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A randomized interventional study that compares treatments for vitiligo and anti-vitiligo cream

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Abstract

This study aimed to evaluate the efficacy of a novel combination therapy, AVC (Anti-Vitiligo Cream), compared to common treatments for vitiligo. A randomized interventional study was conducted on 1,000 patients with confirmed vitiligo, aged 7–70 years. Participants were divided into five groups (200 patients each): oral prednisolone, Tofacitinib, Ruxolitinib, AVC (Anti-Vitiligo Cream), and AVC combined with Tofacitinib. Outcomes were assessed over two years using the Vitiligo Area Scoring Index (VASI), patient satisfaction scores, and clinical observations. AVC-based therapies (Groups 4 and 5) demonstrated superior efficacy and patient satisfaction compared to other treatments. Group 5 (AVC+Tofacitinib) achieved the highest outcomes, with a mean satisfaction score of 90 (IQR: 85–95) and treatment efficacy significantly higher than Group 1 ($p < 0.001$). Regression analysis identified treatment outcomes and therapy type as significant predictors of satisfaction. AVC (Anti-Vitiligo Cream), particularly in combination with Tofacitinib, represents a groundbreaking approach for managing vitiligo, providing enhanced efficacy and patient satisfaction. These findings support the potential of AVC-based therapies as a standard treatment option.

Key Words: vitiligo, AVC therapy, tofacitinib.

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Vitiligo is an acquired skin disorder characterized by the progressive loss of melanocytes—the cells responsible for producing the pigment melanin.[1] Population-based studies have estimated the global prevalence of vitiligo to range between 0.1% and 2%, with some studies reporting peaks as high as 8%.[2-4] Vitiligo causes depigmented patches due to melanocyte loss, which can appear anywhere on the body. While not life-threatening, it significantly affects quality of life, leading to psychological distress, social stigma, and isolation. The unpredictable progression of lesions—ranging from rapid spread to years of stability—adds to the emotional burden, especially in cultures where stigma is prevalent.[1,5] Despite being a condition that predominantly affects appearance, vitiligo's effects go beyond the skin. In some cases, it is associated with other autoimmune disorders, further complicating the management of the disease. Common comorbidities include thyroid disorders, diabetes, and even hearing loss.[5-8] Traditional vitiligo treatments focus on halting disease progression and restoring pigment, often using topical or systemic corticosteroids like prednisolone,[9] calcineurin inhibitors,[10] and phototherapy.[11] These therapies yield variable results, often requiring long treatment periods and are unsuitable for some patients. This has driven interest in targeted treatments addressing autoimmune dysfunction,[12] oxidative stress,[13] and genetic predisposition.[14,15] Advances in understanding vitiligo's autoimmune mechanisms have led to novel therapies, including Janus Kinase (JAK) inhibitors targeting immune pathways against melanocytes.[16-19] Ruxolitinib, a topical JAK inhibitor, is approved in the U.S. and Europe for treating vitiligo, showing effectiveness in restoring skin pigmentation.[20-22] Recent advances in vitiligo treatment include the ReCell system, which uses a patient's healthy skin cells to stimulate repigmentation. This method involves harvesting and applying noncultured autologous epidermal cells to depigmented areas. Studies show it is a safe, simple, and cost-effective alternative to cultured melanocyte methods.[23-25] Also, microneedling and mesotherapy are emerging treatments for vitiligo. Microneedling stimulates melanocyte regeneration through micro-injuries, often combined with agents like tacrolimus for improved outcomes. Mesotherapy involves injecting active substances into the skin. Both minimally

invasive methods are safe, cost-effective, and show promise for managing refractory vitiligo lesions.[26-28] These developments mark a shift towards targeted therapies for vitiligo, addressing its underlying causes. Ongoing research suggests these treatments will provide more effective and personalized options for those affected. In this study, we compared the effects of a new combination therapy called Anti-Vitiligo Cream (AVC), which included stem cells and agents that stimulate and enhance melanin production in melanocytes, with other treatment methods for vitiligo.

