



PSYCHOLOGICAL ASPECTS OF TREATMENT AND REHABILITATION OF PATIENTS WITH ADOLESCENT IDIOPATHIC SCOLIOSIS: RESEARCH ANALYSIS

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Idiopathic scoliosis is a common orthopedic disease of unknown etiology in childhood that limits the patient's activity for a lifetime. Treatment of idiopathic scoliosis includes both conservative and surgical methods and requires psychological consideration, which is important for the rehabilitation of patient with chronic disease.

Systematic research on the psychological aspects of the treatment and rehabilitation of patients with idiopathic scoliosis in the form of analysis allows us to evaluate the medical and psychological approaches to the problem and to identify the factors contributing to the successful adaptation of the patient to chronic disease situation.

Methodology. We selected the articles related to the psychological aspects of scoliosis and its treatment between 2017 and 2018. The primary selection included 16 publications, of which 2 were survey studies. Earlier foreign and domestic publications were also included in the analysis in order to compare the changes in treatment and rehabilitation approaches.

Literature analysis. Idiopathic scoliosis was considered as a risk factor for psychological discomfort in the forms of stress, negative emotions, anxiety, distortion of the image of "I," reduced self-esteem, and communication problems. These increase the risk of mental disorders, such as depression, suicidal tendencies, and psychological disadaptation.

Discussion. Analysis allows us to highlight the most important topics in the studies of adolescent idiopathic scoliosis in recent years: topic on mental health/ill health in adolescent idiopathic scoliosis (AIS), theme of the psychological component of pain, topic on clinical psychological and social psychological factors that determine the course of the disease of the patients with AIS, quality of life of a child or adolescent with AIS, issues of psychological resources for adaptation to a chronic disease, topic on parents' perception of their child's illness, and topic on the psychological accompaniment of patients suffering from AIS.

Conclusions. A modern approach to the study of idiopathic scoliosis suggests a point of view from a biopsychosocial model of the disease; therefore, it is necessary to consider various factors affecting the patient's quality of life, including the psychological component of the disease. Psychological support of the treatment should focus on the formation of the patient's active position in relation to his or her own life and active coping strategies with chronic disease.

Keywords: adolescent idiopathic scoliosis (AIS); psychological aspects of treatment and rehabilitation.

ПСИХОЛОГИЧЕСКИЕ АСПЕКТЫ ЛЕЧЕНИЯ И РЕАБИЛИТАЦИИ ПАЦИЕНТОВ С ПОДРОСТКОВЫМ ИДИОПАТИЧЕСКИМ СКОЛИОЗОМ: АНАЛИЗ ИССЛЕДОВАНИЙ

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Анализ проблемы. Идиопатический сколиоз — распространенное ортопедическое заболевание неясной этиологии, которое начинается в детском возрасте и ограничивает жизнедеятельность больного на протяжении всей его жизни. Лечение идиопатического сколиоза включает в себя и консервативные, и хирургические методы и требует учета психологической составляющей, что важно для реабилитации пациента с хроническим заболеванием.

Систематизация исследований психологических аспектов лечения и реабилитации пациентов с идиопатическим сколиозом позволяет оценить медицинские и психологические подходы к проблеме, выделить факторы, способствующие успешной адаптации пациента к ситуации хронического заболевания.

Методология анализа исследований по сколиозу. Для анализа были отобраны статьи, связанные с психологическими аспектами сколиотического заболевания и его лечения, ссылки на которые появились в 2017–2018 гг. Сначала были проанализированы 16 публикаций, среди которых было два обзорных исследования. Были проанализированы также более ранние зарубежные и отечественные публикации с тем, чтобы сопоставить изменение подходов к лечению и реабилитации.

Обсуждение результатов. Были выделены наиболее важные темы последних лет в исследованиях подросткового идиопатического сколиоза: психическое здоровье/нездоровье при подростковом идиопатическом сколиозе (AIS); психологическая составляющая боли; клинико-психологические и социально-психологические факторы, определяющие течение болезни пациентов с AIS; качество жизни ребенка или подростка с AIS и вопросы психологических ресурсов для адаптации к хроническому заболеванию; восприятие родителями болезни своего ребенка; психологическое сопровождение больных, страдающих AIS.

