ORIGINAL ARTICLE

Effect of prednisone plus either adalimumab or cyclosporine on dermatological symptoms in Vogt-Koyanagi-Harada disease: Systemic outcomes from a randomized trial

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Background: Vogt-Koyanagi-Harada (VKH) disease causes vitiligo, poliosis, and alopecia.

Objective: To investigate the effect of prednisone plus either adalimumab or cyclosporine-based immunosuppression on VKH dermatologic disorders using ancillary data from a VKH eye disease trial.

Methods: Patients with VKH disease treated with individualized prednisone tapering (maximum daily dose, 40 mg; maximum duration, 6 months) were randomized to adjunctive adalimumab (N = 54) or cyclosporine (N = 56). Outcomes included changes in vitiligo, poliosis, and alopecia at the sixth month.

Results: Overall, there was a decrease in the percentage of alopecia but no change in the presence of vitiligo or poliosis at the sixth month. The adalimumab group showed no nominally significant differences in the percentage changes of each dermatologic manifestation but a greater reduction in the number of affected dermatologic categories compared with the cyclosporine group.

Limitations: This is a secondary analysis of a VKH eye disease trial. Six-month follow-up may not fully assess effects on vitiligo and poliosis.

Conclusions: In conjunction with prednisone tapering, both adalimumab and cyclosporine similarily improved alopecia but had no obvious effect on the presence of vitiligo or poliosis at 6 months. Adalimumab was associated with a greater decrease in the number of affected dermatologic conditions compared with cyclosporine. (J Am Acad Dermatol https://doi.org/10.1016/j.jaad.2025.02.081.)

Key words: adalimumab; cyclosporine; dermatologic symptoms; Vogt-Koyanagi-Harada disease.

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Patient consent: Not applicable.

IRB approval status: This trial was conducted in accordance with the provisions of the Declaration of Helsinki. Trial protocols were approved by The Ethics Committee of the First Affiliated Hospital of Chongqing Medical University.

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INTRODUCTION

Vogt-Koyanagi-Harada (VKH) disease is an autoimmune condition characterized by an immune response that mainly targets melanocytes.[1] With a prevalence rate of 3.2-5.3 per 100,000 persons, VKH disease is often under-recognized due to its rarity.[2] This condition triggers acute and chronic inflammation across melanocyte-rich organs, especially the eyes and skin.[3] Ocular involvement is the most predominant manifestation of VKH disease, for which treatment with corticosteroids and immunosuppressants has been effectively established.[4-8] However, almost one third of patients may develop additional dermatologic disorders, such as vitiligo, poliosis, and alopecia.[9,10] This presents a challenge to clinicians in effectively treating all aspects of the disease to improve patients' quality of life.[11] Currently, data are limited in guiding the management of integumentary symptoms in VKH disease. Only a few case reports documented the treatment of vitiligo, poliosis, and alopecia in VKH disease, which have resulted in diverse outcomes.[12-14] The benefits of immunosuppressive treatment for these dermatological disorders, as well as the differences in effectiveness among existing drugs, remain uncertain.

In a randomized trial, we directly compared the clinical effectiveness and safety of prednisone plus either adalimumab or cyclosporine for treating ocular lesions in VKH disease.[15] Adalimumab is a humanized antitumor necrosis factor antibody, while cyclosporine is a calcineurin inhibitor and felt to be a more broadly immunosuppressive agent than adalimumab. Both therapies demonstrated comparable effectiveness in improving visual acuity and controlling intraocular inflammation.[15] In addition to assessing ocular outcomes, this trial collected a range of predetermined data on systemic signs and symptoms throughout the study period. Here, we report the evolving profile of dermatologic findings in patients receiving prednisone plus either adalimumab or cyclosporine-based immunosuppression over a 6-month period.

CAPSULE SUMMARY

- This study investigated the evolving profile of dermatologic manifestations in Vogt-Koyanagi-Harada disease when treated with prednisone plus either adalimumab or cyclosporine.
- Alopecia in Vogt-Koyanagi-Harada disease can be improved through 6-month adalimumab or cyclosporine therapy, while prednisone tapering. Adalimumab appears superior to cyclosporine in decreasing the number of affected dermatologic conditions in Vogt-Koyanagi-Harada disease.

METHODS

Study design and participants

This study was a secondary analysis of predetermined data from a pragmatic, open-label, blinded-end point, noninferiority, randomized trial conducted at the First Affiliated Hospital of Chongqing Medical University, Chongqing, China. Trial protocols and the details of the trial design, eligibility criteria, and procedures have been published previously.[15] Briefly, eligible participants were those adults who were diagnosed with early (initial-onset acute) or late (chronic recurrent) phase VKH disease,[16] and had a disease that was in an active inflammatory state within the past 90 days or met the need for chronic prednisone tapering treatment at daily doses of 20 mg or higher.

