| Anxiety, points | 6.55 ± 0.89 | 11.70 ± 1.42 | <0.001* | 0.86 |
| Depression, points | 9.40 ± 2.46 | 12.70 ± 1.70 | 0.002* | 0.57 |
| Emotions, points | 35.45 ± 6.44 | 47.30 ± 1.70 | <0.001* | 0.74 |
| Functions, points | 16.35 ± 4.08 | 32.50 ± 4.58 | <0.001* | 0.88 |
| Symptoms, points | 25.35 ± 6.54 | 30.30 ± 2.98 | 0.064 | 0.41 |
| Overall QoL score | 25.70 ± 4.58 | 36.83 ± 2.11 | <0.001* | 0.81 |

*Note: * - statistically significant differences at p <0.05. Effect size r interpreted as: 0.1 - weak; 0.3 - moderate; 0.5 - strong.*

Comparison of young patients with different alopecia areata severity revealed marked differences in most of the clinical and psychological parameters examined. Patients with SALT ≥50% had significantly higher levels of anxiety ($p$<0.001; $r$=0.86) and depression ($p$=0.002; $r$=0.57) than those with SALT<50%. The effect sizes observed indicated the high clinical relevance of these differences.

Analysis of QoLmeasures likewise revealed greater impairment in patients with severe disease. Compared with the SALT<50% subgroup, patients with SALT≥50% had significantly higher scores in the "Emotions" ($p$<0.001; $r$=0.74) and "Functioning" ($p$<0.001; $r$=0.88) domains, as well as a higher overall QoLscore ($p$<0.001; $r$=0.81), reflecting a more pronounced adverse effect of the disease on QoL. The difference in the "Symptoms" domain was not statistically significant ($p$=0.064; $r$=0.41).

Thus, in patients aged 18-29 years, greater alopecia areata severity was accompanied by more pronounced anxiety-depressive manifestations and a more substantial reduction in QoL than in patients with SALT<50%. To examine the relationships between QoL and clinical-psychological parameters in patients aged 18-29 years, correlation analysis was performed separately in the SALT<50% and SALT≥50% subgroups (Table 4).

**Table 4** Correlations of clinical and psychological parameters with the overall QoL score in patients aged 18-29 years with different alopecia areata severity (SALT<50% and SALT≥50%)

| Indicator pair | $\rho_1$ SALT<50% | $p_1$ | $\rho_2$ SALT≥50% | $p_2$ | $z$(Fisher) | $p$(z) | Interpretation |
|---|---|---|---|---|---|---|---|
| Age - Overall score | −0.24 | 0.30 | 0.10 | 0.79 | −0.77 | 0.44 | No significant association; no intergroup difference. |
| Anxiety - Overall score | 0.82 | <0.001 | 0.89 | <0.001 | −0.59 | 0.56 | Anxiety strongly associated with worse QoL; no intergroup difference. |
| Depression - Overall score | 0.60 | 0.005 | 0.63 | 0.049 | −0.11 | 0.91 | Depression significantly associated with QoL; no intergroup difference. |
| Emotions - Overall score | 0.89 | <0.001 | 0.64 | 0.047 | 1.48 | 0.14 | Emotional impairment strongly influences QoL; no intergroup difference. |
| Functions - Overall score | 0.55 | 0.013 | 0.91 | <0.001 | −2.02 | 0.043* | Functional limitations significantly affect QoL; intergroup difference significant. |
| Symptoms - Overall score | 0.93 | <0.001 | 0.21 | 0.56 | 3.22 | 0.001* | Symptoms substantially affect QoL; intergroup difference significant. |
| Note: $\rho$ - Spearman's correlation coefficient; $z$ - Fisher's $r$-to-$z$ transformation; * - intergroup differences significant at $p(z)$ <0.05. | | | | | | | |

In the SALT<50% subgroup, the overall QoLscore correlated most strongly with the severity of "Symptoms" ($\rho$=0.93; $p$<0.001), emotional disturbance ($\rho$=0.89; $p$<0.001), and the level of anxiety ($\rho$=0.82; $p$<0.001). Statistically significant correlations were also found with the level of depression ($\rho$=0.60; $p$=0.005) and functional limitations ($\rho$=0.55; $p$=0.013). The association between the overall QoL score and age was weak and not statistically significant ($\rho$=−0.24; $p$=0.30).