Анализ публикаций по идиопатическому сколиозу. Идиопатический сколиоз рассматривается как фактор риска психологического дискомфорта в виде стресса, негативных эмоций, тревожности, искажения образа «Я» и сниженной самооценки, коммуникативных проблем; психических нарушений в виде депрессии, суицидальных тенденций, приводит к нарушению комплайенса и дезадаптации.

Выводы. Современный подход к изучению идиопатического сколиоза предполагает рассматривать его с точки зрения биопсихосоциальной модели болезни, поэтому необходимо учитывать многообразные факторы, влияющие на качество жизни пациента, в том числе психологическую составляющую заболевания. Психологическое сопровождение лечения AIS должно акцентироваться на формировании у пациента активной позиции в отношении собственной жизни и активных стратегий совладания с хроническим заболеванием.

Ключевые слова: подростковый идиопатический сколиоз; психологические аспекты лечения и реабилитации.

Background

The literature distinguishes several nosological groups of scoliosis, namely congenital spinal deformities, idiopathic scoliosis, systemic deformities, neurogenic deformities, post-traumatic deformities, and deformities of combined etiology [1]. Idiopathic scoliosis (scoliotic disease) refers to diseases that pose a challenge to medicine; its etiology remains unclear; no single treatment method, conservative or surgical, can completely cure scoliotic disease; and the issue on the involvement of psychological factors in the genesis of this disease, psychological component of treatment, effective rehabilitation of patients, and their adaptation in society remains.

The onset of idiopathic scoliosis is in childhood; gross disorders develop even in adolescents. The consequences of such disorders are often osteochondrosis and cardiopulmonary pathology. Patients experience from somatic pathology and pain throughout their lifetime, and they significantly restrict their life-sustaining activity.

Idiopathic scoliosis is a common orthopedic disease. Epidemiological studies of idiopathic scoliosis were conducted in Europe and Asia. Epidemiological studies conducted in recent years in Asian countries are indicative. In the study by Elshazly et al., the prevalence of adolescent idiopathic scoliosis (AIS) was described, and the efficacy of screening of children in school (mean age, 12 years) in the city of Al Kharj (Saudi Arabia) was evaluated. The test subjects were 1300 schoolchildren. AIS was revealed in 2%–4% of pediatric patients aged 10 to 16 years [2].

Another similar study was performed in Malaysia. Deepak et al. conducted a screening study with 8966 volunteers aged 13–15 years, and 2.55% of schoolchildren with AIS were identified. The authors present similar screening results in China, Hong Kong, Japan, and Korea, which confirm the epidemiological data obtained in Malaysia [3].

Treatment of idiopathic scoliosis includes both conservative and surgical methods, and according to experts, requires an integrated approach. The

indications for surgical treatment of idiopathic scoliosis include scoliotic spinal deformity of $>40^\circ$, a progressive course of $>15^\circ$ deformity annually, and serious secondary somatic disorders in other organs. Usually, in the case of scoliosis, surgery is accompanied by complications (at least 15%), whereas there is a shortage of long-term follow-up (over 5 years) [1]. Surgery generally provides good results in severe forms of scoliosis, but surgical treatment leads to psychological trauma and lifestyle changes associated with prolonged stay in the hospital, and loss of social bonds.

The treatment of scoliosis often makes the patient dependent on the actions of medical personnel and relatives and creates learned helplessness, while in the process of this disease treatment and rehabilitation, the role of the adolescent's independent activity (regime of physical activity and therapeutic exercises, control over correct posture, etc.) is meaningful.

Considering the pronounced psychological component of idiopathic scoliosis, the patient's personal and environmental resources that may be useful in organizing treatment, rehabilitation, training, adaptation, and self-actualization in society must be assessed.

Clinical and psychological studies of Russian authors deal mainly with the psychological problems of patients with spinal injuries [4–6], with congenital forms of scoliosis [5, 6]. Psychological aspects of patients with AIS are presented mainly in the studies by foreign researchers [7–20] and Russian authors [21–25].

Methodology of analysis of scoliosis research

Foreign articles were selected, which are in any respect related to the psychological aspects of scoliotic disease and its treatment, and the links to which appeared in 2017–2018.

Primary selection included 16 publications, which included two review studies [26, 27] which comprised the analysis of the literature using databases on the problem of parental influence on the child's experience of post-traumatic stress. The effect of the family factor on treatment was also presented in publications by Kadier et al. [18, 28].

The topic of diagnostics, early screening of the disease, and its psychological consequences

(anxiety, depression, and suicidality) is addressed in the publication by Heitz et al. [17]. The literature also investigates the problem of developing tools for diagnosing stress consequences, particularly in the article by Laliberté et al. [29].