Patients were randomly assigned in a 1:1 ratio to receive adalimumab 40 mg every 2 weeks or cyclosporine at a daily dose of 2 to 4 mg per kilogram of body weight. Randomization was stratified by disease phase (early vs late).[16,17] Adalimumab was administered without an 80-mg loading dose, which was in line with its use for VKH disease in some real-world settings and would make the study results more conservative.[18-20] The protocol allowed treating clinicians to personalize cyclosporine dosing within a specified range based on disease severity, which ultimately resulted in a median daily dose of 150 mg (interquartile range, 150-175) in this group. We selected such a maintenance dose range of cyclosporine based on the consideration of enhancing drug retention and patient compliance, as prior data suggested that this relatively low dose, when combined with prednisone, offered an acceptable long-term safety profile and effectiveness in treating VKH disease.[5] The prednisone regimen for the 2 groups has been described in detail elsewhere.[15] The prednisone taper therapy was individualized for each patient and was variable. In this cohort, the maximum daily dose of prednisone was 40 mg, with a gradual tapering period of up to 6 months. Over the 6-month trial period, the cumulative prednisone dose was balanced between the adalimumab and cyclosporine groups, with a median of 3395 mg (interquartile range, 2233-3636) versus 3350 mg (interquartile range, 2220-3611). Such doses were similar to the total glucocorticoid use over the same period in the placebo group of trials for some other immune-related diseases,[21-23] reflecting that the overall intensity of prednisone background therapy

Abbreviations used:

AUC: area under the curve
VKH: Vogt-Koyanagi-Harada

in our trial was largely consistent with what physicians commonly use in clinical practice.

In this study, we investigated dynamic changes in each form of dermatologic manifestations and compared the effectiveness of prednisone plus either adalimumab or cyclosporine in improving these manifestations. The predetermined case report form documented data on 7 core systemic features of VKH disease, including vitiligo, poliosis, alopecia, headache, meningismus, tinnitus, and dysacusis, at baseline and at the 2, 4, and 6-month visits.[17] All these manifestations were evaluated for presence or absence at each visit by blinded study nurses through a comprehensive physical examination. According to our definition, meningismus in VKH disease was indicated by the presence of at least neck stiffness during physical examination.

This trial was conducted in accordance with the provisions of the Declaration of Helsinki. Trial protocols were approved by The Ethics Committee of the First Affiliated Hospital of Chongqing Medical University. All patients provided written informed consent to take part. This trial is registered with Chinese Clinical Trial Registry, ChiCTR2100043061.

Study outcomes

All outcomes were adjudicated using data recorded in the predetermined case report form. Key outcomes of interest included the change from baseline to month 6 in the proportions of patients with vitiligo, poliosis, and alopecia, respectively, and the change from baseline in the number of affected categories of vitiligo, poliosis, and alopecia at month 6. In addition, the total area under the curve (AUC) for the number of affected dermatological categories was evaluated from baseline through months 2, 4, and 6. The total AUC accounted for the remitting and relapsing course of each manifestation, representing the burden of all dermatological involvements over the 6-month period.

Statistical analysis

Details of analytic methods are described in Supplementary Methods, available via Mendeley at https://data.mendeley.com/datasets/yzv3mrvwf4/1/. *P* values of less than .05 were regarded as nominally statistically significant. Analyses were performed with the use of IBM SPSS Statistics, version 25.0 (IBM Corp.), and masked to trial-group allocation.

RESULTS

Between February 23, 2021 and October 28, 2021, a total of 110 patients were enrolled and randomly assigned, with 54 to adalimumab and 56 to cyclosporine. Finally, 41 patients with adalimumab and 43 with cyclosporine completed the assessment at month 6 (Supplementary Fig 1, available via Mendeley at https://data.mendeley.com/datasets/yzv3mrvwf4/1/). The mean age in both groups was 40.3 (SD, 12.1) years, and 51 (46.4%) were women. Late-phase VKH disease was diagnosed in 83 (75.5%) patients, while the remaining 27 (24.5%) had early-phase disease. Baseline demographics and clinical characteristics, including age, sex, body mass index, disease phase, prednisone use, visual acuity, visual field, and quality of life, were balanced between the 2 treatment groups, as previously reported.[15] In this study, 86 (78.2%) patients had at least one of systemic manifestations at baseline. Specifically, vitiligo was present in 15 (13.6%) patients, poliosis in 37 (33.6%), and alopecia in 32 (29.1%). The distribution of all systemic manifestations in each group is depicted in Fig 1, *A*. The composition and number of these manifestations in both groups were largely similar at baseline (Fig 1, *A* and *B*).

