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Causes and contemporary epidemiology of pediatric uveitis – a current review of the literature

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ABSTRACT
Uveitis is a group of diseases that are prevalent worldwide and can lead to serious ophthalmic complications that threaten vision. In the pediatric population, uveitis often presents as a systemic disease with a severe course. Early diagnosis of the causative disease entity for uveitis is often delayed due to the limited cooperation of pediatric patients. Although most cases of uveitis are idiopathic (40%), understanding the potential complications and multiorgan involvement facilitates multidisciplinary pediatric care and allows for earlier initiation of appropriate treatment, prevention and reduction of ocular complications, thus contributing to the normal development of the child. In the first part of this article, the authors reviewed the current literature (2018–2023) from PubMed and Google Scholar to present an updated perspective on the classification and causes of uveitis. Due to the lack of recent data on the prevalence of specific types of uveitis in the pediatric population in Poland, the authors referred to statistical analyses from 2001–2006.
Keywords: uveitis in children; etiology of uveitis; incidence of uveitis in children.

INTRODUCTION

Uveitis is an inflammatory disease of the iris, ciliary body and/or choroid that can lead to serious ocular and multiorgan complications. Pediatric uveitis accounts for 5–20% of all uveitis cases [1, 2]. It is more frequently associated with other organ involvement than in adults, necessitating a multidisciplinary approach [3]. Early diagnosis and recognition of uveitis are crucial to prevent visual deterioration and manage early and late complications such as glaucoma, cataract, vitritis, optic neuritis, and retinal vasculitis.

In children, the insidious onset of the disease, its asymptomatic nature, and the patient's difficulty in verbalizing symptoms or cooperating with examinations often complicate early diagnostic efforts and the establishment of a proper pathogenetic diagnosis. In addition, the absence of symptoms in other organs at the time of ocular changes complicates early diagnosis.

Uveitis is of increasing importance not only to ophthalmologists but also to other pediatric specialists, as more than 30 conditions are characterized by intraocular inflammation. Correct classification of the specific disease entity associated with uveitis is critical for therapeutic management and may aid in the diagnosis of concomitant systemic disease in approx. $^1/_3$ of patients with uveitic eye disease [4].

MATERIALS AND METHODS

The authors reviewed the current literature from 2018–2023 using PubMed and Google Scholar, presenting the latest perspectives on the classification and causes of uveitis. Due to the lack of recent data on the prevalence of specific types of uveitis in the pediatric population in Poland, the authors referred to statistical analyses from 2001–2006. [5].

Classification

The 2021 Standardization of Uveitis Nomenclature (SUN) working group criteria are instrumental in the classification of this multi-etiological disease and have been developed for the 25 most common types of uveitis [6]. The classification takes into account the anatomical location of the uveitis, such as anterior, intermediate, and posterior inflammation, inflammation of all segments of the uvea (panuveitis) and its etiology, categorizing uveitis into infectious, non-infectious, and idiopathic forms. Because of the wide range of etiological factors, only a selection will be described below (Tab. 1).

Infectious agents involved in the pathogenesis of childhood uveitis

Toxoplasmosis

Toxoplasmosis is one of the most common causes of infectious uveitis in children worldwide [7]. The causative agent, *Toxoplasma gondii*, is a protozoan with felines as its definitive hosts. The infection can be congenital or acquired. The prevalence varies by country, with estimates in the U.S. reaching 22.5% of the population over 12 years of age [8]. In Poland, the incidence among newborns is 0.1–0.2% (Department of Epidemiology NIZP-PZH). The prevalence of congenital toxoplasmosis in Poland was 0.00379% in 2019 and 0.00216% in 2020 (Department of Epidemiology NIZP-PZH). The risk of maternal transmission to the fetus increases with pregnancy duration: 17–25% in the first trimester, 25–54% in the second trimester, and 60–90% in the third trimester. Studies in Poland show that toxoplasmosis causes in about 21.8% of