In the SALT≥50% subgroup, the overall QoL score correlated most strongly with functional limitations ($\rho$=0.91; $p$<0.001) and the level of anxiety ($\rho$=0.89; $p$<0.001). Statistically significant associations were also found with the level of depression ($\rho$=0.63; $p$=0.049) and the emotional domain ($\rho$=0.64; $p$=0.047), whereas correlations with the symptom domain ($\rho$=0.21; $p$=0.56) and age ($\rho$=0.10; $p$=0.79) were not statistically significant.

Comparison of the correlation coefficients between the subgroups using Fisher transformation showed no statistically significant differences for most of the associations analyzed ($p$>0.05). However, statistically significant differences were found for the correlations "Functioning–overall QoL score" ($p$=0.043) and "Symptoms–overall QoL score" ($p$=0.001). In patients with SALT≥50%, the reduction in QoL was more closely related to functional limitations, whereas in patients with SALT<50% it was related to the subjective severity of disease symptoms.

Thus, regardless of disease severity, anxiety, depression, and emotional disturbance were closely related to reduced QoL in patients aged 18-29 years. As alopecia areata severity increased, functional limitations became the leading factor in QoL impairment, whereas in less severe disease the subjective severity of symptoms played a more prominent role.

### *3.2. Comparison of clinical, psychological, and QoL parameters in patients aged 30 years and older with different alopecia areata severity (SALT<50% and SALT≥50%)*

Group 2. The study group comprised patients aged 30 years and older, divided into two subgroups according to alopecia areata severity: SALT<50% ($n$=20) and SALT≥50% ($n$=10). The SALT<50% and SALT≥50% subgroups were comparable in age ($p$=0.103), confirming that they were appropriately formed (Table 5).

**Table 5** Clinical, psychological, and QoL parameters in patients aged 30 years and older with alopecia areata according to disease severity

| Indicator | SALT<50% (*n*=20) | SALT≥50% (*n*=10) | *p* (Mann-Whitney U test) | *Effect size (r)* |
|---|---|---|---|---|
| Age, years | 40.50 ± 7.60 | 45.80 ± 9.02 | 0.103 | 0.30 |
| Anxiety, points | 9.20 ± 1.77 | 9.30 ± 1.25 | 0.512 | 0.12 |
| Depression, points | 7.15 ± 0.88 | 8.90 ± 1.60 | 0.002* | 0.54 |
| Emotions, points | 30.15 ± 2.43 | 42.50 ± 2.51 | <0.001* | 0.80 |
| Functions, points | 15.70 ± 4.17 | 24.10 ± 2.96 | <0.001* | 0.72 |
| Symptoms, points | 23.70 ± 5.50 | 28.50 ± 4.14 | 0.036* | 0.39 |
| Overall score | 23.18 ± 2.53 | 31.70 ± 2.50 | <0.001* | 0.80 |
| *Note: * - statistically significant differences at p<0.05. Effect size r interpreted as: 0.1 - weak; 0.3 - moderate; 0.5 - strong.* | | | | |

Comparison of patients aged 30 years and older with different alopecia areata severity revealed statistically significant differences in most of the clinical and psychological parameters examined. Patients with SALT≥50% showed more pronounced depressive manifestations ($p$=0.002; $r$=0.54) than those with SALT<50%. The effect size observed indicated the high clinical relevance of this difference. No statistically significant difference in anxiety level was found between the subgroups ($p$=0.512; $r$=0.12).

Analysis of QoLmeasures likewise showed greater impairment in patients with severe disease. Compared with the SALT<50% subgroup, patients with SALT≥50% had significantly higher scores in the "Emotions" ($p$<0.001; $r$=0.80), "Functioning" ($p$<0.001; $r$=0.72), and "Symptoms" ($p$=0.036; $r$=0.39) domains, as well as a higher overall QoL score ($p$<0.001; $r$=0.80), reflecting a more pronounced adverse effect of the disease on QoL.

Thus, in patients aged 30 years and older, greater alopecia areata severity was accompanied by more pronounced depressive manifestations and a more substantial reduction in QoL, whereas anxiety level was largely independent of disease severity.