In the entire cohort, the proportion of patients with alopecia decreased by 14.0%, 15.7%, and 20.4% at months 2, 4, and 6, respectively (Table I). No significant changes were observed in the presence of vitiligo or poliosis from baseline to month 6. The percentages of alopecia decreased almost synchronously over time in the adalimumab and cyclosporine groups, whereas those of vitiligo and poliosis did not, both of which were numerically higher than baseline at month 6 in the cyclosporine group (Fig 2, *A-C* and Supplementary Tables I-III, available via Mendeley at https://data.mendeley.com/datasets/yzv3mrvwf4/1/). There were no significant differences between the 2 treatment groups in the percentage changes of vitiligo (−1.7% vs 1.9%; difference, −3.5% [95% CI, −14.5% to 7.5%]), poliosis (−13.6% vs 6.5%; difference, −20.1% [95% CI, −46.6% to 6.4%]), and alopecia (−27.4% vs −13.6%; difference, −13.8% [95% CI, −34.0% to 6.5%]) from baseline to month 6 (Table II). Supplementary Tables IV-VII, available via Mendeley at https://data.mendeley.com/datasets/yzv3mrvwf4/1/, summarize changes in other systemic manifestations, showing that both groups had similar decreases in the percentage of headache, meningismus, tinnitus, and dysacusis at month 6.

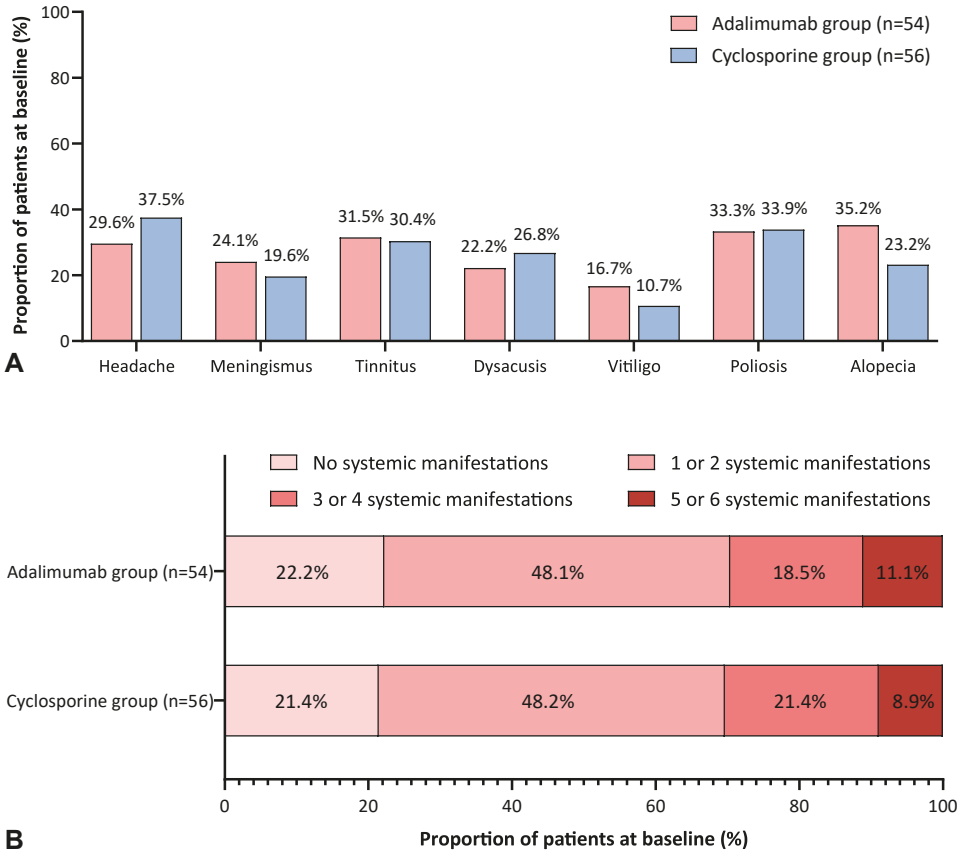

Fig 1. Baseline percentage (**A**) and total number (**B**) of systemic manifestations according to treatment group.

Table I. Overall percentages of dermatologic involvements according to visit point

Visit point*	Overall percentage (n = 110)†	Percentage change from baseline†	P value
Vitiligo			
Baseline	10.8% (5.1% to 16.5%)	-	-
Mo 2 visit	10.8% (4.5% to 17.1%)	0.0% (−5.1% to 5.1%)	.999
Mo 4 visit	11.9% (1.5% to 22.2%)	1.0% (−9.5% to 11.5%)	.833
Mo 6 visit	10.6% (3.8% to 17.4%)	−0.2% (−6.3% to 5.8%)	.938
Poliosis			
Baseline	30.3% (21.4% to 39.3%)	-	-
Mo 2 visit	19.9% (10.4% to 29.4%)	−10.5% (−22.5% to 1.5%)	.085
Mo 4 visit	18.7% (6.7% to 30.6%)	−11.7% (−25.4% to 2.0%)	.095
Mo 6 visit	25.3% (15.4% to 35.2%)	−5.1% (−17.8% to 7.6%)	.432
Alopecia			
Baseline	27.5% (19.3% to 35.7%)	-	-
Mo 2 visit	13.4% (5.1% to 21.8%)	−14.0% (−24.3% to −3.7%)	.008
Mo 4 visit	11.8% (1.8% to 21.8%)	−15.7% (−28.5% to −2.9%)	.018
Mo 6 visit	7.1% (0.2% to 14.0%)	−20.4% (−30.4% to −10.4%)	<.001

*Outcomes were analyzed across visit points using a binomial model with identity link function within the framework of generalized estimating equation, adjusted for treatment and disease phase. Data are from a multiple imputation analysis.
†Data are the least-squares means or mean changes derived from the predictions of regression models. Values are expressed as percentages with 95% confidence intervals.