TABLE 1. Uveitis – etiological factors [7]

Anterior
Idiopathic
Juvenile idiopathic arthritis
Juvenile ankylosing spondylitis
Juvenile psoriatic arthritis
Juvenile reactive arthritis
Sarcoidosis
Blau syndrome
Endothelial nephritis and uveitis
Kawasaki disease
Anterior uveitis herpetiformis of the eye
Uveitis associated with inflammatory bowel disease
Syphilis
Trauma
Foreign body
Intermediate
Idiopathic
Sarcoidosis
Ankylosing spondylitis
Lyme disease
Tuberculosis
Multiple sclerosis
Posterior
Idiopathic
Toxoplasmosis
Toxocariasis
Acute posterior multifocal pigmentary plaque epitheliopathy (APMPPE)
Sarcoidosis
Acute retinal necrosis
Syphilis
Eales disease
Panuveitis
Idiopathic
Behcet's disease
Sarcoidosis
Acute retinal necrosis
Toxoplasmosis
Fungal infection – candida
Vogt–Koyanagi–Harada disease
Herpetic uveitis of the eye
Tuberculosis

children with uveitis and is the most common cause of posterior segment uveitis, accounting for 43.8% of cases [5]. Incidence rates of toxoplasmic uveitis in other regions include: India – 10% [9], South Central Europe – 24.5% [10], Western Europe – 1.6–15.2% [11], and Mediterranean countries – 7.2–25% [2] of all pediatric uveitis cases of infectious etiology. Active lesions are characterized by focal necrotizing retinitis and choroiditis with focal unilateral vitreous inflammation (70–80%) and granulomatous anterior segment uveitis. The initial diagnosis is based on imaging of focal choroidal and retinal lesions during ophthalmoscopic examination, which may appear as single foci, multiple foci, or satellites around choroidal-retinal scars [7].

Herpes viruses

The prevalence of herpes virus-associated uveitis varies geographically. In Poland, it accounts for 1.56% of pediatric uveitis cases [5], 2% in the Middle East [2], and 1.2% in Western Europe [12]. Lesions typically present as unilateral uveitis and/or keratitis caused by herpes simplex virus (HSV) and varicella zoster virus (VZV). Acute herpes zoster infections usually manifest as non-granulomatous uveitis, whereas chronic cases tend to present as granulomatous uveitis. Common symptoms include inflammatory cells in the anterior chamber, iris atrophy, and increased intraocular pressure associated with blepharitis [13].

Cat scratch disease

Cat scratch disease (CSD), caused by *Bartonella henselae*, has domestic cats as its natural reservoir [14]. In Poland, ocular Bartonellosis is seen in about 5–10% of patients with CSD [15]. Prevalence rates of CSD in other regions are: Greece – 15%, Canada – 18.5%, and Chile – 13.3% [16]. Cat scratch disease co-occurs in about 36% of patients across all age groups [17]. Clinical manifestations include regional lymphadenopathy and, less frequently, a systemic course with ocular, parenchymal, or musculoskeletal involvement [18]. Infection can be blood-borne or occur through inoculation of bacteria into the conjunctiva. Parinaud's oculoglandular syndrome, involving the conjunctiva and regional lymph nodes, is the most common ocular manifestation, occurring in about 5% of cases. The clinical picture includes optic neuritis and a neuroretinitis (starry macula), though unilateral anterior uveitis is often an early sign [17]. It is important to inquire about the child's contact with animals during examination.

Ocular tuberculosis

The incidence of ocular tuberculosis varies, but ocular symptoms occur in approx. 1.5% of tuberculosis patients. The most common manifestations are tuberculous keratitis and uveitis. Tuberculous uveitis typically features granulomatous lesions, often bilateral, affecting the posterior or intermediate part of the uvea [19]. In the miliary form, small tubercles appear in the uvea as white or yellow inflammatory foci with necrosis or serous exudation. The inflammatory process often involves venous vessels, and massive tuberculous lesions may resemble a proliferative process. Complicated inflammation can cause subretinal neoplasia and inflammatory reaction in the vitreous body [20]. In Poland, uveitis of this etiology accounted for

4.69% of cases among children [5], in Italy – 3.5% of infectious uveitis [10], while in India and Middle Eastern countries – 3% and 2% of pediatric uveitis, respectively [9, 2]. Common symptoms such as fever, night sweats, history of exposure to tuberculosis, lymphadenopathy, and decreased immunity aid in diagnosis [21].