To examine the relationships between QoL and clinical–psychological parameters in patients aged 30 years and older, correlation analysis was performed separately in the SALT<50% and SALT≥50% subgroups (Table 6).

**Table 6** Correlations of clinical and psychological parameters with the overall QoL score in patients aged 30 years and older with different alopecia areata severity (SALT<50% and SALT≥50%)

| Indicator pair | $\rho_1$ SALT<50% | $p_1$ | $\rho_2$ SALT≥50% | $p_2$ | z (Fisher) | $p$ (z) | Interpretation |
|---|---|---|---|---|---|---|---|
| Age - Overall score | −0.41 | 0.07 | 0.18 | 0.62 | -1.38 | 0.17 | No significant association; no intergroup difference. |
| Anxiety - Overall score | 0.74 | <0.001 | 0.79 | 0.007 | -0.27 | 0.79 | Anxiety strongly associated in both subgroups; no intergroup difference. |
| Depression - Overall score | 0.68 | 0.001 | 0.83 | 0.003 | -0.80 | 0.42 | Depression significantly associated; no intergroup difference. |
| Emotions - Overall score | 0.81 | <0.001 | 0.91 | <0.001 | -0.89 | 0.37 | Emotional impairment strongly correlated; no intergroup difference. |
| Functions - Overall score | 0.63 | 0.003 | 0.87 | 0.001 | -1.32 | 0.19 | Functional limitations significantly affect QoL; intergroup difference not significant. |
| Symptoms - Overall score | 0.79 | <0.001 | 0.88 | 0.001 | -0.68 | 0.50 | Symptoms substantially affect QoL; no intergroup difference. |
| Note: $\rho$ - Spearman's correlation coefficient; z - Fisher's *r*-to-*z* transformation; p <0.05. | | | | | | | |

Analysis of the correlations showed that the influence of clinical–psychological factors on QoL was more pronounced in patients with SALT≥50%. At SALT<50%, the strongest associations of the overall QoL score were with emotional disturbance ($\rho$=0.81; $p$<0.001) and symptom severity ($\rho$=0.79; $p$<0.001), whereas correlations with anxiety, depression, and functional limitations were somewhat lower ($\rho$=0.74,0.68, and 0.63, respectively; $p$≤0.003). The association with age did not reach statistical significance ($\rho$=-0.41; $p$=0.07).

At SALT≥50%, the correlation coefficients were higher for all clinical–psychological parameters examined: emotional disturbance ($\rho$=0.91; $p$<0.001), symptom severity ($\rho$=0.88; $p$=0.001), functional

limitations ($\rho$=0.87; $p$=0.001), depression ($\rho$=0.83; $p$=0.003), and anxiety ($\rho$=0.79; $p$=0.007). Age, meanwhile, remained without a statistically significant association with QoL ($\rho$=0.18; $p$=0.62).

Comparison of the correlation coefficients between the subgroups using Fisher transformation revealed no statistically significant differences for any of the associations analyzed ($p$>0.05). These results indicate a similar structure of correlations between QoLmeasures and clinical–psychological characteristics in patients older than 30 years, regardless of disease severity.

Thus, regardless of disease severity, the overall QoL score in patients older than 30 years was closely related to anxiety, depression, emotional disturbance, functional limitations, and symptom severity. Unlike younger patients, no statistically significant differences in the structure of these associations were found between the SALT<50% and SALT≥50% subgroups, indicating a similar pattern of influence of clinical–psychological factors on QoL irrespective of alopecia areata severity.

### *3.3. Age-related features of clinical, psychological, and QoLparameters in patients with alopecia*

The study group included patients with alopecia areata at SALT<50% ($n$=40). To assess age-related features of clinical, psychological, and QoL parameters, patients were divided into two subgroups: 18-29 years ($n$=20) and 30 years and older ($n$=20). Comparison of patients with mild to moderate alopecia areata (SALT<50%) between the 18-29-year and ≥30-year age groups revealed differences in several clinical and psychological parameters (Table 7).