Most studies focus on treatment methods and psychological aspects of patient adaptation to chronic disease [20, 30–32].

A small number of publications, in 2017–2018, devoted directly to the psychological aspects of AIS, should be noted. These include publications by Gallant [12], Sanders et al. [20], and Pyatakova et al. [25]. The medical aspects of AIS (epidemiological and medical diagnostic questions) are discussed in the studies by Deepak et al. [3] and Heitz et al. [17]. At the same time, the topic of scoliosis (in broader terms, with respect to various forms of scoliosis) is presented in the studies by Aslan et al. [33], Jagger et al. [34], Kontodimopoulos et al. [18], namely the use of surgical intervention; psychological difficulties and psychological maladaptation of patients with scoliosis; the quality of life; aspects of the psycho-traumatic situation of the disease; and factors determining the psychosocial adaptation of the patient.

Because of the scarcity of studies on idiopathic scoliosis, we also considered earlier works summarizing the results of research on scoliosis. Thus, the most interesting is the analysis of 25 studies conducted by Chinese scientists Jing Han et al. who identified biopsychosocial risk factors for reducing the quality of life in AIS [14].

Another important work is a generalizing study of the psychological aspects of AIS treatment by Dagmar and Schanz based on 18 publications in the late XX — early XXI centuries [35].

The issues of idiopathic scoliosis treatment are widely highlighted in the literature. Many papers dealing with treatment issues are purely medical and do not directly affect the psychological aspects of idiopathic scoliosis, but they enable us to understand the methodological level of research. Thus, in the study by Romano et al., 6807 references on the exercises in AIS were analyzed from the Cochrane database of systematic reviews. Romano et al. noted that of 6807 references, only 20 studies were used in full for further evaluation, but 18, 3, and 3 studies were excluded because of the study design, results, and type of intervention, respectively [36]. Two

studies were reviewed in detail, namely one randomized controlled study and one prospective controlled cohort study. Thus, despite the large number of references, the base for serious conclusions is extremely small, which is due to both methodological and ethical problems.

Some psychological aspects of idiopathic scoliosis (pain syndrome; distortion of the body scheme; anxiety and depressive condition which accompanies the disease; psychologically traumatic surgery; lifestyle changes; the need for active self-regulation of life-sustaining activity during treatment) are also inherent in other forms of scoliosis; therefore, we did not ignore some important articles representing the above aspects of chronic disease. Thus, in the study by Pinquart [37], a meta-analysis of the studies of psychological health of pediatric patients with chronic physical pain (and their parents) was conducted. A meta-research by Pinquart [38] concerns post-traumatic stress symptoms in children and adolescents with chronic diseases.

Analysis of publications on idiopathic scoliosis

Not only in contemporary studies but also in studies conducted 10–20 years prior, that AIS has been noted to lead to significant changes in the life of a pediatric patient and his parents [14, 20, 39–41]. Foreign researchers consider idiopathic scoliosis as a risk factor of psychological discomfort. Pediatric patients experiencing idiopathic scoliosis (and their parents) experience stress and negative emotions, namely anger, fear, anxiety, helplessness, hopelessness, and depression [42–46]. In patients with idiopathic scoliosis, the likelihood of mental disorders and suicidal tendencies is high [14]. Most researches of AIS focus on the quality of life of patients and its dependence on the nature of the deformity and treatment methods. These studies provide discrepant data. The results of some studies show that the quality of life parameters in adolescents with idiopathic scoliosis are reduced [43], whereas other studies show a medium to high level of quality of life [19]. The authors identify clinical characteristics that may affect the quality of life, namely the maturity of skeletal muscles, special aspects of the spinal curvature, nature of therapeutic measures, and duration of wearing a corset [11]. Moreover, in some studies, negative experiences in

