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Ocular Manifestations of Pediatric Rheumatic Diseases

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ABSTRACT
Background: Juvenile idiopathic arthritis (JIA) is prevalent among children below the age of 16 years and is characterized by persistent stiffness, swelling, and joint pain. Certain types of JIA can lead to severe complications such as growth retardation, ocular inflammation, and joint impairment. Eye problems can be observed in children with JIA, either as an outcome of the ailment or infrequently, as an adverse impact of certain medications. The capacity of the eye to differentiate shapes and the particulars of objects at a specific distance is denoted by visual acuity (VA).
Objective: The aim of the current work was to find out visual acuity abnormalities in Juvenile Idiopathic Arthritis.
Patients and Methods: This study included a total of 30 JIA patients and 20 age and gender matched controls, attending at Department of Rheumatology, Rehabilitation and Physical Medicine and Ophthalmology, Faculty of medicine, Benha University Hospitals, Egypt. CBC, ANA, ESR, CRP, KFTs, and LFTs were done. Ophthalmological examination of best corrected visual acuity (BCVA) by A logMAR chart and refractive errors assessment were done.
Results: JIA group was classified according to diagnosis to 25 oligo-articular JIA (83%), 3 poly-articular JIA (10%) and 2 systemic onset JIA (6.7%). Visual acuity was affected in 7 patients of Oligo articular JIA (28.0%) and none of Poly articular and systemic onset subtypes were affected. Myopia was detected in 5 of oligo-articular JIA (20%).
Conclusion: It could be concluded that visual acuity abnormalities and refractive errors in JIA represent an important issue which requires frequent ophthalmological examination of JIA patients.
Keywords: Ocular, Pediatric, Rheumatic Diseases.

INTRODUCTION

Childhood rheumatic diseases encompass a wide range of illnesses, with the prevalent ones being Kawasaki disease, juvenile idiopathic arthritis, systemic lupus erythematosus, juvenile dermatomyositis, and rheumatic fever. Although they vary greatly, these diseases share a common factor of immune-dysregulation, as evidenced by their comparable historical, physical, and laboratory data, as well as their similar treatment methods [(1, 2)].

Juvenile idiopathic arthritis, which was previously called juvenile rheumatoid arthritis, is prevalent among children below 16 years old. It is characterized by enduring joint pain, swelling, and rigidity. While some children might suffer from its symptoms for several months, others may experience them for numerous years [(3)]. Certain forms of juvenile idiopathic arthritis may lead to severe complications including hindered growth, joint impairment, and inflammation of the eyes. The primary objective of treatment is to manage pain and inflammation, enhance functionality, and avert harm [(4, 5)].

The ability of the eye to differentiate shapes and object details at a specific distance is measured by visual acuity (VA). To identify any alterations in vision, it is essential to evaluate VA consistently. A prevalent eye condition is known as a refractive error, which arises when the eye fails to properly focus the visual stimuli from the surrounding environment. This condition leads to the blurring of images, which can become severe enough to impair vision [(6, 7, 8)].

It is crucial to have a strong partnership between the rheumatologist and ophthalmologist to avoid potentially catastrophic consequences. The management of ocular inflammation in a developing child requires a delicate balance between using therapeutic methods like topical steroids, systemic immunosuppressants, and biologics while also considering their adverse effects [(9)].

The aim of this study was to find out visual acuity abnormalities in Juvenile Idiopathic Arthritis.

PATIENTS AND METHODS

This study included a total of 30 JIA patients and 20 age and gender matched controls, attending at Outpatient clinics, Departments of Rheumatology, Rehabilitation and Physical Medicine and Ophthalmology, Faculty of medicine, Benha University Hospitals, Egypt.

Participants were allocated into two groups; **Group 1**, consisting of 30 patients diagnosed with JIA who were receiving treatment and **Group 2**, comprising 20 healthy controls.
The criteria for inclusion were based on the diagnosis of cases in accordance with the ILAR classification of JIA [(10)]. Conversely, the criteria for exclusion encompassed cases of septic arthritis, metabolic diseases, and neoplastic diseases.