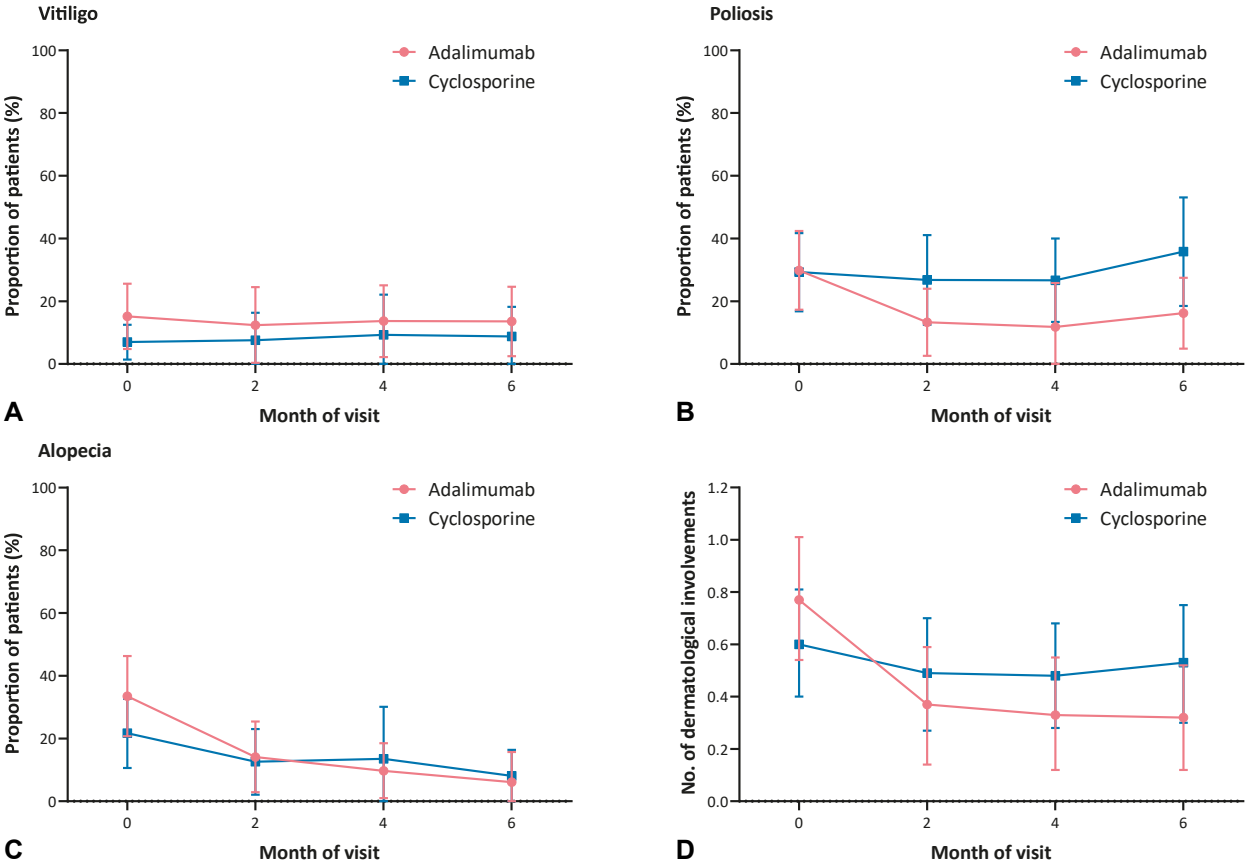

Fig 2. Percentages (**A-C**) and total numbers (**D**) of dermatologic involvements by treatment group across study visits. Data are expressed as percentages (**A-C**) or least-squares means (**D**) with 95% confidence intervals.