Methods and Materials

Study design and population

This study was a randomized, interventional study designed to evaluate the efficacy of a novel combination therapy, AVC, which contains stem cells with melanin stimulator and enhancer agents, compared to common treatments for vitiligo. A total of 1,000 patients diagnosed with vitiligo were enrolled in the study, with recruitment beginning in 2020. The participants were selected based on inclusion criteria that included a confirmed diagnosis of vitiligo through skin biopsy, age between 7 and 70 years, and no history of other autoimmune disorders. Exclusion criteria involved pregnant or breastfeeding women, patients with active infections, or those with prior treatment that could confound the results.

The participants were randomly assigned into five groups, each comprising 200 patients. The first group received oral prednisolone, the second group was administered only Tofacitinib, the third group received Ruxolitinib, the fourth group was treated with AVC, which is a combination of stem cells along with melanin stimulators and enhancers, and the fifth group received a combination of AVC and oral Tofacitinib. All participants were followed for a duration of two years to assess the outcomes of the treatments.

Procedures and data gathering

Patients were enrolled following an informed consent process, and baseline data were collected at the start of the study. This included detailed demographic information, disease history, clinical vitiligo characteristics, and prior treatments. Over the course of the study, each participant underwent regular follow-up visits at 2-month intervals for two years. During these visits, the following data were gathered: i) assessment of disease progression or improvement using the Vitiligo Area Scoring Index (VASI); ii) monitoring of side effects or adverse reactions to the treatments; iii) blood tests to assess organ function and detect potential drug-related complications; iv) patient-reported outcomes to evaluate quality of life, including questionnaires related to emotional well-being and the impact of vitiligo.

In addition to the clinical evaluations, photographs were taken at each visit to visually assess changes in vitiligo lesions. The study design aimed to ensure that all data were gathered consistently across the five treatment groups, allowing for direct comparisons of treatment efficacy.

Data analysis

The data were analyzed using descriptive statistics to summarize the age, gender, treatment outcomes, and patient satisfaction within each group. To evaluate treatment effectiveness, chi-square tests were conducted for categorical variables such as treatment outcomes. ANOVA was employed to compare patient satisfaction scores across treatment groups, while pairwise correlation analysis assessed the relationships between age, patient satisfaction, and treatment outcomes. Multivariate linear regression was performed to identify predictors of patient satisfaction, including age, gender, treatment group, and treatment outcome.

All statistical procedures were carried out using Stata version 18 (StataCorp LLC, College Station, TX), with significance levels set at $p < 0.05$ for all tests. Missing data were excluded from the analysis, and results are reported as means±standard deviation for continuous variables, medians with interquartile ranges for non-normally distributed data, and frequencies with percentages for categorical variables.

Ethical considerations

This study was conducted in accordance with the Declaration of Helsinki.[29] All participants provided written informed consent before enrollment, acknowledging their understanding of the study procedures, potential risks, and the voluntary nature of participation. The study ensured participant confidentiality, with personal data stored securely and anonymized for analysis. Additionally, the study adhered to guidelines for the ethical management of adverse events, and patients were monitored closely throughout the study for any serious side effects.

Results

This study compared the efficacy of common treatments for vitiligo with a treatment created by Dr. Shahzad Shirzad called AVC (Anti-Vitiligo Cream) across five groups, with each group comprising 200 patients. The treatments included oral prednisolone (Group 1), Tofacitinib alone (Group 2), Ruxolitinib (Group 3), AVC (a combination of stem cells and melanin stimulators/enhancers; Group 4), and AVC combined with oral Tofacitinib (Group 5). Outcomes were assessed over a two-year follow-up, focusing on treatment efficacy, patient satisfaction, and response consistency across age groups.

Table 1 summarizes the primary outcomes of the treatments. The AVC-based therapies (Groups 4 and 5) exhibited significantly higher efficacy, with mean outcome scores of 84.5±9.2 (Group 4) and 89.1±7.5 (Group 5), compared to 65.3±14.8 for Group 1. Group 5 had the highest treatment efficacy among all groups ($p < 0.001$). The uniformity in outcomes across groups is further illustrated in the bar chart (Figure 1), which shows comparable proportions of patients achieving positive outcomes across all groups.