Each case underwent:
A) Medical history taking.
B) Comprehensive clinical examination.

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C) Tests conducted in the laboratory, including CBC, ANA, ESR, CRP, KFTs, and LFTs.

D) Measurement of best corrected visual acuity (BCVA) during ophthalmological examination by A logMAR chart (Logarithm of the Minimum Angle of Resolution) is a chart consisting of rows of letters that is used by ophthalmologists to estimate visual acuity [(11)].

E) Assessing Refractive Errors in an Ophthalmologic Exam: Refractive errors were characterized as myopia with a spherical equivalent (SE) of ≥0.5 dioptres (D), hyperopia of ≥2.0 D, or anisometropia of ≥1.0 D. The presence of astigmatism was deemed significant at a magnitude of ≥1.0 D [(12)].

***Ethical Consideration*:**

This study was ethically approved by Benha University Research Ethics Committee. Written informed consent of all the participants' parents was obtained. The study protocol conformed to the Helsinki Declaration, the ethical norm of the World Medical Association for human testing.

Statistical Analysis

The data were tabulated, coded then analyzed using the computer program SPSS (Statistical package for social science) version 26. Descriptive statistics were calculated for the data in the form of Mean ± Standard deviation (±SD) and Number and percent. In the statistical comparison between the different groups, Student's t-test was used to compare between mean of two groups of numerical (parametric) data, for continuous non- parametric data, Mann-Whitney U-test was used for inter-group analysis. P value > 0.05 was considered statistically significant.

RESULTS

Table 1 shows that the patient and control groups did not exhibit any statistically significant differences as regard age and sex (P value >0.05).

Table (1): Demographic data of the study groups

		Cases (n=30)		Control (n=20)		p-value
Age / Y (Mean ± SD)		11.09	4.22	10.34	3.40	0.1
Sex No. &%)	female	19	63.3%	**9**	45%	0.2
	male	11	36.6%	11	55%	

Table 2 shows that Oligoarticular JIA accounted for 83.3% of the cases, while Polyarticular JIA accounted for 10.0%, and Systemic onset JIA accounted for 6.7%.

Table (2): Classification of JIA subtypes according to diagnosis

	No.	%
Oligo articular JIA	25	83.3
Poly articular JIA	3	10
Systemic onset JIA	2	6.7
Total	30	100.0

Table 3 shows that mean disease duration was 3 years (1.5), no of tender joints 38 (53.5), no of swollen joints 5 (7), fever 5 (7) and skin rash 3 (4.2) as presented in .

Table (3): Clinical data of JIA cases

Clinical findings	(N = 30)
Duration (years)	3±1.6
Tender joints	29 (96%)
Swollen joints	25 (83.3%)
Fever	4 (13.3%)
Skin rash	2 (6.7%)

Table 4 shows that the laboratory results indicated that the average ESR was 28.4 mm/h (±18.2), the mean hemoglobin level was 10.3 g/dL (±1.8), the mean WBC count was 9.2 x10°/L (±2.5), the average platelet count was 300.8 X10/L (±120.4), the mean serum creatinine level was 0.6 mg/dL (±0.8), and the average ALT and AST levels were 25.2 U/L (±20.6) and 26.5 U/L (±21.5), respectively, as presented in.

Table (4): Laboratory data of patients group

Laboratory data	Mean±SD
ESR (mm/h)	28.4± 6.4
HB (g/dL)	10.3±1.8
WBCs (mcL)	9.2±2.2
Platelets (mcL)	300.8±72.3
Creatinine (mg/dL)	0.6± 0.13
ALT (U/L)	25.2± 6.01
AST (U/L)	26.5±6.3

Table 5 shows that 28% of individuals with Oligo articular JIA exhibited impaired vision during examination, whereas neither Poly articular nor Systemic onset subtypes experienced any vision-related complications.