Table II. Change from baseline in the proportion of patients with each dermatologic involvement at month 6 visit

Outcome*	Adalimumab group (n = 54)†	Cyclosporine group (n = 56)†	Estimated treatment difference†	*P* value
Vitiligo	−1.7% (−8.3% to 5.0%)	1.9% (−6.7% to 10.4%)	−3.5% (−14.5% to 7.5%)	.514
Poliosis	−13.6% (−30.7% to 3.5%)	6.5% (−13.0% to 26.0%)	−20.1% (−46.6% to 6.4%)	.135
Alopecia	−27.4% (−42.7% to −12.0%)	−13.6% (−27.4% to 0.2%)	−13.8% (−34.0% to 6.5%)	.182

*Data were analyzed using a binomial model with identity link function within the framework of generalized estimating equation, with outcomes at each visit point as the response variable, and treatment, visit and treatment-by-visit interaction as fixed effects, adjusted for disease phase. Data are from a multiple imputation analysis.
†Data are expressed as percentages with 95% confidence intervals.

Collectively, the adalimumab group exhibited a greater reduction in the number of affected categories of vitiligo, poliosis, and alopecia in VKH disease compared to the cyclosporine group (−0.46 vs −0.08; difference, −0.38 [95% CI, −0.72 to −0.03]) from baseline to month 6 (Fig 2, *D* and Table III). The total AUC for the number of affected dermatological categories over the 6-month period was also lower in the adalimumab group than in the cyclosporine group (2.64 vs 3.60; difference, −0.96 [95% CI, −1.90 to −0.03]). Such a treatment effect on the total AUC remained unattenuated even after further adjustment for the cumulative prednisone dose over the 6-month period and body mass index (Supplementary Table VIII, available via Mendeley at https://data.mendeley.com/datasets/yzv3mrvwf4/1/). In addition, the subgroup analysis by disease phase showed directionally concordant estimates for the difference in total AUC (Supplementary Table IX, available via Mendeley at https://data.

Table III. Total number of affected categories of vitiligo, poliosis, and alopecia over the 6-month trial period

Outcome	Adalimumab group (n = 54)*	Cyclosporine group (n = 56)*	Estimated treatment difference*	P value
No.†				
Baseline	0.77 (0.54-1.01)	0.60 (0.40-0.81)	-	-
Mo 2 visit	0.37 (0.14-0.59)	0.49 (0.27-0.70)	-	-
Mo 4 visit	0.33 (0.12-0.55)	0.48 (0.28-0.68)	-	-
Mo 6 visit	0.32 (0.12-0.52)	0.53 (0.30-0.75)	-	-
Change in nos.†				
Baseline to mo 2 visit	−0.41 (−0.65 to −0.16)	−0.12 (−0.36 to 0.12)	−0.29 (−0.61 to 0.03)	.078
Baseline to mo 4 visit	−0.44 (−0.70 to −0.18)	−0.12 (−0.40 to 0.16)	−0.32 (−0.68 to 0.04)	.085
Baseline to mo 6 visit	−0.46 (−0.67 to −0.24)	−0.08 (−0.32 to 0.16)	−0.38 (−0.72 to −0.03)	.033
Total AUC for nos. from baseline through mo 6‡	2.64 (1.86-3.42)	3.60 (2.70-4.50)	−0.96 (−1.90 to −0.03)	.044

AUC, Area under the curve.
*Data are expressed as least-squares means with 95% confidence intervals. Data are from a multiple imputation analysis.
†Data were analyzed using the generalized estimating equation with identity link, with the numbers at each visit point as the response variable, and treatment, visit and treatment-by-visit interaction as fixed effects, adjusted for disease phase. Data are from a multiple imputation analysis.
‡The AUC for each visit interval was determined with the linear trapezoidal method, and the total AUC for the 6-month trial period was the sum of the AUCs in each time interval. Data were analyzed using an analysis of covariance model, with the total AUC as the response variable, treatment and disease phase as factors, and the number of affected dermatological categories at baseline as a covariate.

mendeley.com/datasets/yzv3mrvwf4/1/), with no interaction effects (P = .643 for interaction).

DISCUSSION

This analysis of a randomized trial showed an improvement in alopecia but no obvious effect on the presence of vitiligo or poliosis among patients with VKH disease after 6 months of treatment with prednisone plus either adalimumab or cyclosporine. In addition, adalimumab was associated with a greater reduction in the number of affected dermatological conditions compared to cyclosporine. These findings provide useful insights into effective treatment strategies for managing the dermatologic manifestations in VKH disease.

Although adequate doses of corticosteroids followed by slow tapering can treat VKH disease,[24,25] corticosteroid monotherapy has significant limitations, including systemic side effects and suboptimal effectiveness in preventing chronic progression.[26] Numerous studies have suggested the need to incorporate immunosuppressive agents as first-line treatment in managing both initial-onset acute and chronic recurrent VKH disease.[26-30] Our study fills a data gap in the use of adjunctive immunosuppressants with prednisone treatment for VKH disease. Given the proven benefits of prednisone combination therapy, we felt it both ethically and clinically unjustified to include a prednisone monotherapy arm.[6,27-29]