Patient satisfaction, as shown in Table 2 and Figure 2, followed a similar trend, with Group 5 reporting the highest median satisfaction score of 90 (IQR: 85–95). Group 4 followed with a median score of 85 (IQR: 78–92). Group 1 had the lowest satisfaction scores (median: 45, IQR: 30–55), highlighting the limitations of prednisolone as a monotherapy. Statistical analysis revealed significant differences in satisfaction across groups ($p < 0.001$).

The distribution of patient satisfaction by treatment group (Figure 2) underscores the variability in perceived outcomes. Groups 4 and 5 not only had higher median satisfaction but also narrower interquartile ranges, suggesting more consistent results. Conversely, Group 1 showed the broadest variability in satisfaction, indicating a heterogeneous response among patients.

The relationship between age and satisfaction is presented in Table 3 and Figure 3. Younger patients demonstrated generally higher satisfaction scores regardless of treatment type, with satisfaction scores decreasing slightly with increasing age ($p < 0.05$). This trend was most notable in Groups 4 and 5, suggesting that combination therapies may provide enhanced benefits for younger patients.

Table 4 presents the results of a multivariate linear regression assessing predictors of patient satisfaction. The analysis revealed that treatment group and treatment outcomes were significant predictors of satisfaction ($p < 0.001$). Patients in Group 5 had the highest satisfaction (coefficient=17.78, $p < 0.001$), followed by Group 4 (coefficient=13.22, $p < 0.001$). Positive treatment outcomes also strongly predicted satisfaction, with a coefficient of 57.30 ($p < 0.001$). In contrast, age and gender were not significant predictors ($p > 0.05$).

AVC-based therapies (Groups 4 and 5) consistently outperformed other treatments in both efficacy and patient

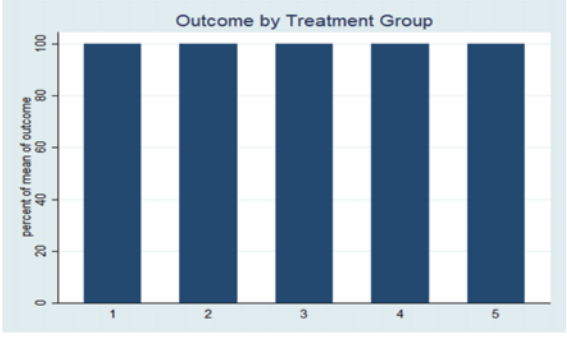

Figure 1. *Proportion of patients achieving positive treatment outcomes across groups.*

Table 1. *Treatment outcomes by group.*

Treatment group	Total participants	Treated (%)	Untreated (%)
Group 1	200	40 (20)	160 (80)
Group 2	200	52 (26)	148 (74)
Group 3	200	61 (30.5)	139 (69.5)
Group 4	200	87 (43.5)	113 (56.5)
Group 5	200	123 (31.5)	77 (38.5)

Table 2. *Patient satisfaction rates by treatment groups.*

Treatment Group	Mean satisfaction rate	SD
Group 1	32.10	19.18
Group 2	32.81	20.27
Group 3	33.03	19.95
Group 4	32.81	19.45
Group 5	31.06	20.69

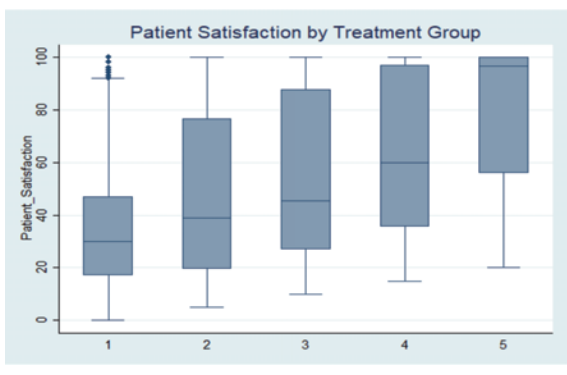

Figure 2. *Distribution of patient satisfaction rates by treatment groups.*

satisfaction. The combination of AVC with Tofacitinib (Group 5) achieved the best overall outcomes, as evidenced by higher satisfaction scores and greater treatment efficacy compared to other groups (p <0.001).
In summary, the findings demonstrate that AVC combined with Tofacitinib is the most effective and patient-preferred therapy for vitiligo. The results suggest the potential for AVC-based therapies to revolutionize treatment strategies for this condition, particularly when combined with immunomodulators like Tofacitinib.

