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Mini Review

Character of somatic and psycho-emotional disorders in children with various types of juvenile arthritis

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Abstract

Rheumatic diseases in children are a source of serious medical, social, and personal problems due to the prevalence, and severity of pain syndrome, progressive course with involvement of internal organs and disorders in the psycho-emotional sphere in the pathological process. The nature of somatic and psycho-emotional disorders was studied in 70 children aged 7 years - 16 years old with various types of Juvenile Rheumatoid Arthritis (JRA). The severe course of the disease, and as a result, disability, leads to emotional instability and social maladjustment of children. The predominance of articular forms with a primary lesion of the joints of the lower extremities and their deformation was remarkable. In children with a systemic variant of JRA, kidney damage was detected in the form of urinary syndrome and tubulointerstitial nephritis. Headache was the leading clinical manifestation of autonomic disorders caused by vascular disorders.

Introduction

Rheumatology has always occupied a special place in pediatrics, as there has been a significant increase and the prevalence of diseases of the musculoskeletal system among children and adolescents [1-4]. The prevalence of pathology in the population is the most important criterion for the social significance of diseases [5-8].

According to the World Health Organization, Juvenile Rheumatoid Arthritis (JRA) occupies one of the first places among childhood rheumatic diseases, and in terms of the severity of the clinical picture and the consequences, it has no equal among other types of arthritis [1,9-13]. Rheumatic diseases are a source of serious medical, social, and personal problems, which are determined by the common negative properties inherent in this group of diseases: widespread, often early onset, high frequency and intensity of pain, dysfunction of the joints, the chronic nature of the course of most of them with continuous progressive a course leading to the disability with a clear tendency to early disability due to violations of not only the function of the joints but also frequent involvement in the pathological process of internal organs with the development of a gross functional deficit [14-18].

Damage to the articular apparatus in JRA is often combined with extra-articular manifestations, and one of the most common is kidney damage [19-21]. The frequency of kidney damage in children with JRA ranges from 13 to 73% [11,21-23]. Many researchers note that the morphological signs of kidney damage in JRA are more common than the clinical symptoms of rheumatoid nephropathy [21,23-25]. Kidney damage in children with JRA can manifest as one type of glomerulonephritis, vasculitis, or nephropathy as a complication during long-term therapy with Nonspecific Anti-Inflammatory Drugs (NSAIDs). Long-term use of NSAIDs can cause a variety of kidney damage and be accompanied by a wide variety of symptoms - from minimal urinary syndrome to severe damage [26-29].

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Eye damage in children with JRA occurs less frequently, however being a serious clinical and social problem, since with late diagnosis and untimely therapy, visual impairment of the eye, up to blindness, is possible [11,30,31]. Despite the obvious association of JRA with eye damage, there is still no single approach to understanding the pathophysiological mechanisms of such damage [2,4,32,33]. If some authors consider eye lesions with JRA as a result of an imbalance of cellular and humoral immunity, others - as an autoimmune reaction, due to the presence in the body of autoantibodies to the components of the eyeball [10,14,30,31]. Features of eye damage in JRA: in some cases, it occurs after the articular syndrome, but more often precedes the development of arthritis [9,16,17,19].

The physical suffering of children with JRA associated with destructive processes very often leads to significant changes in the psycho-emotional sphere due to dysfunction of the autonomic nervous system [2,10,34,35]. Autonomic dysfunction is a state of functional instability due to various reasons, including social and environmental or psycho-emotional character [16,34,36,37].

Childhood is a difficult stage during which the child's body gradually reaches biological maturity. Throughout the entire period of childhood, neuro-psychic and endocrine-humoral changes occur that determine the growth, morphological and functional transformation of organs and systems. And this imposes high adaptive requirements on the child's body, causing increased vulnerability and a tendency to functional disorders and even borderline pathology [11,34,37,38].

Psycho-emotional sphere of children with JRA is another important aspect that requires the attention of doctors, the medical staff of hospitals, and the immediate environment of this group of children [34,35,37,39]. Being a steadily progressing disease that leads to disability in a child, JRA has a number of factors that potentially lead to neuroticism, asthenic manifestations, emotional instability, and, as a result, social maladjustment. The study of the features of the psycho-emotional sphere of children with JRA makes it possible to reveal their inner experiences, and relationships in the family, at school, as well as with medical personnel [34,35,37].

