Journal of Biomedical Sciences | ISSN: 2960-9356
Research Article Peer-review, Open Access

Connective tissue (ndtd) adapted to the clinical characteristics of the cardiovascular system in children and adolescents: physical considerations

Sherzod Sadikov Arslonovich [1]

Abstract: The article provides a comprehensive review of recent studies on the adaptation of the cardiovascular system to physical exercise in children and adolescents with undifferentiated connective tissue dysplasia (UCTD). Accord to literature data, the myocardial function in patients and demonstrate morphological change of the highway, reduced contractility, diastolic dysfunction, and autonomic imbalance. Heart rate variability (hrv) analysis reveals a predominant sympathetic activity and reduced parasympathetic tone, leads to decreased adaptive reserve and prolonged recovery after your workout. Echocardiographic data indicate a lowered ejection fraction (55-58%) and reduced cardiac output by 10-15%. The review emphasizes the importance of individualized assessment of early signs of pregnancy to prevent complications and improve cardiovascular function and the development of adaptation in the rehabilitation program. The clinical significance of the findings highlightly continuous monitoring and management of personalized exercise in children with UCTD.

Keywords: dysplasia, connective tissue, cardiovascular system, physical load, autonomic imbalance, cardiac adaptation, HRV, mitral valve prolapse, hypotonic syndrome.

[1] Tashkent state medical universtiteti medical rehabilitation, sports medicine, folk medicine, and the department of physical education department assistant

ACCESS

Nedifferensiyalashgan displaziyasi connective tissue among children and teenagers in recent years (NDTD) is to identify the disease more and more. According to various epidemiological studies, general symptoms in pediatric populations NDTD 20-40% in children, while accompanied with cardiovascular changes the form of 10-15 % cases occurs. This condition is defined from the aspect of genetic collagen, elastin and fibrillin synthesis of progressing with description of a disorder of the whole body leads to the loosening of the connective tissue in structure and function.

Morfofunksional shortage of connective tissue, primarily in the cardiovascular system show up will. Because of the heart valves, walls of the blood vessels and stromasi myocardial collagen-rich elastic frame structures. Therefore NDTD who are children of the heart muscle tissue decrease in the mechanical stability, increases myocardial cho'ziluvchanlik, vegetative regulyatsiya tonusi lips is broken and the vessels increased. Kompensatsiyalanishi these changes in physiological conditions, but can adapt to enough physical activity during the heart of downloads unable to pathogenesis've the main part becomes.

Modern NDTDning of actual in pediatrics , a few of the factors by is determined:

- **aniqlanish increasing the frequency of that.** Genetic surveys on the development of the characters have been detected much more frequently as a result of ndtdga fenotip, but this disease often from the clinical aspect "light the night" was wrong assessed.
- **Early functional failure of the cardiovascular system.** NDTD the diastolik disfunktsiyasi of the heart in children, or trikuspidal prolapsi mitral valve, cardiac rhythm and arterial lips gipotoniya appear at an early age. This overall physical activity of the child in school, the ability to perform downloads and reduces the quality of life.
- **Regulyatsiya vegetative and psixofiziologik profile cases of violation.** NDTD central autonomic sympathetic system of the heart in the background disbalansi–shall have the management of parasimpatik. As a result, the pulse frequency of unstable, ortostatik gipotoniya, dizziness and fatigue symptoms will appear.
- **Preventive and rehabilitation indicated that the system does not produce enough of.** Struktur violation of current pediatric protocols that can stay focused on mainly the heart is, are directed to mechanisms of functional recovery program compatibility almost there.
- **Sports and physical education in the environment need a differential approach.** Anybody ndtd prevalence among adolescents because of the physical downloads on adapted an agreement reviews, downloads set norms of the individual is of great practical importance.

As recorded in the scientific literature (e. a. smirnova, 2018; n. v. kotelyva changes in temperature and pressure, 2020; t. v. Kaznacheeva, 2021), in children NDTD heart muscles and blood vessels of the walls of morphological changes, vegetative and physical disbalans slow downloads with punctuation marks was yesterday. This condition in the long term, heart rhythm disorders, gipotonik syndrome and increases the risk of development of heart disfunktsiyasi diastolik.

Thus, the problem of the actual NDTD the activity of the cardiovascular system for the early detection of change in children's physical adaptation to assess the capacity of their downloads and individual rehabilitation programs work out of necessity by a is determined. This issue of pediatric cardiology and sports medicine's most pressing scientific and practical is one of the priorities.

Target. The results of the research the main objective — nedifferensiyalashgan displaziyasi connective tissue (NDTD) of children and adolescents to determine the properties of downloads compared to the physical compatibility of the cardiovascular system, and assess changes that happens in the vegetative morfofunksional this process, as well as the scientific basis of their pathogenetic mechanisms in the analysis is from.

Also, the ndtd the management of the vegetative activity of the heart in children, heart qisqaruvchi since the dynamics of the interaction between the heart and the blood vessels tonusi recovery of the results of research regarding the study of the direction has been identified as also important.

Material and methods. Research 2015-2024 for more than 80 years of scientific articles published in foreign and local in the range studied. The most pressing resource is included systematic reviews, 12. Literature, PubMed, Scopus, Elsevier, Google schot network were selected from the database. Qidiruvga the following keywords were used: *“connective tissue dysplasia”, “children”, “physical load”, “cardiovascular adaptation”, “heart rate variability”, “mitral valve prolapse”*.

