

Vernal keratoconjunctivitis and life beyond the symptoms: a clinical and quality of life evaluation at a tertiary eye care hospital

Ceratoconjuntivite vernal e a vida além dos sintomas: uma avaliação clínica e da qualidade de vida em um hospital oftalmológico terciário

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How to cite:

Munir L, Tahir Q, Sharif N, Safdar N, Inayat M. Vernal keratoconjunctivitis and life beyond the symptoms: a clinical and quality of life evaluation at a tertiary eye care hospital. *Rev Bras Oftalmol.* 2026;85:e0036.

doi:

<https://doi.org/10.37039/1982.8551.20260036>

Keywords:

Conjunctivitis, allergic;
Keratoconjunctivitis; Quality of
life

Descritores:

Conjuntivite alérgica;
Ceratoconjuntivite; Qualidade
de vida

Received on:
August 15, 2025

Accepted on:
January 16, 2026

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Conflict of interest:
no conflict of interest.

Financial support:
no financial support for this work.

Data Availability Statement :
The datasets generated and/or analyzed
during the current study are included in the
manuscript.

Associate editor:

Renato Wendell Ferreira Damasceno
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ABSTRACT

Objective: To determine the clinical profile of pediatric patients with vernal keratoconjunctivitis and its impact on their health-related quality of life.

Methods: A cross-sectional study was conducted from April 2024 to July 2024 at a Tertiary Eye Care Hospital in Rawalpindi, including 55 diagnosed vernal keratoconjunctivitis patients. The clinical data were recorded on a pre-structured clinical proforma. The health-related quality of life was evaluated using the adapted questionnaire based on a 5-point Likert Scale. The statistical analysis was performed using Statistical Package for the Social Sciences (version 26) and Pearson's Chi-Squared test to determine the association between the clinical profile and health-related quality of life.

Results: Of 55 vernal keratoconjunctivitis patients, 42 (76.4%) patients were male. The mean age of the patients was 10.44 years with a standard deviation of 3.59. The primary symptoms reported were itching (100%), lacrimation (87.3%), and photophobia (87.3%). Most patients were classified as having a mild form (58.2%), and 52.7% exhibited the palpebral type of vernal keratoconjunctivitis. A statistically significant association between the severity of vernal keratoconjunctivitis and the scores of health-related quality of life (p-value <0.05) was observed.

Conclusion: The health-related quality of life was compromised among vernal keratoconjunctivitis patients, and the scores were considerably lower among patients with a severe type of vernal keratoconjunctivitis. Tailored and timely treatment can mitigate the negative impact of vernal keratoconjunctivitis on children's health-related quality of life.

RESUMO

Objetivo: Determinar o perfil clínico de pacientes pediátricos com ceratoconjuntivite vernal e seu impacto na qualidade de vida relacionada à saúde.

Métodos: Estudo transversal realizado de abril a julho de 2024 em um hospital terciário de cuidados oftalmológicos em Rawalpindi, incluindo 55 pacientes diagnosticados com ceratoconjuntivite vernal. A caracterização clínica dos pacientes foi registrada em um protocolo clínico pré-estruturado. A qualidade de vida relacionada à saúde foi avaliada por meio de um questionário adaptado, baseado em escala de Likert de 5 pontos. A análise estatística foi realizada utilizando o *Statistical Package for the Social Sciences*, versão 26. O teste do qui-quadrado de Pearson foi aplicado para determinar a associação entre o perfil clínico e a qualidade de vida relacionada à saúde.

Resultados: Dos 55 pacientes com ceratoconjuntivite vernal, 42 (76,4%) eram do sexo masculino. A média de idade foi de 10,44 ± 3,59 anos. Os sintomas mais frequentes foram prurido (100%), lacrimejamento (87,3%) e fotofobia (87,3%). A maioria dos pacientes foi classificada como portadora de forma leve da doença (58,2%) e 52,7% apresentaram o tipo palpebral de ceratoconjuntivite vernal. Observou-se associação estatisticamente significativa entre a gravidade da ceratoconjuntivite vernal e os escores de qualidade de vida relacionada à saúde (teste do qui-quadrado; p < 0,05).