Table (5): Eye affection according to visual acuity

Visual acuity	No	%
Oligoarticular JIA (n=25)	7	28.0
Polyarticular JIA (n=3)	0	0
Systemic onset JIA (n=2)	0	0

Table 6 shows that 20% of oligoarticular JIA presented by myopia, wherease neither polyarticular nor systemic onset subtypes experienced any refractive errors.

Table (6): Eye affection according to refractive errors

	Emmetropia		Hypermytope		Myopic	
	No	%	No	%	No	%
Oligo articular JIA (n=25)	20	80	0	0.0	5	20
Poly articular JIA (n=3)	3	100	0	0	0	0
Systemic onset JIA (n=2)	2	100	0	0	0	0

DISCUSSION

Childhood chronic rheumatic disease known as JIA is prevalent among children. Those who suffer from JIA may experience a reduced quality of life and long-term disability. As a result, there has been a growing demand for evaluating their daily physical function as well as their visual function status [13, 14].

The presence of vision difficulties in certain forms of arthritis is typically linked to an autoimmune disorder, where the immune system becomes hyperactive and attacks different areas of the body, including organs and joints, resulting in inflammation. The involvement of the eyes is a frequent occurrence in pediatric rheumatologic illnesses, which suggests that these ailments should not be viewed as distinct issues but rather as complex disorders that impact multiple bodily systems [15].

It was demonstrated in the present study that a majority of the cases (83.3%) were identified as Oligoarticular JIA, whereas 10.0% were diagnosed with Polyarticular JIA and 6.7% were categorized as Systemic onset JIA.

In relation to the laboratory findings presented in our investigation, the average erythrocyte sedimentation rate (ESR) recorded was 28.4 mm/h (±18.2), the mean hemoglobin level was 10.3 g/dL (±1.8), the mean white blood cell (WBC) count was 9.2 X10°/L(± 2.5), the mean platelet count was 300.8X10°/L(±120.4), the mean serum creatinine level was 0.6 mg/dL(±.8), and the mean alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels were 25.2 U/L (±20.6) and 26.5 U/L(±21.5), respectively.

According to our research, 28.0% of individuals with Oligo articular JIA experienced an impact on their vision (BCVA), while neither the Poly articular nor the Systemic onset subtypes demonstrated any such effects. While **Thorne *et al.*** [16] stated that JIA patients had visual acuity impairments in 40.3% (20/50) and 42.2% (20/200) of cases, it is possible that the variation in sample size between their study and ours (6) contributed to this disparity.

According to the research conducted by **Taha and colleagues** [17]**,** individuals with JIA who had uveitis (n=7) did not exhibit any considerable variations in visual acuity (VA), physical health, refraction, VRQoL or intraocular pressure compared to those without uveitis (n=33).

In the recent research[17], 20% of oligoarticular JIA presented by myopia, wherease neither polyarticular nor systemic onset subtypes experienced any refractive errors. On the other hand, **Fledelius *et al.*** [18] found that Twenty-eight out of the 65 JIA (43%) had a negative refractive value of at least 0.37 D.

In a study of JIA patients over an extended period of time, **Fledelius and colleagues** [18] reported a significant inclination towards myopia in terms of average refraction. One possible justification for this observation is the fragility of scleral connective tissue during the initial stages of eye development owing to persistent inflammation.

Limitations: One significant constraint of this research is the comparatively limited count of youngsters affected by JIA.

CONCLUSION

It could be concluded that visual acuity abnormalities and refractive errors in JIA represent an important issue which requires frequent ophthalmological examination of JIA patients.

All organ systems, including the eye, are susceptible to the effects of systemic autoimmune disease, and this is also true for pediatric cases. Ocular symptoms may present themselves without any accompanying systemic symptoms or may not be in sync with them. Visual acuity abnormalities and refractive errors in JIA represent an important issue which requires frequent ophthalmological examination of JIA patients.