A number of foreign works are devoted to the study of the features of the psycho-emotional sphere. In the studies of Joe Yu (2001), they describe the characteristics of children with JRA, namely isolation, self-doubt, and low self-esteem. In the work of Yakovleva L (1999), the author argues that the emotional characteristics of the personality of children with JRA depend on the duration of the disease, gender, and age. The duration of the disease makes children more practical, which can be explained by adaptation to their illness. Changes in the emotional sphere are more pronounced in adolescent girls, manifested by isolation and anxiety, while boys of this age category are characterized by increased irritability and aggressiveness. Despite the publication which highlights the issues of psycho-emotional disorders in children with JRA, further study of this problem is advisable, as it allows rheumatologists to choose the optimal tactics for the complex treatment of this category of children [1,2,10,19]. Decreased quality of life, constant pain syndrome, impaired functional activity, loss of freedom of independent movement, and psycho-emotional disorder create a burden not only to the patient himself, but also to his family, and this problem requires further study [26,35,37,40]. Therefore, the aim of the study is to present the nature of somatic and psycho-emotional disorders in children with various types of JRA.

Materials and methods

The work was performed at the Regional Children's Multidisciplinary Medical Center of the city of Andijan in the Republic of Uzbekistan. The results of the study are based on data from a clinical and instrumental examination of children with rheumatoid arthritis who were treated in the cardio-rheumatology department for the period of 2019 - 2020.

Clinical assessment

All sick children included in the study (n = 70) underwent a single traditional rheumatological examination. Clinical assessment of each child included: taking anamnesis, assessing the state of internal organs, and articular syndrome. Functional joint disorders were assessed according to the criteria developed by the APA (*American Psychiatric Association*, 1991).

Laboratory diagnosis

Laboratory research methods included: a clinical blood test (quantitative indicators of hemoglobin, erythrocytes, leukocytes with a leukocyte formula and ESR) and a biochemical blood test (total protein and protein fractions, C-reactive protein, Malen's reaction, DPA test, and determination of rheumatoid factor).

Assessment of the genitourinary system

The state of the genitourinary system was assessed based on the results of a general urine test (change in urine color, relative density, sediment analysis - the presence of hematuria, leukocyturia, and proteinuria) and the study of daily urine using the Zimnitsky test method.

Assessment of the activity of JRA

As markers of laboratory activity of JRA, we used the results of ESR of more than 20 mm per hour, C-reactive protein of more than 5 mg/l, immunoglobulin G of more than 22,5 g/l, and seromucoid of more than 0,200 U. We determined rheumatoid factor as an indicator of progressive destruction of the joints, regardless of the activity of the disease. However, according to numerous studies, a negative result for the presence of rheumatoid factor does not completely exclude the diagnosis of JRA.

Instrumental diagnostics

Instrumental diagnostics included: radiography of the joints, ultrasound of the genitourinary system, ECG, echocardiography, and REG. Additionally, all children were examined by an ophthalmologist.

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Verification of the diagnosis of rheumatoid arthritis was based on the criteria of the American Rheumatological Association (1987).

Since the participants of this study are minors, the parents of the participant gave their written informed consent for participation in the research, and for publishing the photographic materials.

Results and discussion

There were 70 children under the observation, which we divided into two age groups. The first group included children of primary school age (7 years - 10 years old) – 54,2%; the second group consisted of children of senior school age (11 years - 16 years old) – 45,8% (Table 1). By gender, girls prevailed – 68,5% (Figure 1).

As indicators of the degree of activity of rheumatoid inflammation, we included the clinical manifestations of articular lesions, according to the Haskinson visual analogue scale. Damage to the bone structure was recorded on radiographs according to Steinbrokker (Figure 2).

In the course of the study, it was found that JRA most often occurred in the form of an articular lesion. The articular form (80%) is represented by two variants: polyarticular – 44,3% and oligoarticular – 35,7%. In the systemic variant of JRA, joint damage occurred exclusively in the form of polyarticular syndrome. The localization of joint damage is presented in Table 2.