**Table 7** Comparison of clinical, psychological, and QoLparameters in patients with alopecia areata at SALT<50% between the 18-29-year and ≥30-year age groups

| Indicator | 18–29 years (*n*=20) | ≥30 years (*n*=20) | *p* (t-test) | *p* (Mann–Whitney U test) | *r* | Interpretation |
|---|---|---|---|---|---|---|
| Age, years | 24.65 ± 3.36 | 40.50 ± 7.60 | <0.001* | <0.001* | 0.52 | strong |
| Anxiety, points | 9.40 ± 2.46 | 9.20 ± 1.77 | 0.769 | 0.978 | 0.01 | none |
| Depression, points | 6.55 ± 0.89 | 7.15 ± 0.88 | 0.038* | 0.035* | 0.33 | moderate |
| Emotions, points | 35.45 ± 6.44 | 30.15 ± 2.43 | 0.002* | 0.004* | 0.46 | moderate–strong |
| Functions, points | 16.35 ± 4.08 | 15.70 ± 4.17 | 0.621 | 0.604 | 0.08 | weak |
| Symptoms, points | 25.35 ± 6.54 | 23.70 ± 5.50 | 0.393 | 0.342 | 0.15 | weak |
| Overall score | 25.70 ± 4.58 | 23.18 ± 2.53 | 0.040* | 0.085 | 0.27 | weak–moderate |

*Note: * - statistically significant differences at p <0.05. Effect size r interpreted as: 0.1 - weak; 0.3 - moderate; 0.5 - strong.*

Besides the expected difference in age ($p$<0.001), patients aged 30 years and older had a significantly higher level of depression than those aged 18-29 years ($p$=0.035; $r$=0.33). The effect size was moderate, indicating the clinical relevance of the difference.

Analysis of QoL measures revealed a more pronounced emotional impact of the disease in younger patients. Compared with patients aged 30 years and older, those aged 18–29 years had significantly higher scores in the "Emotions" domain ($p$=0.004; $r$=0.46), reflecting a more marked adverse effect of the disease on emotional state. Differences in the "Functioning" ($p$=0.604; $r$=0.08) and "Symptoms" ($p$=0.342; $r$=0.15) domains were not statistically significant. No statistically significant difference in anxiety level was found between the age groups either ($p$=0.978; $r$=0.01). Although the difference in the overall QoLscore was statistically significant with the t-test ($p$=0.040), it did not reach statistical significance with the Mann–Whitney U test ($p$=0.085; $r$=0.27).

Thus, at the same clinical severity (SALT<50%), age-related differences were manifested mainly as a higher level of depression in patients aged 30 years and older and a more pronounced emotional impact of the disease in younger patients. No statistically significant differences were found in anxiety level, functional limitations, the symptom domain, or the overall QoL score.

To examine the relationships between QoL and clinical–psychological parameters, correlation analysis was performed separately in each age subgroup (Table 8).

**Table 8** Correlations of clinical and psychological parameters with the overall QoLscore in patients with SALT<50% (18-29 years and ≥30 years)

| Indicator pair | $\rho_1$ 18-29 years | $p_1$ | $\rho_2$ ≥30 years | $p_2$ | $z$ (Fisher) | $p(z)$ | Interpretation |
|---|---|---|---|---|---|---|---|
| Age - Overall score | -0.24 | 0.30 | -0.41 | 0.07 | 0.56 | 0.58 | No significant association in either group. |
| Anxiety - Overall score | 0.82 | <0.001 | 0.74 | <0.001 | 0.60 | 0.55 | Strong and significant correlation in both groups. |
| Depression - Overall score | 0.60 | 0.005 | 0.68 | 0.001 | -0.40 | 0.69 | Significant correlation regardless of age. |
| Emotions - Overall score | 0.89 | <0.001 | 0.81 | <0.001 | 0.86 | 0.39 | Very strong correlation in both groups. |
| Functions - Overall score | 0.55 | 0.013 | 0.63 | 0.003 | -0.36 | 0.72 | Significant correlation in both age groups. |
| Symptoms - Overall score | 0.93 | <0.001 | 0.79 | <0.001 | 1.71 | 0.087 | Extremely strong correlation; trend toward intergroup difference ($p$= 0.087). |
| *Note: ρ- Spearman's correlation coefficient; z - Fisher's r-to-z transformation; p <0.05.* | | | | | | | |

In both age groups, QoL was associated primarily with the severity of clinical and emotional–psychological disturbances. In patients aged 18–29 years, the strongest correlations were with symptom severity ($\rho$=0.93; $p$<0.001), emotional disturbance ($\rho$=0.89; $p$<0.001), and anxiety ($\rho$=0.82; $p$<0.001), whereas associations with depression and functional limitations were moderate ($\rho$=0.60 and 0.55, respectively; $p$≤0.013). In the ≥30-year group, the highest correlation coefficients were likewise found for emotional disturbance ($\rho$=0.81; $p$<0.001), symptom severity ($\rho$=0.79; $p$<0.001), and anxiety ($\rho$=0.74; $p$<0.001); correlations with depression and functional limitations were $\rho$=0.68 and 0.63, respectively ($p$≤0.003). In both groups, the association between QoL and age did not reach statistical significance.