In this study, both adalimumab and cyclosporine groups showed notable decreases in alopecia at month 6, likely due to the direct effect of treatment, as alopecia in VKH disease rarely resolves without intervention. However, there was minimal decline in the percentage of vitiligo or poliosis. Previous observation suggested that complete reversal of these conditions occurred around 19.6 months after disease onset, serving as a sign of disease remission.[14] Our results were in line with the previous finding, indicating that 6 months of treatment with adalimumab or cyclosporine, combined with prednisone, may be insufficient for notable improvements in vitiligo or poliosis. Other treatments, such as ruxolitinib cream (a Janus kinase inhibitor)[31] and long-duration phototherapy,[32] have demonstrated benefits in repigmenting vitiligo lesions, but their effectiveness in VKH disease is yet to be validated. Analysis of skin biopsies revealed common T cell gene markers in VKH disease and vitiligo, such as the upregulation of IFNG, tumor necrosis factor, and IL15,[33] suggesting a shared pathogenesis and the potential for similar treatment approaches. Current literature lacks data comparing the efficacy of oral JAK inhibitors or infliximab (another antitumor necrosis factor drug) with adalimumab or cyclosporine in VKH disease, which warrants further investigations.

Although no significant differences were found in the percentage changes of alopecia, vitiligo, and poliosis between the cyclosporine and adalimumab groups at 6 months, all point estimates favored the adalimumab group. Aggregating the number of affected dermatologic conditions increased statistical

power, indicating a superior outcome for the adalimumab group. Such a potential benefit from adalimumab was observed based on similar prednisone usage in both groups. Our trial was not designed to compare corticosteroid-sparing effects; instead, both groups followed a sufficient, gradually tapering prednisone protocol. Since adequate prednisone therapy has already contributed to the observed effectiveness in both groups, a more aggressive or rapid prednisone tapering would make treatment effects primarily driven by the immunosuppressants, potentially magnifying the differences between adalimumab and cyclosporine.

The baseline occurrence rate of each dermatologic manifestations ranged from 10% to 30%, which was largely similar to rates documented in other studies.[10,34] Of note, the presence of specific signs or symptoms may vary with the duration and stage of the disease. We overcame this challenge by adapting our methodological framework to account for disease phase, incorporating it into stratified randomization, covariate adjustments, and subgroup analysis. No modification of treatment effects was found with respect to disease phase.

The strength of this study lies in the use of data from a randomized controlled trial, with data on dermatologic conditions predetermined and prospectively collected. We applied numerous analytical methods to dynamically capture changes in manifestations across multiple follow-up time points. The sample size of this trial is noteworthy for a rare condition like VKH disease. Our analysis helps close the knowledge gap on how dermatological involvements in VKH disease respond to immunosuppressive treatment.

The findings of this study should be interpreted in light of specific limitations. First, the original trial was not specifically designed to assess dermatologic involvements, and this study is a secondary analysis. There might have been treatment effects that we did not detect. The 6-month observation period was originally chosen based on the anticipation of significant differences in ocular outcomes in VKH disease, not in dermatological outcomes. This period may be insufficient for evaluating some dermatological changes, such as vitiligo and poliosis. To increase study power and explore potential differences, we analyzed numerical changes in all dermatological involvements and calculated the total AUC, which revealed treatment differences between adalimumab and cyclosporine. Second, the lack of consensus on tapering protocols for prednisone in VKH disease may limit the generalizability of the findings and confound independent interpretation of comparative effectiveness between immunosuppressive treatments. While some studies required mandatory attempts at prednisone tapering to 7.5 mg daily or even less as soon as possible to assess the effectiveness of alternative treatments,[35-38] others recommend a gradual taper with a maintenance period of at least 6 months for treating VKH disease.[24,25] It is essential to note that, in contrast to clinical trials, the use of corticosteroids in real-world settings is highly personalized, with adjustments being dynamically made based on the level of disease activity. In our study, the mean cumulative dose of prednisone over 6 months remained below 3500 mg, which falls within the range commonly used by clinicians for immune-related diseases.[21-23] Third, the follow-up assessments were scheduled every 2 months, which may not be sensitive enough to detect changes fluctuating over days or weeks. However, considering that dermatological manifestations in VKH disease are not easily variable, this schedule may be appropriate. In addition, dermatologic manifestations were assessed solely for their presence or absence without using common scales or scores of disease severity and improvement. While this approach may obscure the true treatment effect, we chose it because existing severity scores for conditions like vitiligo or alopecia have not been validated for use in VKH disease. Assessing the presence or absence of manifestations provides a relatively objective and clinically meaningful binary endpoint, avoiding the subjectivity associated with severity measurements.

In conclusion, in conjunction with prednisone tapering, both adalimumab and cyclosporine similarily improved alopecia at 6 months but had no obvious effect on the presence of vitiligo or poliosis. Adalimumab was associated with a greater decrease in the number of affected dermatologic conditions compared with cyclosporine.

Conflicts of interest

None disclosed.