Conclusão: A qualidade de vida relacionada à saúde mostrou-se comprometida entre os pacientes com ceratoconjuntivite vernal, sendo os escores consideravelmente mais baixos nos casos graves. O tratamento adequado e oportuno pode contribuir para reduzir o impacto da gravidade da doença sobre a qualidade de vida relacionada à saúde.

INTRODUCTION

Allergic conjunctivitis, commonly referred to as ocular allergy, encompasses several types, including atopic keratoconjunctivitis (AKC), vernal keratoconjunctivitis (VKC), contact blepharoconjunctivitis (CBC), and giant papillary conjunctivitis (GPC). Meanwhile, AKC, VKC, and CBC can be IgE-mediated types of ocular allergic reactions, whereas GPC is a non-allergic hypersensitivity reaction.^(1,2) Vernal keratoconjunctivitis is mainly chronic, bilateral, often asymmetrical, progressive, and can be potentially vision-threatening, affecting both children and adults. Palpebral/tarsal VKC presents as giant cobblestone papillae (if > 1 mm) on the upper tarsal plate. In limbal VKC, infiltration of the limbal conjunctiva occurs in the form of Horner-Trantas dots. In mixed VKC, both upper tarsal and limbal conjunctiva are affected.⁽³⁾

Current statistics have shown that Asia has the highest VKC prevalence due to its warm, dry climate and air pollution. Majorly affected regions include Japan, China, India, and Pakistan.⁽⁴⁾ The etiology of VKC involves the complex combination of ocular hypersensitivity reactions, mainly type 1 and type 4 reactions, that lead to the classical presentation of symptoms among affected patients. Typical symptoms of VKC include intense ocular itching (pruritus), redness, irritation, tearing, photophobia, mucous discharge, foreign body sensations, and ocular pain if the corneal surface is disturbed.⁽⁵⁾ The presentation of small papillae (size ranging from 1mm in diameter) to large cobblestone formation on the tarsal conjunctiva and the presence of limbal corneal infiltrates known as Horner-Trantas dots surrounding the cornea are the supporting diagnostic signs of VKC.⁽⁶⁾

In 2002, Leonardi et al. described the suffering of a VKC patient in the following words: "When you see a child suffering from VKC, you instantly feel the dearth in the knowledge of its pathogenesis that prevents you from adequately treating the signs and symptoms that will most likely ruin their childhood".^(7,8) Analyzing both the clinical presentations and HR-QoL can provide a comprehensive understanding of the disease to better identify the contributing factors of the disease, along with their relevant treatment and management strategies. Whereas most of the existing literature primarily focuses on the clinical aspects of the disease, with limited highlights of the psychosocial aspects of VKC.

This study aimed to determine the clinical profile of pediatric patients with VKC and its impact on their health-related quality of life (HR-QoL). As a result, the findings from this study can aid in developing individually

tailored treatments and interventions, as well as initiating public health programs to improve the HR-QoL among affected patients and their families, ultimately aiming to enhance their overall well-being.

METHODS

Study design and participants

Ethical approval for the study was obtained from the Institutional Review Board of the hospital (IRB # Opt-IRB/17-01; Approval Date: 15 Feb 2024). Voluntary participation was ensured by seeking verbal informed consent from the parents and guardians of the children. According to the current statistics, children are most commonly affected by the VKC in their early childhood, which leads to a decline in their HR-QoL.⁽⁹⁾ A cross-sectional study was conducted from April 2024 to July 2024, and included 55 children (5 to 17 years of age) presenting with VKC and no other systemic or ocular conditions. In the first phase, demographic data of the patients were obtained, followed by clinical evaluation. The diagnosis was made based on the typical presentation of signs and symptoms of VKC. All clinical findings were recorded on a pre-structured proforma based on the patient's and family's sociodemographic profile, ocular, and medical history, presenting symptoms, and clinical signs following a detailed slit-lamp examination. To evaluate the disease severity, a grading strategy defined by Bonini et al. was used.⁽¹⁰⁾ Visual acuity was assessed, and visual impairment was recorded according to the World Health Organization (WHO) classification for visual disabilities.⁽¹¹⁾

The study was reviewed and approved by the Evaluation Board Ethics Committee of the Hospital (Approval #: Opt-IRB/17-01, Approval Date: 15-02-2024).