Fungal inflammation

Uveitis of Candida etiology typically occurs as an opportunistic infection, affecting the posterior part of the uveal membrane. Characteristic symptoms include "cotton wool balls" in the vitreous body [12] and creamy-white retinal lesions. Chronic intraocular inflammation is marked by increased infiltration in the vitreous body and abscess formation [22]. Premature infants, children hospitalized for long periods, those receiving intravenous drugs, malnourished, septicemic, and immunocompromised children are more prone to fungal inflammation [23]. Common symptoms in these patients include ocular pain, ciliary congestion, inflammatory secretions, decreased visual acuity, and often visual field opacities [24].

Infectious uveitis in immunocompromised patients

Immunocompromised patients are at higher risk for several types of infectious uveitis, including cytomegalovirus-induced retinitis, herpetic acute retinal necrosis, herpetic anterior segment uveitis, herpetic progressive outer retinal necrosis, endogenous fungal intraocular inflammation, and toxoplasmic retinitis and choroiditis. A Dutch study reported that uveitis was diagnosed in 46% of immunocompromised adults compared to 12% of immunocompetent patients. No specific data are available for children. In acquired immunodeficiency syndrome (AIDS) patients, cytomegalovirus retinitis and syphilis-associated uveitis are common, while non-AIDS related immunosuppression is often associated with intraocular HSV infections. Patients with generalized cancer have an increased incidence of sarcoidosis, while patients with diabetes mellitus are more prone to sarcoidosis and bacterial intraocular infections [25].

Non-infectious uveitis

Post-vaccination uveitis

Post-vaccination uveitis is an anterior uveitis with a mild course. Commonly reported associations between the occurrence of uveitis and vaccination include vaccines for hepatitis B, human papillomavirus (HPV), measles, mumps, and rubella (MMR), bacillus Calmette–Guérin (BCG), influenza, and varicella [26]. Recently (2020–2022), cases of uveitis after coronavirus disease-19 (COVID-19) vaccination have been reported in adult patients in the U.S., with an incidence of about 41.32% after the first dose; no similar data is available for Poland. The onset of vaccine-associated uveitis was significantly longer in patients receiving Moderna vaccines compared to other preparations [27]. In a Japanese study, the most common manifestation of COVID-19 vaccine-associated uveitis was Vogt–Koyanagi–Harada disease (VKHD). The non-small cell lung cancer (NSCLC) of the anterior segment has also been reported [28]. Despite these side effects, the overall vaccination schedule should not be compromised, and the relationship between inflammation and vaccination remains controversial [29].

Post-treatment uveitis

Post-treatment uveitis may be related to medications when the etiology of the uveitis remains unexplained, although medications are a rare cause of uveitis, accounting for less than 0.5% of cases [30]. Causes may include topical, systemic, or periocular preparations such as prostaglandin and brimonidine analogs, intravitreal injections of vancomycin, triamcinolone acetonide, or anti-vascular endothelial growth factor (anti-VEGF) agents, and systemic medications such as cidofovir, rifabutin, fluoroquinolones, bisphosphonates, immune checkpoint inhibitors, protein kinase inhibitors, and sulfonamides [31]. The mechanism may be toxic or immune-mediated, and the onset may be immediate or delayed up to several months after drug use [32]. In Poland, there are no data on the incidence of drug-induced uveitis in children.

