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A STUDY EVALUATING THE EFFECTIVENESS OF THE SEAS (SCIENTIFIC EXERCISES APPROACH TO SCOLIOSIS) METHOD IN COMPARISON WITH TRADITIONAL THERAPEUTIC EXERCISES IN THE TREATMENT OF SECOND-DEGREE SCOLIOSIS IN ADOLESCENTS 12-14 YEARS OLD

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Annotation. 40 research participants were randomly divided into two groups: experimental and control groups.As a result, there was a noticeable improvement in the clinical course of the disease and a decrease in complaints among the participants of the experimental group.In addition, a significant reduction in asymmetry and breast lump was found among SEAS group members compared to the control group.Thus, as a result of the study, it was found that the application of the SEAS method provides better and faster results than traditional methods in the treatment of secondary scoliosis among adolescents.In addition, although the application of SEAS is convenient in practice, it is a method that requires constant supervision by a specialist.Despite all this, new and larger studies are needed to confirm the results found and determine their effectiveness in the long term. The novelty of the study is that, for the first time, the comparative analysis and effectiveness level of the SEAS method compared to the traditional approach was measured.

Keywords: *scoliosis, adolescents, second degree of scoliosis, SEAS method, asymmetry, therapeutic exercises, modern approach.*

The stages of adolescence, particularly 12-14 years of age, represent a critical period in which intense physiological development highly predisposes to orthopedic pathologies such as second-degree scoliosis - characterized by an angle of spinal deformity ranging from 11 to 25 degrees on the Cobb scale. Based on a variety of epidemiological studies, the prevalence of scoliosis in this demographic category is precisely defined, ranging from 2 to 4% [1].

Statistical indicators illustrate the presence of strategic factors that contribute to the development of this pathology. These include gender, with girls presenting 1.5-2 times more frequently; genetic susceptibility, expressed through family history; and concomitant medical conditions, such as myopathies or neuromascular dysfunction. Risk factors also include lack of physical activity and poor posture, especially with prolonged time spent in front of a computer [2].

In light of the above, the analysis of empirical data highlights the urgent need for more research on methods of correction and treatment of second-degree scoliosis, tailored to this specific age group. The collected statistical data provide a foundation for the generation of innovative methodological and therapeutic concepts aimed at minimizing this orthopedic problem.

In terms of correcting pathological curvatures of the spine, several methods can be categorized as surgical, orthopedic and physiotherapy. Each of them has its advantages and disadvantages, and the choice of the optimal treatment method depends on several parameters such as the degree of deformity, the patient's age criterion and the presence of concomitant medical conditions.

For example, the SEAS (Scientific Exercises Approach to Scoliosis) methodology aims to correct spinal curvature by improving coordination abilities and conscious control of

the static position of the body. This method offers a set of individualized exercises aimed at three-dimensional correction of the spinal structure [3].

In terms of comparative effectiveness, surgery, despite its invasiveness and risks of complications, provides the fastest and most reliable correction of deformities. Orthopedic corsets can be effective when it is necessary to prevent further progression of the curvature, but wearing them can be psychologically difficult for adolescents. Physiotherapeutic modalities such as SEAS and Schroth provide more conservative and less risky treatment options, also contributing to overall body strengthening and quality of life.

Thus, a multiparametric assessment of the patient's condition can provide a basis for choosing the most effective and safe treatment method, including the possibility of combining different approaches to achieve an optimal therapeutic effect.

The SEAS methodology is an innovative and scientifically supported physiotherapeutic intervention option for the correction of scoliotic changes. This system focuses on optimizing coordination, balance and conscious posture control on the part of the patient [4]. The main elements of the approach are individualized physical tasks and the patient is instructed to perform these tasks autonomously, with the possibility of correction from a professional. Continuous modification of the exercises according to the patient's current condition reinforces the effectiveness of this methodology.

An analytical review of scientific data confirms the high effectiveness of the SEAS methodology, particularly in the initial stages of scoliosis and among young people in the period of accelerated growth [5]. According to these data, the methodology provides statistically relevant reductions in spinal deformity angle and amelioration of patients' standard of living. One of the key aspects is not just minimizing the deformity angle but also preventing its further aggravation, which is critical in the adolescent patient population.