Health-related quality of life assessment

In the second phase, the patients' HR-QoL was assessed using a questionnaire, which was adopted using two validated questionnaires, the Pediatric Quality of Life Inventory (PedsQL) and the Pediatric Eye Questionnaire (PedEyeQ).^(12,13) The reliability of the questionnaire was calculated to be 0.94 using Cronbach's alpha. Responses were recorded on a 5-point Likert scale (from zero to four). The quality of life was distributed into two groups based on mean score values (a score from 22 to 62 shows poor HR-QoL and a score > 62 shows good HR-QoL). Pilot testing was conducted to identify any problem areas in the study tool or methodology and improve the quality of this research study.

Statistical analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS), version 26, and Microsoft Excel (2016). Frequencies and percentages were reported for categorical variables, and continuous variables, mean, standard deviation, and range were reported. To find out the association between the outcome variable and independent variables, Pearson's chi-squared test for independence was used. The test was applied to all the applicable independent and outcome variables. For inferential results, a 95% confidence level and a statistical significance of $p < 0.05$ were used for analysis.

RESULTS

The majority of the participants in the study were males (76.4%). Meanwhile, 56.4% of the participants were present in the age group between 5 and 11 years of age. Nearly 50% of the patients had Mild/no visual impairment (Table 1).

Table 1. Demographic information

Gender	
Male	42 (76.4)
Female	13 (23.6)
Age	
5-11	31 (56.4)
12-17	24 (43.6)
Education level	
Primary school	38 (69.1)
Secondary school	17 (30.9)
Area	
Urban	28 (50.9)
Rural	27 (49.1)
WHO classification of visual impairment	
Mild/No VI ($\geq 6/18$)	40 (72.7)
Moderate VI ($< 6/18-6/60$)	13 (23.6)
Severe VI ($< 6/60-3/60$)	2 (3.6)

WHO: World Health Organization.
Results expressed as n (%).

The most frequently presented symptoms were intense ocular itching (100%), followed by lacrimation (87.30%), photophobia (87.30%), foreign body sensation (83.60%), red eyes (76.40%), and burning sensation (62%). On sign-wise evaluation, congestion (85.5%), palpebral papillary hypertrophy (90.9%), Horner-Trantas dots (38.2%), limbal conjunctival edema (49.1%), discharge (61.8%), corneal erosions (21.8%) were present. Based on type, 52.7% of patients had palpebral VKC. The most commonly presented corneal complication associated with VKC was keratoconus (27.30%) (Figure 1).

Based on the type, 52.7% of patients presented with palpebral and 38.2% presented with a mixed type of VKC. Furthermore, 58.2% of patients had a mild type of VKC (Table 2).

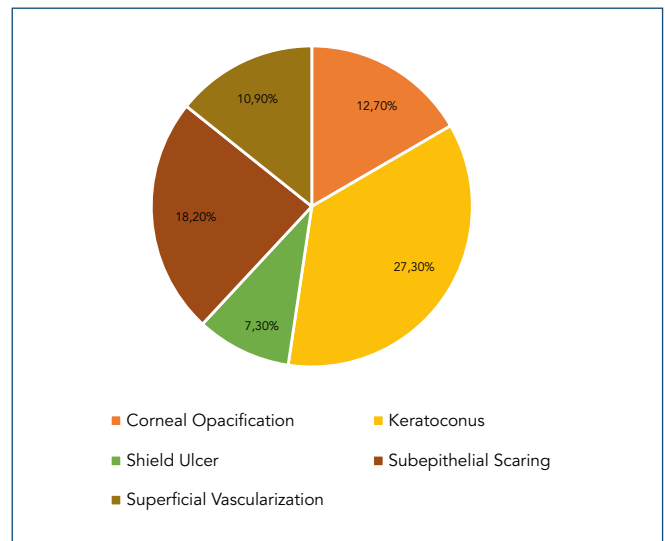


Figure 1. Corneal complications of vernal keratoconjunctivitis

Table 2. Type and severity of vernal keratoconjunctivitis

Type and severity	n (%)
Type of VKC	
Limbal VKC	5 (9.1)
Palpebral VKC	29 (52.7)
Mixed VKC	21 (38.2)
Severity of VKC	
Mild	32 (58.2)
Moderate	4 (7.3)
Severe	19 (34.5)

VKC: vernal keratoconjunctivitis.
Results expressed as n (%).