Uveitis associated with juvenile idiopathic arthritis

Uveitis associated with juvenile idiopathic arthritis (JIA) is a diverse group of chronic arthritis in which uveitis is the most common extra-articular manifestation [33]. Currently, there are 7 subtypes of JIA based on the International League of Associations for Rheumatology (ILAR) criteria [34]. In Poland, uveitis affects 10–20% of children with JIA [33], while in France it represents 25.6% and in Finland 61% of pediatric uveitis cases, making it the most commonly diagnosed cause in these regions [35, 36]. Prevalence in other regions includes Korea – 14.8% [3], China – 8.1% [37], Jordan – 35.5% [38] and Lebanon – 12% [2]. The subtypes of JIA can be divided into those with low and high risk of uveitis. High-risk subtypes include spondyloarthritis, rheumatoid factor-negative polyarthritis, tendonitis-related arthritis, and juvenile psoriatic arthritis. The most common subtype associated with uveitis in Italy and Turkey is sclerosing JIA [39]. Juvenile idiopathic arthritis is the most common identifiable cause of anterior segment uveitis in children (50–80%) [7, 40], presenting as chronic non-malignant uveitis. Ophthalmic examination reveals inflammatory cells, protein deposits in the anterior chamber, saddle-shaped corneal deposits and iris nodules. Risk factors for ocular involvement include Caucasian race, female sex, young age, presence of antinuclear antibodies, and absence of rheumatoid factor (RF) [41]. Routine screening is critical because symptomatic cases often indicate serious complications: band keratopathy, posterior adhesions, cataracts, glaucoma, hypotony, macular edema, epithelial membrane, and optic disc edema. Complications are more common in the sclerosing subtype of JIA, with a mean age of onset of first ocular complications of 6 ±2.7 years [42]. Complications at diagnosis are highly predictive of permanent vision loss. Genetic determinants of uveitis in JIA include the risk alleles HLA-DRB1*11 and *1343, HLA-DQB1*04:02, and HLA-DRB1*08:01 [43, 44]. Six single nucleotide polymorphism (SNP) variants (PRM1/rs11074967, JAZF1/rs73300638, IRF5/rs2004640, MEFV/rs224217, PSMA3/rs2348071 and PTPN2/rs7234029) have also been shown to be associated with uveitis in JIA [45].

Sarcoidosis

Sarcoidosis in children is rare, with an estimated incidence of 0.6–1.02 per 100,000. In younger patients (<5 years) it manifests with a triad of symptoms: anterior segment uveitis, arthritis and skin lesions. Uveitis associated with sarcoidosis can occur in any segment of the uvea. Typical symptoms include granulomatous chronic anterior uveitis, large corneal deposits, iris nodules, choroidal granuloma that may surround the optic nerve, and/or varying degrees of opacities of the vitreous body, as well as "snowballs and snowdrifts" [46]. Sarcoidosis is cited as a cause of uveitis in children in various regions of the world. In Poland, it accounts for 3.1% of pediatric uveitis cases [5], in France for 2.3%[12], in Lebanon for about 2% [11] of all pediatric uveitis, and in Egypt for 4% [47] of non-infectious uveitis in children. Diagnostic criteria for sarcoidosis-related uveitis in adults were proposed at the first International Workshop on Ocular Sarcoidosis (IWOS) in 2009 but criteria for children have not yet been established internationally [48]. For a diagnosis of ocular sarcoidosis, 3 conditions must be met: clinical manifestations consistent with IWOS criteria must be present keratic precipitates (KP), inflammatory cellular debris visible on the corneal endothelium/small granulomatous KP and/or iris nodules, barrel-shaped reticular nodules, peripheral tent-like anterior adhesions, vitreous opacities with visible snowballs/pearls, multiple peripheral choroidal/retinal lesions (active and/or atrophic), nodular/segmental perivascular inflammation (candlewax drippings) and/or retinal macroaneurysm, optic disc granulomas or a single choroidal nodule, and bilateral lesions. Histopathologic examination of biopsy material shows evidence of unserrated granulomas, and other causes of granulomatous inflammation are excluded [49]. If biopsy is not possible, the diagnosis is based on clinical features, laboratory findings and chest imaging – chest radiography or chest computed tomography (CT) scan – according to the IWOS criteria [7, 50].