Comparison of the correlation coefficients between the age subgroups using Fisher transformation revealed no statistically significant differences for any of the associations analyzed ($p$>0.05). Nevertheless, a trend toward a between-group difference was noted for the "Symptoms-overall QoL score" association ($p$=0.087), which may indicate a somewhat greater influence of the symptom component on QoL in younger patients.

Thus, regardless of age, the reduction in QoL in patients with alopecia areata at SALT<50% was closely related to anxiety, depression, emotional disturbance, functional limitations, and symptom severity. No statistically significant age-related differences in the structure of these associations were found.

### *3.4. Age-related features of clinical, psychological, and QoL parameters in patients with alopecia areata at SALT≥50%*

The study group comprised patients with alopecia areata at SALT≥50% (*n*=20). According to age, two subgroups were identified: patients aged 18-29 years (*n*=10) and patients aged 30 years and older (*n*=10). Comparison of patients with severe alopecia areata (SALT≥50%) between the 18-29-year and ≥30-year age groups revealed marked differences in most of the clinical and psychological parameters examined (Table 9).

**Table 9** Comparison of clinical, psychological, and QoLparameters in patients with alopecia areata at SALT≥50% between the 18–29-year and ≥30-year age groups

| Indicator | 18–29 years (n=10), M±SD | ≥30 years (n=10), M±SD | *p*(t-test) | *p* (Mann–Whitney U test) | *r* | Interpretation |
|---|---|---|---|---|---|---|
| Depression, points | 11.70 ± 1.42 | 8.90 ± 1.60 | 0.0006* | 0.0021* | 0.67 | strong |
| Anxiety, points | 12.70 ± 1.70 | 9.30 ± 1.25 | <0.001* | <0.001* | 0.78 | strong |
| Age, years | 24.70 ± 3.95 | 45.80 ± 9.02 | <0.001* | <0.001* | 0.82 | strong |
| Emotions, points | 47.30 ± 1.70 | 42.50 ± 2.51 | <0.001* | 0.0012* | 0.71 | strong |
| Functions, points | 32.50 ± 4.58 | 24.10 ± 2.96 | <0.001* | 0.0014* | 0.70 | strong |
| Symptoms, points | 30.30 ± 2.98 | 28.50 ± 4.14 | 0.281 | 0.304 | 0.24 | weak |
| Overall score | 36.83 ± 2.11 | 31.70 ± 2.50 | <0.001* | <0.001* | 0.79 | strong |

*Note: * - statistically significant differences at p <0.05. Effect size r interpretation: 0.1 - weak; 0.3 - moderate; 0.5 - strong.*

Besides the expected difference in age ($p<0.001$), patients aged 18–29 years had significantly higher levels of anxiety ($p<0.001$; $r=0.78$) and depression ($p=0.002$; $r=0.67$) than those aged 30 years and older. The effect sizes observed indicated the high clinical relevance of these differences.

Analysis of QoL measures likewise revealed greater impairment in younger patients. Compared with patients aged 30 years and older, younger patients had significantly higher scores in the "Emotions" ($p=0.0012$; $r=0.71$) and "Functioning" ($p=0.0014$; $r=0.70$) domains, as well as a higher overall QoL score

($p$<0.001; $r$=0.79), reflecting a more pronounced adverse effect of the disease on QoL. The difference in the "Symptoms" domain was not statistically significant ($p$=0.304; $r$=0.24).

Thus, at the same clinical severity (SALT≥50%), patients aged 18–29 years showed more pronounced anxiety–depressive manifestations and a more substantial reduction in QoL than patients aged 30 years and older.