patients are noted to be associated with medical procedures, primarily with the difficulties of wearing a corset [40]; in others, no negative effect was found in wearing a corset on the personality or quality of life of adolescents with idiopathic scoliosis [9, 47]. As a result of studying the effect of sex and age characteristics on satisfaction with life of patients with scoliosis, girls have more pronounced distress manifestations than boys, as well as reduced quality of life indicators [41]. With age, in pediatric patients experiencing idiopathic scoliosis, anxiety is increased about the body, and the level of mental health is reduced [9, 47]. Adolescents with idiopathic scoliosis are hypersensitive, insecure, and have distorted body image and low self-esteem [42]. Adolescents with idiopathic scoliosis experience difficulties in dealing with parents and healthy peers. They are characterized by hypersocialized behavior, difficulties in modulating and expressing emotions, high level of neuroticism, anxiety, low resistance to stress, and communication problems. The authors discuss issues of psychological assistance to children and adolescents with idiopathic scoliosis and conclude that such pediatric patients require psychological work aimed at reducing stress, developing understanding of the body, and improving the skills of social relations. In adolescents awaiting surgical treatment, signs of fear and overcontrol of emotional manifestations are more pronounced [11, 41, 47].

Jagger et al. considered the problems of physical and psychological adaptation as impaired lung function in pediatric patients and young people with scoliotic disease. In contrast to previous publications, the authors argue that the greater severity of scoliosis and, consequently, the weaker function of the lungs correlate with a higher working capacity. These patients also report a better quality of life, which may be associated with maintaining normal levels of physical load [34].

D'Agata et al. studied the quality of life in scoliosis using the methods, namely Scoliosis Research Society (SRS) and Quality of Life in Spinal Deformities, Health-Related Quality of Life, Human Figure Drawing (HFD). Fifty patients were the study subjects (mean age was 16 years). Approximately 48%–52% of patients demonstrated physical and emotional pressure (stress) associated with the shoulders based on the HFD technique; this was more often observed in older adolescents.

No aggressive manifestations were found in pediatric patients. At least one-third of the sample demonstrated a tendency to isolation and avoidance reactions, but they also had difficulties in interpersonal relationships. No significant correlations were found between personality traits and quality of life [9].

Gallant et al. studied the image of own body in adolescents with idiopathic scoliosis and showed that a disorder of the body image and associated eating disorder is typical (compared with their healthy peers) [12].

Physicians most often discuss the efficiency of certain methods of treatment and rehabilitation (particularly, the efficiency of surgical intervention) and the impact of certain methods of treatment on chronicity of the disease, disability, and the patient's quality of life. Thus, Reichel et al. considered the issues of rehabilitation and compliance difficulties in connection with the patient's emotional stress due to cosmetic defect and problems in establishing contacts [35].

Issues of the efficiency of treatment and rehabilitation were discussed in the studies by Reichel et al. [35], Leszczewska et al. [19], Tomaszewski et al. [43], Xu et al. [48], Villafañe [47], and Han et al. [14]. Foreign researchers have noted a high level of stress in scoliosis, which leads to increased anxiety, depression, and maladaptation of patients. The disease is especially detrimental to girls because it causes emotional stress associated with cosmetic defect, which inevitably leads to a decrease in coping resources (infantilism, a feeling of helplessness, development of a sensitive and avoidant type of response to the disease). A number of works are devoted to problems related to surgical intervention and methods to overcome preoperative anxiety [31, 33].

Reichel et al. analyzed the studies published in the 1990s and early 2000s, which addressed the issues of treatment of scoliosis in adolescence [35]. Studies showed that the initial shock that accompanies the establishment of scoliosis diagnosis can lead to emotional uncertainty, depression, feeling of fear, helplessness, or hopelessness. Uncertainty about the further development of the disease can lead to changes in the patient's attitude toward himself and the disease. The patient's understanding that a perfect body cannot be achieved erodes self-esteem and self-respect. Changes in life plans due

to the abandonment of specific sports interests (or limitations) bear additional burden for the patient. The adolescent's contact with peers may be complicated due to the long-term stay in clinics, which adversely affects the process of orientation to the reference group. These statements are supported by the results of studies that describe scoliosis during adolescence; particularly, the study by Payne et al. [49] showed that an increased amount of suicidal thoughts and emotional stress about abnormal physical development, difficulties with peers is typical for young people with scoliosis compared with the control group of healthy adolescents. Singer et al. also registered the presence of psychological problems in adolescents with severe spinal deformities [50]. Freidel showed that adolescents with scoliosis generally had less positive attitudes than healthy peers, often experienced non-disease-related physical symptoms, had low self-respect, and more often experienced depression. A traumatic factor for adolescents is the use of corsets, which distorts the body image, lowers self-esteem, and disrupts the separation process from parents during adolescence. As a result, all this leads to decreased quality of life [51]. At the same time, other (longitudinal) studies have not found a link between wearing a corset and changing the body image [52].