Blau syndrome (familial sarcoidosis)

Blau syndrome (BS) is an autosomal dominant autoimmune inflammatory disease caused by a *NOD2* mutation. The triad of BS includes dermatitis, arthritis and uveitis. Between the ages of 2–4 years, children may develop polyarthritis and bilateral chronic uveitis [7, 51]. Ocular symptoms include photophobia, eye pain, redness, dryness, itching, foreign body sensation, decreased vision, headache, and watery eyes. Uveitis occurs in approx. 60–80% of patients with BS, most commonly as bilateral uveitis. Complications include band keratopathy, posterior adhesions, increased intraocular pressure and cataracts. Other manifestations include optic disc edema, macular edema, optic disc pallor, periorbital nodules, subepithelial corneal deposits, and multifocal choroidal and retinal lesions [52]. The diagnosis is made by excluding other systemic diseases such as systemic sarcoidosis, JIA, Behçet's disease, ocular tuberculosis and ocular sarcoidosis.

Tubulointerstitial nephritis and uveitis

Tubulointerstitial nephritis and uveitis syndrome (TINU) is characterized by bilateral anterior segment uveitis occurring within two months before or twelve months after the onset of interstitial nephritis, without other causes explaining the pathology [53]. Tubulointerstitial nephritis and uveitis syndrome is diagnosed in approx. 1–2% of children presenting to uveitis clinics [54]. The incidence varies slightly by region: 1.2% in Western Europe [12], 1% in East Asia [38], and 2% in Western Asia [2]. The average age of onset is 15 years and it is more common in females [55]. Because of its rarity, TINU is often underdiagnosed. Symptoms include bilateral non-granulomatous anterior segment uveitis, abnormal renal function, high inflammatory markers, fever, weight loss, and abdominal pain [56]. More than 300 cases have been described in the world literature, although the number is probably underestimated due to low recognition [57].

Behçet's disease

Behçet's syndrome is less common in children than in adults, although 15–20% of cases develop in childhood. The average age of onset is 10–15 years. Pediatric Behçet's disease is classified according to criteria developed by the Pediatric Behçet's Disease Group [58]. Treatment is multidisciplinary due to the multisystem nature of the disease. Ocular involvement, associated with the HLA-B51 antigen, is a major concern, reported in 14.1–66.2% of pediatric cases [59]. Ocular symptoms typically appear within 2–3 years of diagnosis, and boys are more commonly affected. The highest incidence has been reported in communities between the Mediterranean Sea and East Asia. Incidence rates of Behçet's uveitis in children are Jordan – 11.4% [38], Lebanon – 6.1% [2], Korea – 6.5% [3], Egypt – 9.9% [44], China – 1.9% [37] and Europe – 1.2% [12]. Symptoms include blurred vision, photophobia, pain, and redness of the eye. Examination often reveals bilateral posterior segment uveitis, less commonly anterior segment uveitis with hypopyon. Other symptoms include iris and ciliary body inflammation, corneal epitheliitis, vitreous hemorrhage, cataract, glaucoma, and retinal detachment. In pediatric patients, recurrent ocular involvement worsens prognosis, making early recognition and aggressive immunomodulatory treatment essential [60].