In the context of orthopedic therapy, the SEAS technique stands out as an innovative and holistic approach to scoliosis correction, whereas standard methods may offer limited or even risky solutions. This technique minimizes the potential complications that often accompany surgical procedures, providing a less invasive treatment. It also offers a dynamic and patient-centred model of intervention that differs significantly from the limited comfort and psychological burden associated with the use of orthopedic braces.

Rather than universalized treatment plans, SEAS seeks to tailor therapeutic techniques to each individual case, making it not only personalized but also flexible within clinical practice. This individualization is enhanced by a comprehensive approach to improving the patient's overall physiological status, and is not limited to the correction of spinal curvatures alone. It includes the holistic development of the muscular system, coordination and balance, thus enriching the patient's quality of life.

The economic component cannot be ignored either: the SEAS technique can be considered more cost-effective when compared to the short- and long-term costs of surgery and orthopedic devices. The effectiveness of the SEAS approach is further amplified when it is integrated into a comprehensive therapeutic course that includes not only somatic but also psycho-emotional rehabilitation.

SEAS, a technique for the treatment of scoliosis, provides a quality alternative to traditional approaches, including surgery and orthopedic braces. SEAS is characterized by low invasiveness, which reduces the likelihood of complications or side effects. As part of an academic literature review, this study covers the multifaceted nature of scoliosis, from its distribution in specific age groups to current approaches to diagnosis and therapeutic interventions.

The study represents the first attempt at a comparative assessment of the effectiveness of the SEAS method and traditional therapeutic exercises in treating second-degree scoliosis in adolescents.

The study involved 40 people - 23 girls and 17 boys. Participants were randomly divided into two groups. The first group of 20 people included the same as the second, 20 people. The first experimental group consisted of 13 girls and 7 boys. The second control group consisted of 10 girls and 10 boys.

The study took place in a rehabilitation center. Both groups were treated with tradetional therapeutic gymnastics for the treatment of scoliosis, while the experimental group was treated with the SEAS method. Participants did not receive any other treatment in the form of a corset or massage or physical therapy, nor did they attend sports clubs.

Classes in two groups took place three times a week with traditional therapeutic gymnastics (45 minutes) and once a week SEAS therapy was carried out only in the first group (60 minutes).

The total number of traditional therapeutic gymnastics classes in the two groups was 30 classes over three months.

Participants had no history of trauma or surgery, or congenital anomalies of the spine.

Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Age and Developmental Stage: The protocol is specifically designed for children aged 12-14, as this age group typically exhibits significant spinal growth, making them ideal candidates for the SEAS method	Severe Scoliosis or Other Spinal Abnormalities: Children with severe scoliosis or other significant spinal deformities are excluded, as the SEAS method is tailored for mild to moderate cases
Diagnosis of Second-Degree S-shaped Scoliosis: Patients must have a confirmed diagnosis of second-degree S-shaped scoliosis	Neurological or Musculoskeletal Disorders: Any neurological or musculoskeletal disorder that could interfere with the exercise regimen or pose a risk during the treatment leads to exclusion
Cognitive and Physical Ability: The children must have the cognitive and physical capacity to understand and participate actively in the treatment, as the SEAS method relies heavily on patient engagement and self-correction	Non-Compliance or Inability to Participate: Patients who are unable or unwilling to comply with the regular and active participation required by the SEAS method are also excluded

Methods of data collection and analysis. The assessment of the study participants includes a visual assessment of the asymmetry of body segments and an X-ray image from which the Cobb angle is determined [6]. An X-ray is taken on a digital machine to accurately determine the angle of curvature of the spine. After determining the angle of curvature by the device, the angle is double-checked manually using a special mobile application “Scoliometer” to exclude any error. On the X-ray image, in addition to the Cobb angle, the Risser test is determined in all participants. There were no statistically significant differences in the magnitude of the spinal curvature angle between the study and control groups.