REFERENCES

1. Zhong Z, Su G, Kijlstra A, Yang P. Activation of the interleukin-23/interleukin-17 signalling pathway in autoinflammatory and autoimmune uveitis. *Prog Retin Eye Res*. 2021;80:100866.
2. Umazume A, Ohguro N, Okada AA, et al. Prevalence and incidence rates and treatment patterns of non-infectious uveitis in Japan: real-world data using a claims database. *Jpn J Ophthalmol*. 2021;65(5):657-665.
3. Du L, Kijlstra A, Yang P. Vogt-Koyanagi-Harada disease: Novel insights into pathophysiology, diagnosis and treatment. *Prog Retin Eye Res*. 2016;52:84-111.
4. Shen E, Rathinam SR, Babu M, et al. Outcomes of Vogt-Koyanagi-Harada disease: a subanalysis from a randomized clinical trial of antimetabolite therapies. *Am J Ophthalmol*. 2016;168:279-286.

5. Yang P, Ye Z, Du L, et al. Novel treatment regimen of Vogt-Koyanagi-Harada disease with a reduced dose of corticosteroids combined with immunosuppressive agents. *Curr Eye Res*. 2018;43(2):254-261.
6. Ono T, Goto H, Sakai T, et al. Comparison of combination therapy of prednisolone and cyclosporine with corticosteroid pulse therapy in Vogt-Koyanagi-Harada disease. *Jpn J Ophthalmol*. 2022;66(2):119-129.
7. Abu El-Asrar AM, Dosari M, Hemachandran S, Gikandi PW, Al-Muammar A. Mycophenolate mofetil combined with systemic corticosteroids prevents progression to chronic recurrent inflammation and development of 'sunset glow fundus' in initial-onset acute uveitis associated with Vogt-Koyanagi-Harada disease. *Acta Ophthalmol*. 2017;95(1):85-90.
8. Nakai S, Takeuchi M, Usui Y, et al. Efficacy and safety of adalimumab for exacerbation or relapse of ocular inflammation in patients with Vogt-Koyanagi-Harada disease: a multicenter study. *Ocul Immunol Inflamm*. 2022;24:1-9.
9. Yang P, Ren Y, Li B, Fang W, Meng Q, Kijlstra A. Clinical characteristics of Vogt-Koyanagi-Harada syndrome in Chinese patients. *Ophthalmology*. 2007;114(3):606-614.
10. Rao NA, Gupta A, Dustin L, et al. Frequency of distinguishing clinical features in Vogt-Koyanagi-Harada disease. *Ophthalmology*. 2010;117(3):591-599.e1.
11. Souto FMS, Missaka R, Magalhães BM, et al. Impact of inflammation and treatment on self-reported quality of life in patients with non-acute Vogt-Koyanagi-Harada disease (VKHD). *Ocul Immunol Inflamm*. 2021;29(1):137-148.
12. Subudhi P, Khan Z, Subudhi BNR, Sitaram S. Unusual case of vitiligo reversal in Vogt-Koyanagi-Harada syndrome. *Indian J Ophthalmol*. 2017;65(9):867-868.
13. Chuang CT, Huang PS, Chen SC, Sheu SJ. Reversible alopecia in Vogt-Koyanagi-Harada disease and sympathetic ophthalmia. *J Ophthalmic Inflamm Infect*. 2013;3(1):1869-5760.
14. Tabbara KF. Reversal of poliosis and vitiligo following Vogt-Koyanagi-Harada disease. *Arch Ophthalmol*. 2012;130(3):394-396.
15. Zhong Z, Dai L, Wu Q, et al. A randomized non-inferiority trial of therapeutic strategy with immunosuppressants versus biologics for Vogt-Koyanagi-Harada disease. *Nat Commun*. 2023;14(1):023-39483.
16. Yang P, Zhong Y, Du L, et al. Development and evaluation of diagnostic criteria for Vogt-Koyanagi-Harada disease. *JAMA Ophthalmol*. 2018;136(9):1025-1031.
17. Standardization of Uveitis Nomenclature (SUN) Working Group. Classification criteria for Vogt-Koyanagi-Harada disease. *Am J Ophthalmol*. 2021;228:205-211.
18. Couto C, Schlaen A, Frick M, et al. Adalimumab treatment in patients with Vogt-Koyanagi-Harada disease. *Ocul Immunol Inflamm*. 2018;26(3):485-489.
19. Takayama K, Obata H, Takeuchi M. Efficacy of adalimumab for chronic Vogt-Koyanagi-Harada disease refractory to conventional corticosteroids and immunosuppressive therapy and complicated by central serous chorioretinopathy. *Ocul Immunol Inflamm*. 2020;28(3):509-512.
20. Flores-Robles BJ, Blanco-Madrigal J, Sanabria-Sanchinel AA, Pascual DH, Demetrio-Pablo R, Blanco R. Anti-TNFα therapy and switching in severe uveitis related to Vogt-Koyanagi-Harada syndrome. *Eur J Rheumatol*. 2017;4(3):226-228.