In the study by Han et al., a review of life quality studies of patients with AIS aged 10 years and older in connection with surgical treatment was conducted. The authors reviewed studies on the effect of the factors, namely 1) disease severity; 2) treatment; 3) age and sex characteristics; 4) social environment (differences between urban and rural patients; influence of the family environment) [14]. They cited the study by Payne et al. [49], which showed that the presence of spinal deformity is a risk factor for psychological depression, regardless of the treatment the patient receives. Factors, such as spinal deformity and physical discomfort during adolescence can affect the quality of life of patients with AIS, and severe spinal deformity, as a rule, causes pronounced psychological stress. Payne et al. used the AHS questionnaire to study 685 patients with AIS, wherein 269 and 416 were boys and girls, respectively, aged 12 to 18 years. Male adolescents were 60% more likely to experience underweight, whereas suicidal thoughts were 52% more common in adolescent girls [49].

When analyzing social factors, Han et al. relied on the study by Wang et al. [14, 53] who used the SRS-22 questionnaire to study regional factors that affected the quality of life of patients. Patients living in urban areas had significantly higher scores of self-control over the disease and lower self-esteem compared with peers from rural areas. The authors related the results obtained to the fact that, compared with rural areas, urban areas of China have better conditions for a more open lifestyle, with urban residents having higher incomes and better health insurance system [53].

The family factor in adapting patients to a disease situation is widely represented in clinical and psychological studies of idiopathic scoliosis and other chronic diseases affecting the quality of life. The article by Pinquart provides the results of a meta-analysis of publications on the problem of the psychological health of pediatric patients with chronic somatic disease and their parents. The authors analyzed the studies of serious diseases such as HIV/AIDS, cerebral palsy, cancer, and spinal fractures. Depression and anxiety were found to be less pronounced in pediatric patients than their parents. Unfortunately, the heterogeneity of the samples, by disease (the specificity of the disease, its severity, and duration), age of pediatric patients, and characteristics of their psychosocial development, and the specific treatment, does not enable to establish a hierarchy of factors determining the differences in mental health of patients and their parents. The study confirmed that pediatric patients often do not realize all the consequences of their disease, and this reduces the degree of the disease injury rate for the child's psyche [37].

The study by Waldron et al. presented the results of the literature review on the problem of parental influence on the experience of the post-traumatic stress of a child after physical injury. Cognitive processes (awareness of pain) play an important role in experiencing post-traumatic stress [27]. Wise et al., based on a literature review using the PsycINFO and PubMed research databases, studied the influence of the emotional state of parents on their child's experience of post-traumatic stress associated with physical trauma. The review discusses various behaviors of the parents of the injured child. The authors emphasize that a family atmosphere that promotes open discussion of a traumatic event in the family, emotional support,

encouraging display of feelings in a traumatic situation contribute to relieving emotional stress in a physically injured child [28].

Pinquart conducted a meta-analysis of 150 studies of post-traumatic stress symptoms and mental disorders in children and adolescents with chronic diseases. The analysis aimed to study the correlates of these symptoms. On average, 11.5% of participants with pediatric chronic physical diseases had post-traumatic stress disorder (PTSD). In this group, the prevalence of PTSD was higher than in the control groups that included children without chronic physical diseases. PTSD levels did not differ in physical disease, but a positive relationship was found between PTSD and disease severity and duration/intensity of treatment, and a negative relationship was found with disease duration, time that passed after the last treatment, adherence to treatment, and family function. Pinquart concludes that individuals with chronic pediatric diseases must be screened, and if necessary, provide psychological assistance to patients [38]. In our opinion, this recommendation is directly related to patients with AIS.

Sanders et al. (2018) examined 92 adolescents (mean age, 14 years) with diagnosed idiopathic scoliosis. Furthermore, 32% of pediatric patients had clinically significant psychological and emotional disorders. Most often they were depressive disorders and high level of anxiety [20].

The quality of life of children and adolescents with idiopathic scoliosis is largely determined by the presence of pain syndrome, which is not always clearly correlated with the objective severity of the disease. Hence, the topic of pain is widely discussed in the literature. Thus, Koch et al. attempted to understand the relationship between chronic pain and orthopedic aspects. Among the presented models of chronic pain, a special place belongs to pain with a psychological foundation. Here apparently, the factors associated not so much with the disease itself, as with surgical interventions, are due in no small part, as well as change (toward deterioration) of the social situation of the child, namely physical and social restrictions, loss of habitual social bonds [54].