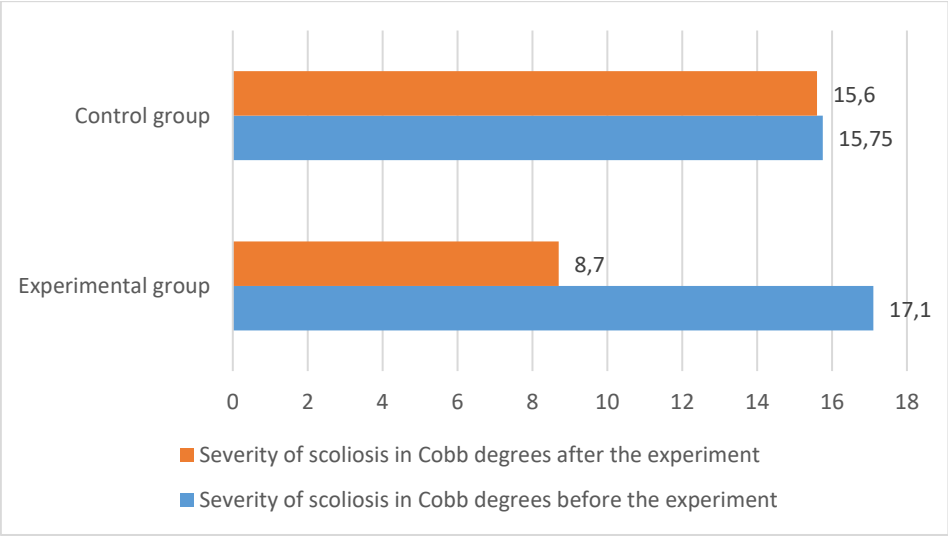
Scoliosis severity in Cobb degrees according to the data X-ray examinations (M±SD)

	Patient Groups			Significance of the differences in the indicators (p) of the experimental and control groups
	All patients (n=40)	Experimental group (n=20)	Control group (n=20)	
Severity of scoliosis in Cobb degrees	16,42±4,66	17,1±3,64	15,75 ±3,78	>0,05

Analysis of the results obtained showed that in 2/3 of the patients of the main group, there was a decrease in the severity of asymmetry of the upper arms, shoulder blades and waist triangles, while in the control group, similar results were achieved in about half of the patients. As for the asymmetry of the iliac wings, positive changes were observed in the vast majority of patients in both groups (77.8% and 70%). As an important point, it should be noted that the severity of costal hump decreased in 66.6% of patients in the study group, which is twice as high as the results obtained in the control group (33.3%, $p<0.05$). At the same time, there was a slight increase in the clinical signs of scoliosis in a small number of patients who had these manifestations before the course of treatment. At the same time, for example, an increase in asymmetry of the upper arms was noted slightly more often in the control group (24.2%) than in the group of patients who received an additional course of SEAS (13.3%).

Thus, the assessment of clinical symptoms of scoliosis in children revealed better results in the study group of patients compared to the results of patients who received basic therapy.

As for the effectiveness of the treatment depending on the severity of the scoliotic deformity, in both groups under study, a more significant positive trend was observed in the children of the experimental group. An increase in the severity of clinical signs was only in children of the control group with a curvature arc greater than 25 degrees Cobb in thoracolumbar and combined types of scoliosis.



Thus, summing up the results of the assessment of the effect of the treatment complex, we can say that SEAS has a certain advantage over the basic treatment, contributing to both the rapid regression of the clinical manifestations of stage II scoliosis and the reduction in the number of patient complaints.

Thus, based on the results of the assessment, we can see that the SEAS method is easy to use, although its application requires constant supervision by a specialist. At the same time, it should be noted that scoliosis is a pathology that needs constant treatment and control.

The main weaknesses of the study can be identified: a small number of patient participants; performing x-rays only while standing and only in one frontal projection; comparison of the method used not with advanced methods for the treatment of second-degree scoliosis, for example, with meal therapy, but with traditional therapeutic exercises; different qualifycations of instructors; not all patients diligently performed the exercises, because patients had to perform Seas exercises at home every day for 20 minutes and it was impossible to control their performance; control was carried out only from the words of their parents.

Further explorations in this research context not only improve current methods, but also develop new avenues for more productive diagnostic and therapeutic strategies for scoliosis. An integrated view of multiple etiological factors, both genetic and environmental, is key. Meta-analyses that contrast the efficacy of the SEAS method with conventional approaches on large numbers of subjects are necessary for scientific consensus.