Functional vision was a highly affected domain in the HR-QoL of patients. Emotional functioning was affected mainly in terms of anger. Patients reported disturbance in their school functioning, affecting their levels of concentration and vision-related tasks in their school settings. In contrast, social functioning was least affected, which reflected the ability of patients to maintain their social relationships. The data shows that VKC puts a noticeable burden on the patient's families, increasing their caregiving duties and emotional stress (Table 3).

No statistically significant association was observed between the patients' sociodemographic characteristics and their quality of life. Pearson's Chi-Square test results have shown a statistically significant association of HR-QoL with visual impairment, onset of symptoms, frequent changes in glasses prescription, signs, symptoms, and disease severity (Table 4).

DISCUSSION

This study was designed to analyze the clinical profile and HR-QoL of patients diagnosed with VKC, and determine the association between the demographic status, type,

Table 3. Health-related quality of life among vernal keratoconjunctivitis patients

Quality of life assessment	Never	Almost never	Sometimes	Often	Almost always
Physical functioning					
Walking/running	21 (38.2)	10 (18.2)	13 (23.6)	9 (16.4)	2 (3.6)
Participating in sports	17 (30.9)	3 (5.5)	9 (16.4)	12 (21.8)	14 (25.5)
Lifting something heavy	20 (36.4)	5 (9.1)	10 (18.2)	6 (10.9)	14 (25.5)
Doing chores around the house	21 (38.2)	3 (5.5)	16 (29.1)	8 (14.5)	7 (12.7)
Having pains or aches	20 (36.4)	6 (10.9)	12 (21.8)	7 (12.7)	10 (18.2)
Low energy levels	12 (21.8)	6 (10.9)	11 (20.0)	7 (12.7)	19 (34.5)
Emotional functioning					
Feeling afraid	33 (60.0)	6 (10.9)	5 (9.1)	3 (5.5)	8 (14.5)
Feeling sad	35 (45.5)	2 (3.6)	10 (18.2)	10 (18.2)	8 (14.5)
Feeling angry	6 (10.9)	2 (3.6)	4 (7.3)	13 (23.6)	30 (54.5)
Having Trouble sleeping	22 (40.0)	11 (20.0)	6 (10.9)	6 (10.9)	10 (18.2)
Worrying about what will happen	22 (40.0)	8 (14.5)	11 (20.0)	7 (12.7)	7 (12.7)
Social functioning					
Getting along with other children	40 (72.7)	4 (7.3)	5 (9.1)	6 (10.9)	0 (0)
Kids not wanting to be their friends	48 (87.3)	5 (9.1)	0 (0)	2 (3.6)	0 (0)
Getting teased by other children	41 (74.5)	4 (7.3)	7 (12.7)	3 (5.5)	0 (0)
Not able to do things that children of same age can do	19 (34.5)	7 (12.7)	8 (14.5)	14 (25.5)	7 (12.7)
School functioning					
Paying attention in class	8 (14.5)	8 (14.5)	14 (25.5)	9 (16.4)	16 (29.1)
Forgetting things	11 (20.0)	5 (9.1)	5 (9.1)	6 (10.9)	28 (50.9)
Keeping up with schoolwork	9 (16.4)	15 (27.3)	11 (20.0)	10 (18.2)	10 (18.2)
Missing school because of not feeling well	24 (43.6)	12 (21.8)	10 (18.2)	4 (7.3)	5 (9.1)
Missing school to go to the doctor	15 (27.3)	7 (12.7)	20 (36.4)	8 (14.5)	5 (9.1)
Functional vision					
Hard time seeing	5 (9.1)	10 (18.2)	11 (20.0)	11 (20.0)	18 (32.7)
Need help with certain things	25 (45.5)	7 (12.7)	9 (16.4)	4 (7.3)	10 (18.2)
Hard to concentrate	9 (16.4)	1 (1.8)	16 (29.1)	9 (16.4)	20 (36.4)
Seeing the board at school	5 (9.1)	1 (1.8)	16 (29.1)	9 (16.4)	21 (43.6)
Eyes get tired easily	0 (0)	1 (1.8)	8 (14.5)	8 (14.5)	38 (69.1)
Impact on parents and family (because of the child's eye condition)					
Feels different from other parents	16 (29.1)	9 (16.4)	10 (18.2)	8 (14.5)	12 (21.8)
Causes stress on the family	2 (3.6)	5 (9.1)	9 (16.4)	6 (10.9)	33 (60.0)
Difficult to ensure the child receives the help they need	30 (54.5)	8 (14.5)	6 (10.9)	5 (9.1)	6 (10.9)
Hard to be more involved in a child's schooling	36 (65.5)	6 (10.9)	6 (10.9)	4 (7.3)	3 (5.5)
Hard to attend frequent eye exams for the child	12 (21.8)	6 (10.9)	13 (23.6)	4 (7.3)	20 (36.4)
Bothers that child's eye condition causes physical discomfort	13 (23.6)	5 (9.1)	6 (10.9)	14 (25.5)	17 (30.9)
Worry that child's eye condition is getting worse	1 (1.8)	3 (5.5)	10 (18.2)	9 (16.4)	32 (58.2)
Worry about the treatment child may need	18 (32.7)	14 (25.5)	12 (21.8)	3 (5.5)	8 (14.5)
Worry about child's eye condition affecting them socially	19 (34.5)	9 (16.4)	7 (12.7)	9 (16.4)	11 (20.0)
Worry about child's affected behavior	12 (21.8)	3 (5.5)	8 (14.5)	10 (18.2)	22 (40.0)