Regardless of the variant, the maximum group consisted of children with a duration from the onset of the disease from 2 to 5 years (54,3%) (Figure 3).

Characteristics of clinical manifestations are highlighted separately in each age group. The first group of children with JRA (38 children) was represented mainly by the articular

Table 1: The ratio of children with JRA by sex and age.

	Division by age							
	First group 7 - 10 (n = 38)				Second group 11 - 16 (n = 32)			
Total *n* = 70 (100%)	Boys		Girls		Boys		Girls	
	Subtotal	%	Subtotal	%	Subtotal	%	Subtotal	%
	16	42,1	22	57,9	6	18,8	26	81,2

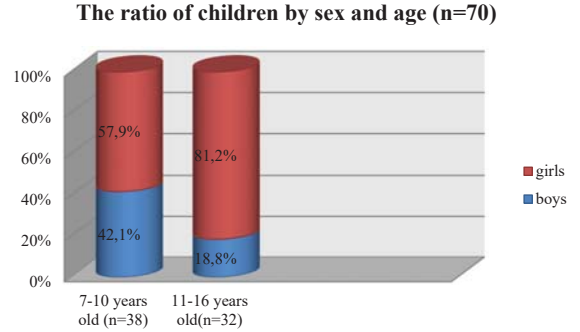

Figure 1: The ratio of children by sex and age (*n* = 70).

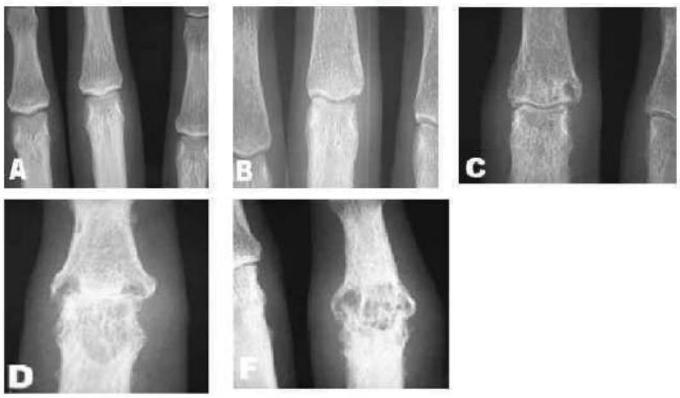

Figure 2: X-ray stages according to Steinbroker.
Stage 1(A) - Periarticular osteoporosis
Stage 2(B,C) - Narrowing of the joint space and the appearance of small usura and cysts
Stage 3(D) - The presence of multiple erosions, subluxations of the joints
Stage 4(F) - Formation of ankylosis.

Table 2: Localization of joint damage depending on JRA variants (*n* = 70).

Localization of joint damage	Polyarticular variant (*n* = 31)	Oligoarticular variant (*n* = 25)	Systemic variant (*n* = 14)
Knee	-	21 (84%)	2 (14,3%)
Ankle	3 (9,7%)	1 (4%)	-
Foot joints	8 (25,8%)	-	7(50%)
Elbows	-	3 (12%)	-
Wrist	4 (13%)	-	-
Hand joints	16 (51,5%)	-	5 (35,7%)

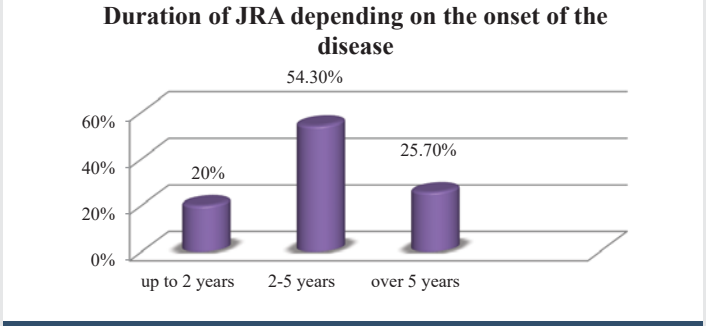

Figure 3: Duration of JRA depending on the onset of the disease.

form (63,2%), and the oligoarticular variant of this form was more common (58,3%) mainly with damage to the knee and ankle joints. The inflammatory reaction in the knee joints was accompanied by significant exudation, which caused severe pain and limited mobility in it. Morning stiffness and joint deformation were typical for children with polyarticular disease (41,6%). Damage to the ankle and foot joints was noted in 2 children; wrist and hand joints - in one child and a combined lesion - in one child (Figures 4,5).