21. Stone JH, Tuckwell K, Dimonaco S, et al. Trial of tocilizumab in giant-cell arteritis. *N Engl J Med*. 2017;377(4):317-328.
22. Jayne DRW, Merkel PA, Schall TJ, Bekker P. Avacopan for the treatment of ANCA-associated vasculitis. *N Engl J Med*. 2021;384(7):599-609.
23. Patel NJ, Jayne DRW, Merkel PA, et al. Glucocorticoid Toxicity Index scores by domain in patients with antineutrophil cytoplasmic antibody-associated vasculitis treated with avacopan versus standard prednisone taper: post-hoc analysis of data from the ADVOCATE trial. *Lancet Rheumatol*. 2023;5(3):e130-e138.
24. Fushitsu R, Ishibazawa A, Murono M, Kinouchi R. Outcomes of patients with acute Vogt-Koyanagi-Harada disease treated with intravenous corticosteroid pulse followed by the slow tapering of oral corticosteroid therapy. *Int Ophthalmol*. 2023;43(2):431-440.
25. Lai TY, Chan RP, Chan CK, Lam DS. Effects of the duration of initial oral corticosteroid treatment on the recurrence of inflammation in Vogt-Koyanagi-Harada disease. *Eye*. 2009;23(3):543-548.
26. Abu El-Asrar AM, Van Damme J, Struyf S, Opdenakker G. New perspectives on the immunopathogenesis and treatment of uveitis associated with Vogt-Koyanagi-Harada disease. *Front Med*. 2021;8:705796.
27. Papasavvas I, Tugal-Tutkun I, Herbort CP Jr. Vogt-Koyanagi-Harada is a curable autoimmune disease: early diagnosis and immediate dual steroidal and non-steroidal immunosuppression are crucial prerequisites. *J Curr Ophthalmol*. 2020;32(4):310-314.
28. Takeuchi M, Nakai S, Usui Y, et al. Adalimumab treatment for chronic recurrent Vogt-Koyanagi-Harada disease with sunset glow fundus: a multicenter study. *Saudi J Ophthalmol*. 2022;36(4):380-386.
29. Shinagawa M, Namba K, Mizuuchi K, et al. The steroid-sparing effect of adalimumab in the treatment for the recurrent phase of Vogt-Koyanagi-Harada disease. *Ocul Immunol Inflamm*. 2022;25:1-5.
30. Cuchacovich M, Solanes F, Díaz G, et al. Comparison of the clinical efficacy of two different immunosuppressive regimens in patients with chronic Vogt-Koyanagi-Harada disease. *Ocul Immunol Inflamm*. 2010;18(3):200-207.
31. Rosmarin D, Passeron T, Pandya AG, et al. Two phase 3, randomized, controlled trials of ruxolitinib cream for vitiligo. *N Engl J Med*. 2022;387(16):1445-1455.
32. Bae JM, Jung HM, Hong BY, Lee JH, Choi WJ, Kim GM. Phototherapy for vitiligo: a systematic review and meta-analysis. *JAMA Dermatol*. 2017;153(7):666-674.
33. Egbeto IA, Garelli CJ, Piedra-Mora C, et al. Case series: gene expression analysis in canine Vogt-Koyanagi-Harada/uveodermatologic syndrome and vitiligo reveals conserved immunopathogenesis pathways between dog and human autoimmune pigmentary disorders. *Front Immunol*. 2020;11:590558.
34. Tugal-Tutkun I, Ozyazgan Y, Akova YA, et al. The spectrum of Vogt-Koyanagi-Harada disease in Turkey: VKH in Turkey. *Int Ophthalmol*. 2007;27(2-3):117-123.
35. Writing Committee for the Multicenter Uveitis Steroid Treatment Trial, Follow-up Study Research Group, Kempen JH, Altaweel MM, Holbrook JT, Sugar EA, Thorne JE, Jabs DA. Association between long-lasting intravitreous fluocinolone acetonide implant vs systemic anti-inflammatory therapy and visual acuity at 7 Years among patients with intermediate, posterior, or panuveitis. *JAMA*. 2017;317(19):1993-2005.
36. Rathinam SR, Gonzales JA, Thundikandy R, et al. Effect of corticosteroid-sparing treatment with mycophenolate mofetil vs methotrexate on inflammation in patients with uveitis: a randomized clinical trial. *JAMA*. 2019;322(10):936-945.
37. Jaffe G, Dick A, Brézin A, et al. Adalimumab in patients with active noninfectious uveitis. *N Engl J Med*. 2016;375(10):932-943.
38. Nguyen QD, Merrill PT, Jaffe GJ, et al. Adalimumab for prevention of uveitic flare in patients with inactive non-infectious uveitis controlled by corticosteroids (VISUAL II): a multicentre, double-masked, randomised, placebo-controlled phase 3 trial. *Lancet*. 2016;388(10050):1183-1192.