Inflammatory bowel disease

Inflammatory bowel disease (IBD), which includes Crohn's disease and ulcerative colitis, is characterized by chronic, relapsing inflammation of the gastrointestinal tract. Both diseases have extraintestinal manifestations, with ocular changes being common. These include dry eye, eyelid inflammation, epithelial inflammation, scleral inflammation, and anterior uveitis, which is the most common ocular manifestation. Intermediate or posterior uveitis is much rarer, occurring in less than 1% of patients [61]. Other less common manifestations include retinal vascular occlusion secondary to vasculitis, orbital inflammation, myositis, papillitis, corneal infiltration, scleral softening, perforating scleromalacia, and optic neuritis [61]. In children, extraocular manifestations are more common than in adults, with uveitis being the most common [62]. Literature on the incidence of uveitis complicated by IBD is limited. In Korea it is 0.7% [3], while in Lebanon no cases have been reported [2]. Ocular inflammation is more common in patients with Crohn's disease than in those with ulcerative colitis. Inflammatory bowel

disease may even precede intestinal symptoms [7]. Symptoms in young patients include eye pain, headache, blurred vision and photophobia. Rapid progression of the disease requires urgent referral to an ophthalmologist, and the diagnosis can be confirmed by slit lamp examination.

Juvenile seronegative spondyloarthropathies

Juvenile seronegative spondyloarthropathies (JSpA) are a group of chronic inflammatory diseases that begin before the age of 16. The exact cause of JSpA is unknown, but environmental and genetic factors, including the presence of the HLA B27 antigen, play an important role [63]. The peak incidence is in early adolescence and boys are more commonly affected. The incidence of uveitis in JSpA in children ranges 4.5–10.1% [64]. Extra-articular manifestations include acute anterior uveitis, inflammatory bowel disease, psoriasis, and cardiac disease [7]. Anterior segment uveitis is characterized by unilateral acute inflammation with redness, pain, and photophobia. Symptoms may include deposits on the corneal endothelium, inflammatory cells in the aqueous humor, exudate in the anterior chamber, and adhesions between the pupillary margin and the anterior lens capsule. Uveitis usually resolves within three months, but can lead to complications such as decreased visual acuity, glaucoma, and vision loss if left untreated [65]. The prevalence of uveitis due to JSpA is 3.4% in France [12], 3.5% in Egypt [44], and 1.9% in China [37]. In Poland, HLA B27 antigen was detected in 1.5% of children with uveitis [5].

Childhood systemic lupus erythematosus

Childhood systemic lupus erythematosus (cSLE) occurs with an incidence of 0.3–0.9 per 100,000 children per year, representing approx. 10–20% of all SLE cases. In Poland, cSLE is the cause of uveitis in 1.5% of children studied [5], and usually has a more severe clinical course than adult SLE [66]. In Middle Eastern countries, cSLE accounts for 0.8% of all pediatric uveitis cases [2]. Common ocular manifestations include dry keratoconjunctivitis, iritis, ciliary body inflammation, retinal vascular changes, optic neuritis, and occlusive vasculitis. Active inflammation in the retina and choroid may mimic systemic vasculitis, which can occur in other organs [67]. Pathological changes localized in the posterior uvea usually precede other systemic features of the disease. They can, therefore, help in the diagnosis and timely implementation of therapy [68].

Multiple sclerosis

Multiple sclerosis (MS) is a chronic neurodegenerative disease of the central nervous system characterized by inflammatory and demyelinating processes leading to axonal degeneration. Childhood MS, defined as onset before 16 years of age, occurs in 3–10% of patients younger than 16 years and less than 1% younger than 10 years [69]. Diagnosing MS in children can be challenging due to atypical symptoms such as optic neuritis, sensory, brainstem and cerebellar abnormalities, and motor changes. Children often have a more aggressive onset with severe symptoms. The prevalence of MS in young uveitis patients is estimated to be 1.03% [69], while the incidence of uveitis in MS patients varies from 0.7–28.6% [70]. The most common anatomical diagnosis is uveitis of the intermediate segment (45–94%). The uveitis of other segments (anterior, posterior) and panuveitis are also among the presenting symptoms. The inflammatory process may be accompanied by iris nodules, iris-lens adhesions, vitreous body exudates, panuveitis (periphlebitis), cystic macular edema, exudates, retinal ischemia, and central retinal vein occlusion. Complications also include cataracts and secondary glaucoma. Symptoms include pain, red eye, blurred vision, and photophobia [71].