To assess age-related features of the relationships between QoL and clinical–psychological parameters, correlation analysis was performed separately in each age group (Table 10).

**Table 10** Correlations of clinical and psychological parameters with the overall QoLscore in patients with SALT≥50% between the 18–29-year and ≥30-year age groups

| Indicator pair | $\rho_1$ 18-29 years | $p_1$ | $\rho_2$ ≥30 years | $p_2$ | $z$ (Fisher) | $p(z)$ | Interpretation |
|---|---|---|---|---|---|---|---|
| Depression - Overall score | 0.63 | <0.05 | 0.54 | >0.05 | 0.17 | 0.86 | Depression significantly correlates with worse QoL; effect similar in both groups. |
| Anxiety - Overall score | 0.89 | <0.001 | 0.79 | <0.01 | 0.55 | 0.58 | Anxiety strongly associated with lower QoL in both groups. |
| Emotions - Overall score | 0.64 | <0.05 | 0.80 | <0.01 | −0.39 | 0.70 | Emotional impairment strongly associated with QoL; effect present in both groups. |
| Functions - Overall score | 0.91 | <0.001 | 0.78 | <0.01 | 0.40 | 0.69 | Functional limitations significantly associated with lower QoL regardless of age. |
| Symptoms - Overall score | 0.35 | >0.05 | 0.78 | <0.01 | −0.86 | 0.39 | Symptom severity strongly affects QoL in older patients; in younger patients association is weak and nonsignificant. |

*Note: ρ - Spearman's correlation coefficient; z - Fisher's r-to-z transformation; p <0.05.*

In patients aged 18–29 years, QoL was most closely associated with functional limitations ($\rho$=0.91; $p$<0.001) and anxiety ($\rho$=0.89; $p$<0.001), whereas correlations with the emotional domain and depression were moderate ($\rho$=0.64 and 0.63, respectively; $p$<0.05). The association with the symptom domain was weak and not statistically significant ($\rho$=0.35; $p$>0.05). In patients aged ≥30 years, QoL showed strong correlations with emotional disturbance ($\rho$=0.80; $p$<0.01), anxiety ($\rho$=0.79; $p$<0.01), functional limitations

($\rho$=0.78; $p$<0.01), and symptom severity ($\rho$=0.78; $p$<0.01). The correlation with depression remained moderate and not statistically significant ($\rho$=0.54; $p$>0.05).

At the same time, Fisher *z*-transformation revealed no statistically significant differences between the age groups for any of the correlations examined ($p$>0.05 in all cases), indicating no statistically confirmed modification of the relationships between QoL and clinical–psychological characteristics by age.

At the same time, analysis of the correlation structure revealed certain trends. In patients aged 18–29 years, the strongest associations of the overall QoL score were with functional limitations and anxiety, whereas in patients aged 30 years and older high correlation coefficients were also found for the emotional and symptom domains. These differences should be interpreted with caution, however, as they were not statistically confirmed on between-group comparison and may reflect the small sample size.

Thus, regardless of age, the deterioration of QoL in patients with severe alopecia areata was closely related primarily to elevated anxiety, emotional disturbance, and functional limitations. The observed differences in the correlation structure between the age groups were trends only and did not reach statistical significance on comparison using the Fisher test.

# 4. Discussion

The present study showed that the effect of alopecia areata severity on QoL and patients' emotional state is determined not only by the objective area of scalp involvement but also by the subjective perception of the disease. The findings also point to possible age-related features in how clinical severity affects QoL and emotional state. The most pronounced features were found in patients aged 18–29 years. At SALT<50%, the overall QoLscore correlated most strongly with symptom severity, emotional disturbance, and the level of anxiety, probably reflecting the subjective perception of the disease.

As clinical severity increased, a statistically significant rise was observed in the overall QoL score, calculated as the mean of the three Skindex-29 domains ($p$<0.001; $r$=0.81), reflecting a more pronounced adverse effect of the disease on patients' QoL; at the same time, the pattern of associations changed, with the contribution of functional limitations increasing significantly. Differences in the correlation coefficients between the subgroups were confirmed using Fisher z-transformation. The most marked changes were found for the associations between the overall QoL score and the "Functioning" ($p$=0.043) and "Symptoms" ($p$=0.001) domains. Thus, in patients aged 18–29 years, greater clinical severity was accompanied not only by poorer QoL but also by a change in the structure of the associations between the overall QoL score and its individual domains.