Results expressed as n (%).

and severity of VKC and their HR-QoL. The demographic statistics of the current study are consistent with those of previous studies. The male-to-female ratio in this study was found to be 3:1, which shows the male preponderance that confirms its global pattern of gender discrepancy. This perfectly aligns with the previous study conducted by Minhas et al.⁽¹⁴⁻¹⁶⁾ This discrepancy between female-to-male ratio can be attributed to the long-term exposure of the male population to warm, dry climates, and allergens. Studies have also shown the role of male sex hormones, mainly estrogen and progesterone, in the exacerbation of VKC.⁽¹⁷⁻¹⁹⁾

The most frequent presenting symptoms reported by the individuals affected by VKC were itching, lacrimation, and photophobia, consistent with the previous studies that found itching, photophobia, lacrimation, and

redness as major presenting symptoms manifested by the patients.^(14,20,21) This study has shown that VKC is predominantly of the palpebral type, followed by the mixed type. A previous study conducted at the Ophthalmology Department of Jinnah Postgraduate Medical Center (JPMC) Karachi has shown similar results.⁽²²⁾ Some other studies argue that mixed and limbal variants of VKC are more prevalent in Asian and African regions, with some variation in geographical distribution.⁽²³⁾ This difference can be attributed mainly to the environmental factors and lack of individually tailored treatment options that progress to mixed types of VKC among patients.⁽²⁰⁾

The patients' Visual acuity was measured using the Snellen chart, and the patients' best corrected visual acuity (BCVA) was recorded. The WHO classification of low vision was used to analyze visual impairment. Fortunately,

Table 4. Relationship between health-related quality of life and study variables

Variables	Health-related quality of life (HR-QoL)		χ^2 (df)	p-value	
	Poor HR-QoL	Good HR-QoL			
Visual impairment					
Mild/no visual impairment	15 (37.5)	25 (62.5)	12.57 (1)	0.001*	
Moderate visual impairment	12 (92.3)	1 (7.7)			
Severe visual impairment	1 (50)	1 (50)			
Ocular history					
Onset of Symptoms	Day	8 (40.0)	12 (60.0)	6.44 (2)	0.04*
	Night	7 (38.9)	11 (61.1)		
	All-day	13 (76.5)	4 (23.5)		
Frequent changes in glasses prescription	Yes	16 (69.6)	7 (30.4)	5.51 (1)	0.029*
	No	12 (37.5)	20 (62.5)		
Ocular symptoms					
Burning sensation	Yes	24 (61.5)	15 (38.5)	6.06 (1)	0.02*
	No	4 (25.0)	12 (75.0)		
Constant blinking	Yes	23 (67.6)	11 (32.4)	9.98 (1)	0.002*
	No	5 (23.8)	16 (76.2)		
Previous history of mucous production	Yes	14 (82.4)	3 (17.6)	9.73 (1)	0.003*
	No	14 (36.8)	24 (63.2)		
Ocular signs					
Congestion	Yes	28 (59.6)	19 (40.4)	9.71 (1)	0.002*
	No	0	8 (100)		
Horner-Trantas dots	Yes	15 (71.4)	6 (28.6)	5.72 (1)	0.03*
	No	13 (38.2)	21 (61.8)		
Epithelial erosions	Yes	10 (83.3)	2 (16.7)	6.46 (1)	0.02*
	No	18 (41.9)	25 (58.1)		
Superficial vascularization	Yes	6 (100)	0	6.49 (1)	0.02*
	No	22 (44.9)	27 (55.1)		
Severity of VKC					
Mild VKC	11 (34.4)	21 (65.6)	9.48	0.006*	
Moderate VKC	2 (50)	2 (50)			
Severe VKC	15 (78.9)	4 (21.1)			