Heathcote et al., with a sample of 311 patients and their parents, analyzed pain symptoms accompanying the diseases of pediatric patients, including idiopathic scoliosis (13.8% of respondents).

The mean age of pediatric patients was 13.75 years, and the mean duration of treatment was more than 1 year. The researchers were interested in the relationship of symptoms in pediatric patients and their parents because the literature showed that some symptoms (pain, anxiety, depression) are “suggestive” in nature and are not directly related to the objective severity of the disease. The child’s reports about his somatic and psychological symptoms influenced the parental attributes of the child’s symptoms. This effect was more often manifested in relation to the characteristics, namely somatic symptoms, anxiety, and depressive symptoms of the pediatric patient. However, “approval” of the somatic state and anxiety of pediatric patients by the parents can be considered to a greater extent, but not depression [55].

The results obtained by Heathcote et al. enable to consider not only mutual “induction” of patients and their parents, but also the problem of hypo- and overdiagnoses in the treatment of diseases with unclear etiology and imprecisely defined symptoms. These diseases include idiopathic scoliosis, wherein the psychological background can apparently be a depressive state, whereas depressive symptoms are not sufficiently significant for parents of pediatric patients [55].

Studies of medical workers suggest the psychosomatic nature of pain symptoms. Waldron et al. studied adolescents’ attitudes to the awareness of chronic pain. The study involved 54 and 94 adolescents with chronic pain and healthy adolescents, respectively. This attitude has been shown to manifest itself in both groups due to a particular mood and anxiety. No statistically significant differences in the physical condition of adolescents were identified, but the social behavior in both groups differed significantly. The results obtained help to understand better the experience of painful symptoms characteristic of pediatric patients with idiopathic scoliosis, and, accordingly, develop recommendations for improving the environment of pediatric patients to generate sanogenic attitudes in parents and pediatric patients, which contribute to the improvement of the quality of life [27].

Longitudinal studies play an important role in analyzing the factors affecting the quality of life and adaptation of patients with severe chronic diseases. For several years, Aslan et al. studied pediatric patients (9 boys and 12 girls) who underwent

several surgeries for scoliosis. At the beginning of the observation, the mean age of the pediatric patients was 6.4 years (from 4 to 10.5 years). They all underwent numerous surgical procedures (from 6 to 18 surgeries), and after a few years, they studied the psychological and psychiatric status at the age of 8 to 17 years. Surgical interventions have been found to impair the quality of life. Depression and generalized anxiety disorder were noted in 23.8% and 42.8% of patients, respectively. Patients in the study group were more likely to have a psychiatric diagnosis than in the general population [33].

Kontodimopoulos et al. conducted a comparative analysis of the assessment of the quality of life of adolescents with idiopathic scoliosis and their parents. Parents were found to rate the quality of life higher than their children [18].

Kadier et al., in a longitudinal study, considered the interrelation of the quality of life assessments by adolescents with recently diagnosed chronic diseases and their parents. The authors found that the existing discrepancy in assessing the quality of life between sick adolescents and their parents tends to decrease [28].

A study by Glowacki et al. (2012) focused on mental health perception by adolescents with idiopathic scoliosis and their parents in the treatment course [56]. Psychosocial and family aspects are very important during the treatment of AIS. Medical workers state that in addition to psychosocial disorders, they often have to deal with impaired body image. Fixation in special limits can cause psychological stress and low self-esteem. The researchers did not find evidence of open psychopathology, but described some of the problems faced by patients, such as soreness, discomfort in activity, difficulties in selecting clothing, and social interaction. Parents generally understand the prospect of treating an orthopedic patient, and there is a high level of consistency between the child’s and the parent’s responses regarding the assessment of the difficulties of treatment [56].

Tomaszewski et al. analyzed publications on self-esteem of adolescents with idiopathic scoliosis. Based on special questionnaires, most adolescents were dissatisfied with their appearance. The authors have also drawn attention to the need for psychological support of patients with AIS during treatment and emphasized the role of training in the formation of productive adaptation strategies of

the individual. The authors pay special attention to the formation of high self-esteem, a sense of self-efficacy and optimism in the treatment of patients with AIS [43].

A significant part in the study of idiopathic scoliosis is found by works on the methods of diagnosing stress in patients with AIS during treatment because treatment sometimes causes no less injury than the disease itself [48].