These findings are consistent with the literature, according to which greater clinical severity of alopecia areata is accompanied by poorer QoL and more pronounced anxiety–depressive symptoms and emotional distress [16, 19, 22–25]. At the same time, they partly diverge from studies showing that QoL

is determined less by the area of scalp involvement than by the subjective assessment of disease severity. Gelhorn et al. [26] and Muñoz-Barba et al. [27], for instance, found that the highest level of psychological distress occurs not in total alopecia but with involvement of approximately 20–50% of the scalp.

Our findings suggest that such discrepancies may stem from the unequal contribution of individual QoLcomponents depending on clinical severity and from age gradations within the adult patient population. In patients aged 18–29 years with mild alopecia areata (SALT<50%), the reduction in QoL was related mainly to the "Symptoms" domain, probably reflecting subjective perception, whereas in severe disease (SALT≥50%) the importance of functional limitations increased, and greater clinical severity was accompanied by a more pronounced negative perception of the disease. These data are consistent with the review by Muntyanu et al. [28], in which poorer QoL was associated with greater clinical severity of alopecia areata, and the "Emotions" and "Functioning" domains had the greatest impact on QoL, particularly in younger patients (19-24 years). Symptoms of anxiety and/or depression occurred in 30-68% of patients regardless of age.

In the meta-analysis by Vañó-Galván et al. [29], high agreement was demonstrated between physician-rated disease severity and patients' subjective assessment of severity. The authors found that greater clinical severity was accompanied by a more pronounced negative perception of the disease, progressively poorer QoL, higher levels of anxiety and depression, and reduced work capacity. The results of the present study do not contradict those of Vañó-Galván et al. but add to current understanding of the age-related features in how the clinical severity of alopecia areata affects QoL, since a separate 18-29-year group was identified. The authors noted that in the European study adult patients were treated as a single group, and the mean age of participants did not account for the variability in effect sizes in the analysis of anxiety and depression.

In the published literature, age is most often treated as a descriptive characteristic of the sample, with averaged age values, or the analysis is limited to comparing children and adults. Even large studies and meta-analyses have not examined the features of different age groups within the adult population [19,29]. The features identified here are probably attributable to the psychological characteristics of early adulthood. Between the ages of 18 and 29 years, professional identity, interpersonal relationships, and family roles are actively forming, and appearance plays an important part in social self-presentation. Even limited hair loss may therefore be perceived as a marked cosmetic defect and accompanied by considerable emotional distress [21,31,32]. Similar trends have been described by Cartwright et al.[33] and Zhang et al.[34], who likewise noted a more pronounced reduction in QoL in younger patients.

These findings are also consistent with the concept of Cumulative Life Course Impairment (CLCI), according to which the long-term impact of a chronic disease is determined not only by its clinical severity but also by the cumulative effect on various areas of the patient's life, including stigmatization, psychoemotional disturbance, and features of psychological adaptation [35,36]. In the context of the present study, this may explain the more pronounced deterioration in QoL among young patients with

severe alopecia areata, since the disease arises during a period when social, professional, and family roles are actively forming.

A different pattern was found in patients aged 30 years and older. Unlike younger patients, and regardless of clinical severity, the overall QoL score maintained stable associations with anxiety-depressive symptoms, emotional disturbance, functional limitations, and subjective symptoms, while no statistically significant differences in correlation coefficients were found between the SALT<50% and SALT≥50% subgroups. This indicates relative stability in the structure of the factors determining QoL in this age group.

Our findings are partly consistent with those of van Dalen et al. [30], in which participants of higher mean age showed less pronounced reduction in QoL. Our results extend these data by demonstrating that in older patients the structure of associations between QoL and clinical–psychological parameters remains relatively stable regardless of clinical severity. This is probably related to the development of more effective mechanisms of psychological adaptation and emotional regulation. This suggestion is consistent with the socioemotional selectivity theory of Carstensen et al.[37], according to which, with age, people regulate emotional responses more effectively and adapt more readily to chronic stressors.