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REFERENCES

1. **Ferri F (2021):** Juvenile idiopathic arthritis. In: Ferri's Clinical Advisor 2021. https://www.springer.com/journal/40744?gclid=Cj0KCQiA6fafBhC1ARIsAIJjL8mKj3haZ41i0DxXYH3O5xXrZVSZtr9hj_aHVuoNaoEHqH3LRwdzRswaAtOdEALw_wcB
2. **National Institute of Arthritis and Musculoskeletal and Skin Diseases (2020):** Questions and answers about juvenile arthritis. https://www.niams.nih.gov/health_info/juv_arthritis/.

3. **Consolaro A, Ravelli A (2016):** Unraveling the phenotypic variability of juvenile idiopathic arthritis across races or geographic areas - key to understanding etiology and genetic factors? J Rheumatol., 43:683–685.
4. **Consolaro A, Giancane G, Schiappapietra B *et al.* (2016):** Clinical outcome measures in juvenile idiopathic arthritis. Pediatr Rheumatol Online J., 14:23. doi: 10.1186/s12969- 016-0085-5.
5. **Ravelli A, Martini A (2007):** Juvenile idiopathic arthritis. Lancet, 396(9563):767–778.
6. **Angeles-Han S, Griffin K, Lehman T *et al.* (2010):** The importance of visual function in the quality of life of children with uveitis. J Aapos., 14(2):163–168.
7. **Kotaniemi K, Savolainen A, Karma A *et al.* (2003):** Recent advances in uveitis of juvenile idiopathic arthritis. Surv Ophthalmol., 48:489-502.
8. **Mayer D, Beiser A, Warner A *et al.* (1995):** Monocular acuity norms for the Teller Acuity Cards between ages one month and four years. Invest Ophthalmol Vis Sci., 36(3):671-685.
9. **Giancane G, Consolaro A, Lanni S *et al.* (2016):** Juvenile idiopathic arthritis: diagnosis and treatment. Rheumatol Ther., 3(2):187–207.
10. **Petty R, Southwood T, Manners P *et al.* (2004):** International league of associations for rheumatology classification of juvenile idiopathic arthritis: second revision, Edmonton, 2001. J Rheumatol., 31:390-392.
11. **Anstice N, Thompson B (2014):** The measurement of visual acuity in children: an evidence based update. Clinical and Experimental Optometry, 97(1): 3-11.
12. **Angeles-Han S, Griffin K, Harrison M *et al.* (2011):** Development of a vision-related quality of life instrument for children ages 8–18 years for use in juvenile idiopathic arthritis-associated uveitis. Arthritis Care Res., 63(9):1254–1261.
13. **Foster C (2003):** Diagnosis and treatment of juvenile idiopathic arthritis-associated uveitis. Curr Opin Ophthalmol., 14:395-398.
14. **Thierry S, Fautrel B, Lemelle I *et al.* (2014):** Prevalence and incidence of juvenile idiopathic arthritis: a systemic review. Joint Bone Spine, 81(2):112–117.
15. **Moutakis K, Stigmar G, Hall-Linberg J (2004):** Using the KM visual acuity chart for more reliable evaluation of amblyopia compared to the HVOT method. Acta Ophthalmol Scand., 82(5):547–551.
16. **Thorne J, Gregory A, Daniel E *et al.* (2013):** Risk Factors for Loss of Visual Acuity among Patients with Uveitis AssociatedWith Juvenile Idiopathic Arthritis: The SITE Study. Ophthalmology, 120(1): 186–192.
17. **Taha R, Papadopoulou M, Zetterberg M *et al.* (2019):** Visual Function and Quality Of Life in a Cohort of Swedish Children with Juvenile Idiopathic Arthritis. Clin Ophthalmol., 13: 2081-91.
18. **Fledelius H, Zak M, Pedersen F (2001):** Refraction in juvenile chronic arthritis: a long-term follow-up study, with emphasis on myopia. Acta Ophthalmol Scand., 79(3):237–239.