Idiopathic intermediate uveitis in the pediatric population (pars planitis)

In a French cohort, idiopathic intermediate uveitis accounted for 18.6% of pediatric uveitis cases [12]. It is bilateral in 70–90% of cases with no sex or race predisposition. Characteristic symptoms include "snowballs" in the vitreous body and "snowdrifts" in the inferior pars plana, peripheral choroidal sheaths, cystic macular edema and epiretinal membrane [72]. Ocular complications include vitreous floaters, macular edema, papillitis, vasculitis, and cataracts [73].

Vogt–Koyanagi–Harada disease

Vogt–Koyanagi–Harada disease is a multisystem autoimmune disease characterized by granulomatous ocular inflammation affecting melanocyte-containing tissues in the eye, central nervous system, inner ear, and skin [1]. Vogt–Koyanagi–Harada disease is rare in childhood and more common in individuals with pigmented skin. The prevalence of uveitis due to VKHD in children is 3.3% in China [37], 1.9% in Korea [3] and 2% in Beirut [11]. It manifests with bilateral uveitis, most commonly anterior inflammation with iris nodules [74], optic disc swelling, multiple exudative retinal detachments, and vitreous inflammation. Chronic inflammation is manifested by recurrent anterior inflammation and poses the greatest risk of sight-threatening complications. The diagnosis of VKHD is a diagnosis by exclusion [7]. There are no data on the incidence of VKHD in Polish children.

Eales disease

Eales' disease is an idiopathic retinal vasculitis with secondary neovascularization and vitreous hemorrhage. It is widely reported in Asia, especially in the Indian subcontinent, but is rare in the Western world. The disease progresses through 3 stages: inflammatory (peripheral vascular inflammation), ischemic (vascular obliteration), and proliferative (prolonged ischemia increases VEGF production) [75]. Complications include recurrent vitreous hemorrhage, usually resolving within 3–6 months. Longer-lasting hemorrhages threaten the formation of a membrane in the vitreous body and retinal detachment [75]. Other complications include neovascular glaucoma, macular edema and choroidal neovascularization. The condition usually affects healthy young adults in their 3rd or 4th decade of life [76]. Eales' disease typically affects young adults in their 20s and 30s, but can also occur in children, although it is rare (no contemporary pediatric data available). A 2018 Indian study of patients younger than 16 years reported that 94% had bilateral Eales disease, with

84.6% being boys and 14.1 years old on average. Visual impairment was the most common complaint (36%). Sclerosed vessels were seen in all patients, 84% had active peripheral inflammation, 80% had neovascularization elsewhere, and 4% had optic disc neovascularization. Veno-venous valves were found in 48% and vitreous hemorrhage in 72% of eyes [77]. The pathogenesis is not well understood and diagnosis requires exclusion of other retinitis pigmentosa diseases.

CONCLUSION

Uveitis is a multidisciplinary disease. Understanding its etiology will aid in the early diagnosis of concomitant systemic diseases in children, allowing for early specialized care and appropriate treatment. Pediatricians and family physicians play a crucial role in the care of patients with uveitis as they are often the 1st point of contact.

The pediatric population has a higher incidence of serious complications and co-morbidities, as well as side effects of therapy. These may include increased intraocular pressure, glaucoma (which may be refractory to treatment and persist after discontinuation of topical steroids), cataracts, and retinal or choroidal emboli. In addition, systemic side effects are more common and may include growth and developmental retardation, psychosis, and gastrointestinal problems (such as peptic ulcer and candidiasis). Dermatological side effects (such as hirsutism, striae, and difficulty in wound healing) and hormonal problems (including weight gain, adrenal suppression, hypertension, and hyperglycemia) are also common.

Most cases of uveitis are idiopathic (40%) [78]. Studies suggest that non-infectious uveitis is more common in children, accounting for 67.2–93.8% of cases [7]. The most common identifiable cause of uveitis is JIA, affecting approx. 10–45% of patients with the disease [78].

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