*p<0.05

VKC: vernal keratoconjunctivitis.

Results expressed as n (%).

most of the patients had mild/no visual impairment. According to the severity of VKC, the mild form was the most common presentation. Almost similar results have been reported in the study conducted in Yemen.⁽²⁴⁾

A significant statistical association was found between VKC and HR-QoL among the study population. Another study was conducted to determine the impact of allergic conjunctivitis on HR-QoL in children and their parents. The authors concluded that VKC/AKC had a negative association with HR-QoL, especially among pediatric patients.⁽¹²⁾ In an interview, Yi Ning, J. Strube MD, an associate professor of ophthalmology and pediatrics at Queen's University, Kingston, Canada, highlighted that the children with allergic conjunctivitis reported lower quality of life scores as compared to the children with vision-threatening diseases, such as glaucoma and congenital cataract. The possible reason might be due to the irritating symptoms caused by allergic conjunctivitis.⁽²⁵⁾

This study aimed to assess the quality of multiple aspects of a patient's life. The study findings have shown a considerable decline in the emotional, social, and school functioning of the patients. The results of the previous studies have also depicted a decline in the physical, social, and school functioning of the patients. As pediatric patients spend most of their time in an educational environment, this finding is a matter of concern regarding whether they have poor performance in school. Due to this disease, the decline in the social functioning of the patient can lead to limitations in their daily routine tasks, outdoor playing, interactions with friends, and free time.^(2,26)

VKC in its severe form can lead to moderate to severe visual impairment, and this can have a damaging and detrimental effect on the quality of life of individuals. This study has determined the strong correlation between visual impairment and the HR-QoL score of the patients. In a past study, the QoL in children with visual impairment (VI) was compared with an age-matched comparison group. Children with VI had lower QoL scores. This can have a bad impact on their developmental, cognitive, and educational abilities.⁽²⁷⁾

RECOMMENDATIONS

The findings of this study guide us to redirect the treatment options to a more holistic and proactive approach. Instead of just treating signs and symptoms, psychological burden should also be included with the help of counselors, psychologists or through the aid of school health services, particularly for children.

STUDY STRENGTHS AND LIMITATIONS

The strength of this study is that this is the first study conducted in the region of Pakistan that has found the association between VKC and HR-QoL. It highlights the adverse impact of VKC on the different aspects of HR-QoL of not only patients but also their families. Thus, it is challenging for the healthcare providers to deal with the allergic problems along their psychosocial impact by treating disease signs and symptoms while addressing their psychological needs side by side, the negative impact of the VKC on patients' HR-QoL.

There were certain limitations to this research. Randomized sampling was not done, and the sample size was small due to the short study duration. The age group of the study population did not include the adult patients; only the pediatric age group was considered as the target study population.

CONCLUSION

This study has highlighted both the clinical and psychosocial impact of vernal keratoconjunctivitis on patients and their families. Male preponderance was observed in the current and previous studies. A significant association of health-related quality of life with the severity of vernal keratoconjunctivitis was found. Social, emotional, and school functioning were the majorly affected domains reported by the patients. A significant association of visual impairment in vernal keratoconjunctivitis with health-related quality of life shows the negative impact of the decline in vision on the patients' quality of life. To achieve long-term treatment outcomes, it is essential to incorporate regular screenings and quality of life assessments to develop early intervention strategies tailored to each patient's individual needs.

AUTHORS' CONTRIBUTION

All authors have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, data acquisition, analysis, writing, and revision of the manuscript.

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