Laboratory activity in children with articular form was assessed as moderate, and the degree of damage to the bone structure, according to the X-ray report, corresponded to I (64,3%) and II degrees (35,7%) with an oligoarticular form and

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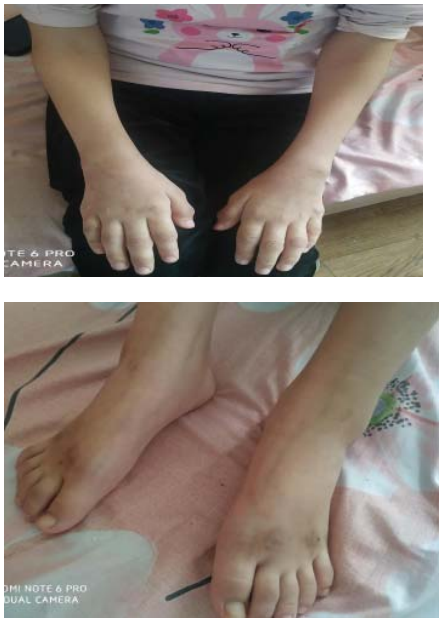

Figure 4: Patient A, 12 years old, with a polyarticular variant: deformity of the wrist, hand, ankle, and foot joints.

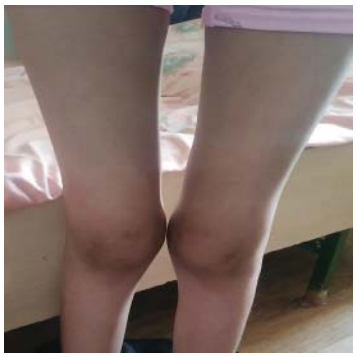

Figure 5: Patient N, 11 years old, with an oligoarticular variant: deformity of the knee joints.

to the II (60%) and III (40%) degrees with more severe damage to the bone structure with a polyarticular variant.

The systemic form of juvenile arthritis was found only in this age group and is represented by an allergic-septic variant (20%), which is seropositive for rheumatoid factor. The condition of the children upon admission was assessed as serious. The leading clinical symptom in all children was fever, which was of a constant nature during the first month of the disease, and in subsequent periods of the disease, the temperature rose in the evening or at night to febrile numbers, and its independent decrease was accompanied by profuse sweating. This nature of the course of fever was more pronounced in children who had previously received glucocorticoid therapy for a long time. Hepatomegaly occurred in all children. In one child, hepatomegaly was accompanied by an increase in liver enzymes (ALT and AST) in the blood serum, which gave grounds for the diagnosis of immunocomplex hepatitis. The articular syndrome is represented by arthralgia and formed arthritis of the knee joints with II (50%) and III (50%) stages of radiological lesions of the bone structure. Of the visceral lesions, there were changes in the cardiovascular system: tachycardia, dullness of heart tones, and systolic murmur in the apex of the heart. High electrical activity of the left ventricle was diagnosed on the ECG. High clinical and biochemical blood parameters along with systolic murmur at the apex of the heart, served as the basis for the setting of III degree of activity in this age group of children.

The second group of children is presented (32) in the age range of 11 years - 16 years. Children with a duration of juvenile arthritis of more than 5 years accounted for 56,2%. This group in our studies is represented by the articular variant of JRA (100%), where the leading position was occupied by polyarticular lesions (81,2%) with a rapid progression of the process. In children of this age group, upon admission to the hospital, the lesions of the ankle, proximal metacarpophalangeal, interphalangeal, radiocarpal, and knee joints were leading. In 2 children, we revealed an ulcer deviation of the fingers in combination with a radial deviation of the wrist, and in one child, a valgus deformity of the lower leg. According to the results of an X-ray examination of the joints in one child (3,1%), grade I bone changes were determined; in 37,5% of children - with II degrees; 46,9% - with III degrees, and 12,5% of children with IV degree of radiological changes. In our studies, radiological changes in the joints were more pronounced in the "predominant hand" and foot joints, which can be explained by greater physical stress on them.