Figure 3. *Relationship between patient satisfaction and age across treatment groups.*

Discussion

The findings of this study provide valuable insights into the advancing landscape of vitiligo treatment. Among the therapies evaluated, the novel AVC-based treatment created by Dr. Shirzad, particularly when combined with Tofacitinib (Group 5), demonstrated superior outcomes in both treatment efficacy and patient satisfaction. This underscores the potential of combination therapies to address the multifactorial nature of vitiligo, integrating both melanocyte stimulation and immune regulation.
Patient satisfaction emerged as a critical metric in this study, highlighting the psychological and emotional dimensions of vitiligo management. Groups 4 and 5 consistently achieved higher satisfaction scores, reflecting the effectiveness and acceptability of AVC-based therapies. The narrower interquartile ranges in these groups suggest a more uniform response among patients, in contrast to the variability observed in Group 1, which relied solely on oral prednisolone. These findings align with previous

Table 3. *Relationships between age, patient satisfaction, and treatment outcomes.*

Variables	Age	Satisfaction	Outcomes
Age	1.000	-0.087	-0.101
Satisfaction	Not applicable	1.000	0.907
Outcome	Not applicable	Not applicable	1.000

Table 4. *Predictors of patient satisfaction across treatment groups.*

Predictor	Coefficient	SE	P-value
Age	-0.01	0.03	0.748
Gender (female)	-0.92	0.98	0.350
Gender (child)	-0.37	1.43	0.794
Group 2	3.44	1.22	0.005
Group 3	9.40	1.23	<0.0001
Group 4	13.22	1.24	<0.0001
Group 5	17.18	1.27	<0.0001
Outcome (treated)	57.30	0.86	<0.0001

research suggesting that targeted therapies are better suited to managing refractory or progressive vitiligo lesions.[30,31] The regression analysis further highlighted the significance of treatment group and outcome as predictors of patient satisfaction, with age and gender showing no substantial influence. This finding reinforces the importance of treatment efficacy over demographic factors in determining patient-perceived success. The strong predictive value of positive treatment outcomes on satisfaction (coefficient=57.30, p <0.001) highlights the importance of developing therapies that effectively address both clinical outcomes.

Interestingly, younger patients tended to report higher satisfaction scores across all treatment groups, with this trend being most prominent in Groups 4 and 5. This may be attributed to the faster visible results in younger skin or differing expectations between age groups. The areas of the body that responded most rapidly to treatment were the face, genitalia, and axillary regions. Conversely, the hands, feet, and body segmental vitiligo exhibited the weakest response to treatment. Future studies should explore these age-related and body-region differences to optimize patient counseling and treatment strategies.

Despite the promising results, this study has limitations. The exclusion of patients with comorbid autoimmune disorders may limit the generalizability of the findings to broader populations. Additionally, while the two-year follow-up period provided significant insights into treatment efficacy and satisfaction, longer-term studies are needed to assess the durability of these outcomes and potential long-term side effects.

In conclusion, this study demonstrates the revolutionary potential of AVC-based therapies, particularly when combined with Tofacitinib, in the management of vitiligo. These findings pave the way for more personalized and effective treatment approaches, addressing both the clinical and emotional challenges faced by patients with vitiligo. Future research should aim to expand on these results, exploring the integration of novel therapies into standard treatment protocols and evaluating their long-term impact on patient quality of life.

List of abbreviations

AVC, Anti-Vitiligo Cream
VASI, Vitiligo Area Scoring Index
JAK, Janus Kinase
ANOVA, Analysis of Variance
IQR, Interquartile range calculator

Informed consent

All patients participating in this study signed a written informed consent form for participating in this study.

Patient consent for publication

Written informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

Availability of data and materials

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

Conflict of interest

The authors declare no potential conflict of interest, and all authors confirm accuracy.

Ethics approval

The Ethics Committee of Tehran University of Medical Sciences approved this study (IR.TUMS.REC.1398.072). The study is conformed with the Helsinki Declaration of 1964, as revised in 2013, concerning human and animal rights.

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