Adequate evaluation of the long-term impact and cost-effectiveness of innovative therapeutic techniques is an integral part of the process. Interventions should also incorporate personalized treatment regimens, taking into account bio individual responses to SEAS techniques. Equally important is attention to the psychosocial effects of scoliosis and its treatment on the emotional status of patients. Finally, the integration of a variety of therapeutic modalities to improve overall efficacy represents a promising area for further research.

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12-14 YAŞLI YENİYETMƏLƏRDƏ 2-Cİ DƏRƏCƏLİ SKOLYOZUN MÜALİCƏSİNDƏ ƏNƏNƏVİ TERAPEVTİK MƏŞQLƏRLƏ MÜQAYİSƏDƏ SEAS (SCIENTIFIC EXERCISES APPROACH TO SCOLIOSIS) METODUNUN EFFEKTİVLİYİNİ QİYMƏTLƏNDİRƏN BİR ARAŞDIRMA

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Annotasiya. 40 nəfərədən ibarət tədqiqat iştirakcıları təsadüfi üsulla iki qrupa: eksperimental və kontrol qruplarına bölünüblər. Nəticədə, eksperimantal qrup iştirakcıları arasında xəstəliyinin klinik gedişatında nəzərə çarpılan yaxşılaşma və şikayətlərin azalması müşahidə edilmişdir. Bundan əlavə, kontrol qrupu ilə müqayisədə, SEAS qrupu üzvləri arasında asimmetriyanın və sinə qabarının əhəmiyyətli dərəcədə azalması aşkar edilmişdir. Beləliklə, tədqiqat nəticəsində aşkar edilmişdir ki, SEAS üsulunun tətbiqi yeniyetmələr arasında ikinci dərəcəli skoliozun müalicəsində ənənəvi üsullara nisbətən daha üstün və sürətli nəticələr əldə edilməsini təmin edir. Bundan əlavə, SEAS-in tətbiqi praktik olaraq rahat olsa da, mütəxəssis tərəfindən daimi nəzarət tələb edən bir üsuldur. Bütün bunlara baxmayaraq, aşkar edilmiş nəticələrin təsdiqləməsi və uzunmüddətli perspektivdə effektivliyini müəyyənləşdirmək üçün yeni və daha iri miqyaslı tədqiqatlara ehtiyac duyulur. Tədqiqatın yeniliyi ondan ibarətdir ki, ilk dəfə olaraq SEAS üsulunun ənənəvi yanaşmaya nisbətən müqayisəli analizi və effektivlik səviyyəsi ölcülmüşdür.

Açar sözlər: *skolyoz, yeniyetmələr, ikinci dərəcəli skolyoz, SEAS üsulu, asimmetriya, terapevtik məşqlər, müasir yanaşma.*

ИССЛЕДОВАНИЕ ОЦЕНИВАЮЩЕЕ ЭФФЕКТИВНОСТЬ МЕТОДА SEAS (SCIENTIFIC EXERCISES APPROACH TO SCOLIOSIS) В СРАВНЕНИИ С ТРАДИЦИОННОЙ ЛЕЧЕБНОЙ ГИМНАСТИКОЙ ПРИ ЛЕЧЕНИИ СКОЛИОЗА ВТОРОЙ СТЕПЕНИ У ПОДРОСТКОВ 12-14 ЛЕТ

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Аннотация. Исследование представляет первую попытку сравнительной оценки эффективности SEAS (Scientific Exercises Approach to Scoliosis) метода и традиционной лечебной гимнастики в лечении сколиоза второй степени у подростков. Участвовали 40 пациентов, случайным образом распределенных на экспериментальную и контрольную группы. Результаты показали, что SEAS метод обеспечивает более заметное снижение клинических проявлений сколиоза и улучшение асимметрии в сравнении с традиционной терапией. Эти данные подчеркивают новизну исследования, так как ранее подобные сравнительные анализы не проводились. Эффективность SEAS метода подтверждается как с клинической, так и со статистической точек зрения, что открывает перспективы для его широкого применения в практике лечения

сколи-оза второй степени у подростков. Однако необходимы дальнейшие исследования с более крупными выборками для подтверждения полученных результатов и выявления долгосрочных эффектов.

Ключевое слово: *спортивные результаты, идеальная игровая позиция, индекс биологической массы, юный футболист, жировая масса, баланс жидкости, мышечная масса, гибкость.*