Leszczewska et al. attempted to assess the stress level in pediatric patients with idiopathic scoliosis, depending on the method of treatment and deformity parameters. For this purpose, they used the tool Bad Sobernheim Stress Questionnaires (BSSQs), which includes two questionnaires, BSSQ Deformity and BSSQ Brace. Of the 73 patients with idiopathic scoliosis involved in the study, 52 were treated with physiotherapy, and 21 patients used the Cheneau corrective corset in combination with physiotherapy. No relationship was found between disease severity (degree of the spine curvature) and stress level. Physical activity was a stress-reducing factor in patients with idiopathic scoliosis. The results of the study using the BSSQ Brace indicate the mean stress level in pediatric patients treated with corrective corset [19].

The study by Rullander et al. aimed to describe the symptoms of stress in adolescents with idiopathic scoliosis pre- and postoperatively due to postoperative pain. The design of the work suggested a quantitative cohort study with the consistent inclusion of participants. The cohort consisted of 37 adolescents aged 13–18 years. A checklist of trauma symptoms for pediatric patients was compiled to assess the emotional stress of adolescents preoperatively and 6–8 months postoperatively. A visual analog scale was used to self-report postoperative pain on day 3. Preoperative anger, social problems, and attention problems correlated significantly with postoperative pain on day 3. In subsequent observations, postoperative pain was significantly correlated with anxiety, social problems, and attention problems. Anxiety and depression rates were significantly higher preoperatively than after 6 months. The results of this study indicated the need for psychological intervention to reduce preoperative stress and postoperative pain [57].

The efficiency of treatment and rehabilitation of patients with orthopedic diseases (especially,

idiopathic scoliosis) is often determined by adherence to recommendations of the medical staff primarily regarding therapeutic exercises, which must be performed for the life term.

The study by Paech and Lippke aimed at studying social-cognitive factors (purposes and intentions, social support, self-determination, planning and self-efficacy) that affect the maintenance of a regular exercise regime after discharge from an orthopedic treatment and rehabilitation facility. Respondents were enrolled from an orthopedic rehabilitation center. The main sample included 641 patients, and 495, 373, 330, and 191 were followed up for 6 months, 1 year, 3 years, and 7 years, respectively. The value of this study consisted in three types of resources of patients with orthopedic disease for the implementation of coping strategies, namely volitional resources (purposes and intentions, planning), social support, and personal attitude (self-efficacy and self-determination). Traditionally, the literature pays attention to volitional resources and social support and ignores the role of the personal attitude because the patient was considered as an object of medical intervention [31]. The study by Paech and Lippke showed that long-term exercise depends not only on the conscious intentions of the patient but also on personal resources (self-efficacy and self-determination) and social support. Accordingly, behavior change actions should be supported by personal and social resources to encourage people to maintain a healthy lifestyle [30].

Discussion

In medical studies of AIS, the topics of the epidemiological situation and early diagnostics (screening), organization of treatment, and consideration of factors (including psychological) that ensure its efficiency are the most relevant.

Russian psychological studies on AIS can be divided into several fields. The first field considered the psychosocial characteristics of patients with scoliosis and included Kraynyukov, Pokhilko, Pyatakova, Mamaychuk, and Poltorakova; the other is related to the study of risk factors for the development of scoliotic disease (Pyatakova), the third is based on the study of parent–child relationships in the context of social situation of the disease and maladaptation (Pyatakova, Mamaychuk, and Poltorakova) [5, 6, 22, 24, 58–61].

There are several approaches in studying the treatment and rehabilitation of patients with AIS. The choice of an approach is often determined by the base of the study. Thus, patients are more likely to be admitted to the hospital to receive assistance, usually with a passive attitude regarding treatment and unrealistic expectations regarding surgical intervention. At the same time, a large group of patients refuse surgery, use corset therapy, therapeutic exercises, and active methods to cope with the disease. Cherkasova, Togidny, and Zhernokleeva distinguished another (third) group of patients with scoliosis, that is, adolescents with an anosognosic type of attitude toward the disease [62].

Krainyukov analyzed foreign studies and noted that the choice of treatment (corset therapy or surgery) affects the quality of life and nature of the patient's adaptation [5]. In a number of works, psychological factors of adaptation of adolescents with scoliosis to corset therapy were studied, and psychological factors that impede treatment were identified, namely reduced mental capacity, expressive and protest behavior, difficulties in communicating with doctors, and increased physical and social activity [8, 11, 63]. It turned out that adolescent compliance was also influenced by the type of corset, time of its wearing, self-esteem, and age of patients [8, 11, 53].