In our studies, 25 children out of the total number of children examined (35,7%), had damage to the articular apparatus combined with disorders of the kidneys. Renal pathology, according to many authors, is regarded as one of the most severe visceropathies that determine the severity of the course and prognosis of JRA. The first signs of changes in urinalysis were observed in children with a disease duration of more than 3 years and exclusively in the polyarticular variant, in the form of the urinary syndrome. In children with the urinary syndrome, changes in the urine were transient and manifested as hematuria and leukocyturia without urodynamic disturbances during ultrasound examination of the kidneys.

If kidney disorders were observed in children with a polyarticular variant, then eye damage occurred in 8 children with an oligoarticular variant of JRA (57,1%), also with a disease duration of more than 3 years. According to the conclusion of the ophthalmologist, eye damage in these children proceeded in the form of iridocyclitis. The main complaints of the children were redness of the sclera and slight pain in the eyes, but in 3 children iridocyclitis was asymptomatic and the diagnosis was established only after examination by an ophthalmologist. One child was treated by an ophthalmologist with the use of corticosteroids even before the manifestation of juvenile arthritis.

The severity of the course of juvenile arthritis, regardless of the variant and age of the children was confirmed by high laboratory activity.

Of a large number of extra-articular complaints in all the children we examined, a special place was occupied by complaints associated with autonomic dysfunction, of which

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we identified the most common ones being headache (51,4%), excessive sweating (35%), emotional lability (48,5 %), tearfulness (17,1%), social maladaptation (lack of permanent friends, violation of contact with peers 38,5%), and isolation (15,7%).

Of the asthenic complaints in children, regardless of the JRA variant, irritability, social maladaptation (increased conflict in the family and at school) and increased tearfulness prevailed, especially in children in the age group of 7 years - 10 years (Table 3).

Children with a polyarticular variant were characterized by increased conflict at school (61,3%), which is apparently associated with frequent hospitalization and the presence of limited mobility of the affected joints due to their deformation. Children with the oligoarticular variant were characterized by increased irritability and excitability (64%), often ending in tearfulness. A feature of children with a systemic variant was their isolation (24,3%), and a conversation with them very often ended in increased irritability. The frequency of vegetative manifestations is presented in Table 4.

Vegetative disorders in children with JRA were represented by headache (36 children) and dizziness (19 children). Most often, these symptoms occurred in children aged 11 years - 16 years, and more often among girls with a disease duration of more than 3 years. Headache was most often localized in the frontal part of the head being of moderate intensity with a duration of several hours, but did not always require the administration of medications.

In half of the children with a systemic variant of juvenile arthritis, the onset of headache was due to an increase in blood pressure, which we associated with long-term hormonal therapy and intoxication. For relief of headaches, additional medical intervention was required.

Among children with an articular variant of juvenile arthritis, headache occurred in 26,7% of children with a polyarticular variant, and the degree of activity of the underlying disease upon admission was assessed as moderate.

Table 3: The nature and frequency of asthenic manifestations in children with JRA.

Symptoms	Polyarticular variant (*n* = 31)	Oligoarticular variant (*n* = 25)	Systemic variant (*n* = 14)
Irritability	14 (45%)	16 (64%)	4 (28,6%)
Excitability	12 (38,7%)	16 (64%)	-
Tearfulness	6 (19,3%)	5 (20%)	1 (7,1%)
Closure	7 (22,5%)	2 (8%)	2 (24,3%)
Increased conflict	19 (61,3%)	5 (20%)	3 (21,3%)

Table 4: The frequency of vegetative manifestations (*n* = 70).