To test the influence of age on the nature of the relationships between clinical severity, QoL, and emotional parameters, a between-group analysis was performed using Fisher *z*-transformation. Although comparison of mean values revealed a more pronounced reduction in QoL, higher levels of anxiety and depression, and more severe emotional and functional impairment in patients aged 18–29 years with severe disease, no statistically significant differences in correlation coefficients were found between the age groups ($p>0.05$).

These results indicate that age-related differences appear mainly in the severity of clinical and psychological disturbances, whereas the overall structure of the relationships between the variables studied remains comparable. The available data therefore do not allow the conclusion that age reliably alters the mechanisms underlying the psychosocial burden of alopecia areata. At the same time, the absence of statistically significant differences does not preclude the existence of clinically relevant trends. Notably, only in patients aged 18-29 years was a statistically significant reorganization of the associations between the overall QoLscore and its individual domains found as clinical severity increased. This suggests that age may influence the pattern of psychosocial response as alopecia areata progresses, although this hypothesis requires confirmation in studies with larger samples.

One of the most likely reasons for the absence of statistically significant differences between the age groups is the limited sample size. In the comparison of patients with severe disease, the age subgroups were relatively small, which reduced the statistical power of the analysis and increased the probability of a type II error. In addition, the study had a cross-sectional design, which did not allow assessment of the dynamics of psychosocial changes over the course of the disease. Disease duration, relapse frequency, and features of the treatment administered were also not analyzed, although these, according to the literature, may substantially affect patients' emotional state.

Despite these limitations, the present study has several strengths. Unlike most previously published work, it provides a comprehensive assessment of how the clinical severity of alopecia areata affects QoL and patients' emotional state, taking into account age-related differences within the adult population. The use of correlation analysis combined with Fisher *z*-transformation made it possible to evaluate not only the severity of clinical and psychological disturbances but also the features of the structure of relationships between the variables studied.

# 5. Conclusions

1. Increasing clinical severity of alopecia areata is associated with poorer QoL and greater psychoemotional disturbance. Regardless of age, patients with severe disease (SALT≥50%) showed deeper depressive symptoms, greater emotional disturbance, and lower QoL than those with SALT<50%.

2. Age-related differences in emotional state were most evident in severe disease. At SALT<50% they were minor and involved only individual symptom-related and emotional measures. At SALT≥50%, patients aged 18-29 years had higher anxiety and depression, more severe emotional and functional impairment, and lower QoL than patients older than 30 years, pointing to a greater psychosocial burden of the disease at a young age.

3. On correlation analysis, QoL in all groups was closely related to anxiety-depressive symptoms and all domains of the Skindex-29 questionnaire (emotions, functioning, symptoms), reflecting the complex nature of the psychosocial burden of alopecia areata.

4. In patients aged 18-29 years, the structure of the factors determining QoL changed significantly as clinical severity increased: at SALT<50% the leading factor was the subjective severity of symptoms, and at SALT≥50% it was functional limitations. No such reorganization of associations was observed in patients older than 30 years.

5. Direct comparison of the correlations between the age groups (Fisher *z*-transformation) revealed no significant differences ($p>0.05$). The age-related features identified should therefore be regarded as a trend requiring confirmation in a larger sample.

6. The practical value of this work lies in supporting a comprehensive approach to managing patients with alopecia areata: alongside assessment of clinical severity, it is advisable to routinely take into account QoL, anxiety–depressive symptoms, and emotional state. Young patients with severe disease (SALT≥50%), in whom disturbances are most pronounced, warrant particular attention when planning dermatological and psychodermatological care.

*Use of artificial intelligence*

Artificial intelligence tools were used exclusively for grammatical, stylistic, and structural editing of the manuscript. They were not used to generate scientific data, conduct analyses, interpret the findings, or

draw the study's conclusions. Full responsibility for the analyses, interpretation of results, and scientific content of this manuscript rests with the authors.

## Declarations

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**Data Availability** The authors confirm that the data supporting the findings of this study are available within the article.

**Competing interests** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Ethical approval** All methods were carried out in accordance with relevant guidelines and regulations. The study was reviewed and approved by the Local Bioethics Committee of Semey Medical University, Semey, Kazakhstan (Protocol No. 5, 15 January 2026) and by the Research Ethics Council of the Abai Kazakh National Pedagogical University, Almaty, Kazakhstan (Conclusion No. 4, 27 March 2026). Written informed consent was obtained from all participants prior to inclusion.

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