Noonan et al., in a longitudinal study, analyzed the psychosocial characteristics of adolescent girls (95 patients) with scoliosis, whose treatment included conservative and surgical methods. In patients who used corset therapy, temporary psychological effects were noted during the treatment period, in the form of decreased satisfaction with their appearance and discrimination due to their appearance. At the same time, patients who underwent surgery, after 7 years had a negative body image, unlike patients who used corset therapy. The study revealed that the long-term effects of treatment may differ significantly from short-term results. This is why longitudinal research is important. Based on the above, another significant conclusion can be made regarding research methodology, namely considering the circumstances of the disease occurrence (trauma or gradual progression of the disease; chronic nature; when the onset of the disease was registered), treatment, and rehabilitation (considering the nature of the surgical intervention; circumstances of rehabilitation) are important [64].

The place of the patient's rehabilitation should be considered (at home or in a specialized residential facility), as well as how his psychological support was organized. Thus, the study by Chizhakova et al. presented the results of a longitudinal study conducted in a boarding school of secondary general education. The main stage of the study covered 2005–2009, and pupils of primary school (3–5 forms) and secondary school (6–8 forms) participated in the study. The authors studied the rehabilitation of patients with scoliosis under conditions of activity specially organized by teachers and psychologists. The main pedagogical task was to create value-comprehended attitudes in the students, a subjective responsible attitude toward their own lives; interaction with other children in learning in the process of joint creative activity [65].

The following topics are discussed in foreign psychological studies of AIS in recent years:

- 1) the effect of the disease on the psyche of the child; mental health/illness with AIS (manifestations of mental illness most often in the form of depression, anxiety, PTSD);
- 2) pain symptoms and their psychological component;
- 3) factors determining the course of the disease, treatment, and rehabilitation of patients with AIS;
- 4) child's quality of life and psychological resources for adaptation to a chronic disease (self-attitude, the attitude of adolescents to their illness and their cosmetic defect);
- 5) parents' perception of the child's illness, their influence on treatment and rehabilitation;
- 6) psychological support of treatment of orthopedic diseases (attitude to the disease, the consequences of surgery, the study and the formation of sanogenic attitude).

The studies by Han et al. [14] and Paech et al. [30] are the most interesting because both social and psychological factors of the development of scoliotic disease, its treatment, and rehabilitation are widely represented. Nevertheless, the modern literature lacks studies focused on the influence of idiopathic scoliosis on the psyche of a child. The authors of the studies often do not consider that pediatric patients with idiopathic scoliosis undergo surgical intervention and other "hard" methods that violate the body image and physical activity, which, in turn, causes no less psychological trauma than

the disease itself. In addition, the studies considering the nature of medical influences (strictly prescriptive treatment methods and less prescriptive options for medical interventions) are underrepresented. At that, the fact that a strictly prescriptive approach to the treatment of idiopathic scoliosis on the part of the doctors and the parents contributes to the formation in the sick child of a negative self-concept, learned helplessness, and axpasive life position in the fight against the disease, is ignored.

Conclusions

Idiopathic scoliosis should be considered from the point of view of the disease biopsychosocial model; therefore, diverse factors (biological, psychological, social) should be considered, which affects the patient's quality of life.

1. Treatment of scoliotic disease often causes no less psychological trauma to the patient than the disease itself, whereas long-term trends in the development of the disease and adaptation of the patient are not always noticeable.
2. Scoliotic disease violates the body image and the self-concept of the patient, which affects significantly its self-esteem and self-attitude.
3. The most important specificity of AIS is the need for constant conscious volitional effort to adjust own condition, whereas the prescriptive attitude of doctors and parents can reduce the patient's adaptive capability.
4. Psychological support of AIS treatment should be aimed at forming a patient's active position in relation to his own life and active strategies of coping with chronic disease.

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Contribution of the authors

G.V. Pyatakova was involved in the study organization, compilation of results, writing the article, editing the article.

O.V. Okoneshnikova analyzed foreign and Russian sources of literature, wrote the article.

A.O. Kozhevnikova translated foreign sources of literature, analyzed foreign sources of literature.

S.V. Vissarionov edited the article.

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