Symptoms	Polyarticular variant (*n* = 31)	Oligoarticular variant (*n* = 25)	Systemic variant (*n* = 14)
Headache	19 (61,3%)	5 (20%)	12 (85,7%)
Dizziness	8 (25,8%)	1 (2,5%)	10 (71.4%)

In the analysis of Rheoencephalography (REG) data in 9 children (16%), a violation of the venous outflow was noted; in 4 (7,1%) - tortuosity of arteries; in 2 children (3,5%) - arterial spasm. An increase in blood pressure against the background of headache was diagnosed in 2 children aged 15 and 16 years, with the duration of juvenile arthritis of more than 5 years, with a rapidly progressive course and long-term glucocorticosteroid therapy.

A less frequent complaint of headache was made by children with the oligoarticular variant, which accounted for 10,7% of the total number of children with this variant of the course of juvenile arthritis. Headache in this group of children was due to emotional lability, was not accompanied by an increase in blood pressure, and did not require medical intervention.

Emotional lability occurred in more than half of the children we examined (52,5%). Children of the first age group came into contact more easily when talking with them, however, attacks of irrit ability quickly set in, and they closed in on themselves, which was especially pronounced in children with systemic and polyarticular variants that had functional insufficiency of the joints of II and III degrees.

We experienced somewhat greater difficulties in communication when talking with children of the second age group (11 years - 16 years old). They were more reserved and reluctant to answer questions. Irritability and slight aggressiveness were shown by boys (22,2%) aged 15 - 16, who have a physical disability due to joint deformity. Girls (38,9%) were noted for irascibility and rapid mood swings. Social maladaptation of children was more common in this age group.

Parents of one-third of the children surveyed noted a decrease in school performance, which apparently may be due to the negative impact of the disease itself as well as frequent and prolonged hospitalizations.

Overall, emotional lability occurred in more than half of the observed population of children and was signified by irritability, difficulties in communication, and aggressiveness.

Conclusion

1. When conducting a comprehensive clinical and instrumental examination, the predominance of articular forms (80%) in children with JRA was established, with the largest proportion being children with polyarticular lesions (44,3%) and a disease duration of more than 3 years (61,3%).

2. Most often, upon admission to the hospital, children with JRA were diagnosed with stage II laboratory activity (48,6%) and with a predominant lesion of the joints of the lower extremities and their deformation, confirmed by stage III and IV radiological changes in the bone structure (31,4%), associated with polyarticular and JRA system variants.

3. Of the extra-articular manifestations of JRA, kidney damage manifested itself in the form of a urinary

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syndrome (84%) and tubulointerstitial nephritis (16%) diagnosed only in children with a systemic variant. Eye damage was observed in 13% of children with polyarticular and 28% of children with oligoarticular variants of JRA, and one-third of children had asymptomatic iridocyclitis.

4. The leading manifestation of autonomic disorders in children with juvenile arthritis was headache (51.4%), presented by all children with a systemic variant and 26,7% with a polyarticular variant, due to vascular disorders, confirmed by the results of REG.

5. Emotional lability in group I of child ren was irritability and isolation in oneself; in group II - irascibility, aggressiveness, and social maladaptation.

6. Timely detection and correction of psycho-emotional disorders is an important aspect of the complex treatment of children with SJRA.

Summary

Summarizing the obtained results it was found that in our studies, children with the articular variant of rheumatoid arthritis, with high laboratory and radiological activity, with severe kidney damage, and with severe disorders of the psycho-emotional sphere, predominated. The severity of clinical manifestations, both articular and visceral, did not depend on the presence of rheumatoid factor in the blood and the onset of the disease.

Thus, the study revealed that the articular syndrome was dominated by a polyarticular variant ($p < 0.01$) with a predominant lesion of the hand and foot joints, with a II degree of laboratory activity and III stage of X-ray changes in the bone structure ($p < 0.05$). Among the extra-articular manifestations of JRA, kidney damage in children with a systemic variant prevailed, and eye damage - in children with oligoarticular JRA variants.

The leading manifestation of vegetative disorders in children with juvenile arthritis was headache ($p < 0.001$), and psycho-emotional disorders are represented by irritability, irascibility, aggressiveness and social maladaptation.

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