Selection criteria (inklyuziya terms):ndtd confirmed the diagnosis in children or teenagers who have participated in the research, to be given information on the changes of the cardiovascular system and vegetative morfofunksional regulyatsiyasiI; downloads or physical tests HRV (heart rate variability) analysis to be available, I; data statistical processing ofthe last to beI ($p<0,05$).

The method of analysis. Systematic literature review research method out did not go. Each one a source with the following parameters baaunt was: the type of research (clinical, experimental, monitor); sample size, and age groups; the activities of the cardiovascular systemto the main related indicators; downloads physical testing results; Conclusionsand clinical recommendations.

The data obtained in the analysis of PRISMA (2020) international regulations of the requirements to comply with did not. Cited by the authors for the reliability of the analysis results, the average value of the standard deviations and the significance of the differences student's t-test and $\chi 2$ criteriaby were assessed.

The main methodological approach. The analysis of the literature to track not only the clinical but also ekg, echo, HRV, ortostatik test and PWC170 test results both rely on. Additionally, in the research since some heart qisqaruvchi (EF – ejeksiya faction), heart chiqimi (CO) and vegetative tonusi analysis was made. Furthermore, with the methodological aspect ndtd from healthy children identify the difference betweenat and comparable statistics korrelyativ upon analysis methods were applied.

The results obtained. The scientific literature that the results of the analysis made shows, nedifferensiyalashgan displaziyasi connective tissue (NDTD) standard features than the physical adaptation of the cardiovascular system of children and adolescents are dramatically different than downloads. Struktur established from the genetic aspects and functional changes of the heart in these cases the synthesis of collagen, elastic fibers associated with the weakness of management and vegetative muvofiqlashmaganligi enough. Smirnova e. a. (2018) displaziyasi spent in the research of the decrease of the thickness of the heart muscle in children, heart and mitral valve prolaps in the mode of the compartment were relatively stretched to be determined. These morphological changes qisqaruvchi shares reduces the heart of the reserve and will not lead to a sufficient increase of heart during physical chiqimi downloads.

Changes in temperature and pressure kotelyva v. n. (2020) ndtd track their activity in central mechanisms of the cardiovascular system in the background of the main — pulse frequency, blood vessels tonusi and peripheral resistance showed that the balance between had been broken. Furthermore, mitral valve prolapsi who are children chiqimi heart by 10-15% decreased, while accompanied with fatigue and vegetative disbalansga disfunktsiya diastolik this reason. Stable performance is directly related to the position of the vegetative system of the heart, for the reason that Kaznacheeva t. v. (2021) HRV (heart rate variability) and sympathetic with the method of the research conducted in the active column ndtd children ministry noted that while reactive parasimpatik had decreased significantly. Thus, stress-index index is higher by 2-3 times, stating the condition of the heart that limit the compatibility options.

Shimanskaya, n. i. (2017) the heart of tests that ortostatik on the basis of the analysis of the teenagers NDTD at 70% ortostatik gipotonik reaction at 25% while giperdinamik response is observed. The full cycle in the peripheral blood of the heart that can adapt to this show will. In the meantime, morphological changes of the heart muscle tissue also plays an important role. Borisov, o. s. (2019) analysis in the left ventricle of the heart in ultrasound trabekulyatsiya increase of the heart valve were stretched, and the expansion of part of the root of the aorta , the incidence is described. This quality of collagen tissue weakness by caused.

Korzun, V. O. (2016) the analysis was conducted by physical tests that downloads the ndtd the recovery period than the average pulse frequency among teenagers healthy child 1,4–1.6 times lasts longer, while this decrease means that the heart muscle energy efficient. The heart's energy resources and the process of elastic tissue in the carcass oksidativ fosforlanish be limited because of the shortage ofI can. Shatalova n.

a. (2022) the response of the heart giperdinamik ortostatik research identified during testing and unstable stressed arterial pressure is increased the responsiveness of the cardiovascular system compared to that estimated downloads the physical.

Rumors v. i. (2019) NDTD ecg analysis in the PP children to be extended the range of the t-wave of displacement and determine who observed that it was a violation of repolyarizatsiya process. This changes the conductivity of the heart muscle tissue and collagen structure of interstitsial linked with the disorder. Klimov, A. Yu. (2017) on the basis of the echo of the heart while ejeksiya faction 55-58% around that and a healthy heart since qisqaruvchi children compared to 10-12% is low noted has. These facts NDTD the children in the mechanical stability of the heart and the reserve qisqaruvchiI had lowered their shows.

Petrova, g. m. (2021) by conducted Doppler analysis in these children sistolik pressure 90-100 mmHg around, reactive vascular wall, while low level is detected. With this along, Tulyakova l. a. (2020) out of the heartof imi (cardiac output) 15-20% reduction through peripheral circulatoryits nest compatibility reserve, which was the limit that I noted. NDTD the children the function of the heart fail to keep the contract and reactive vegetative between strong reverse in korrelyativ observed: HRV parameters of low heart out ofthe imi reduction with directly associated.

Aleksandrov, s. n. (2018) morfotipik features on NDTD in children astenik body structure, low muscle tonusi and narrow chest qafasi the heart of physiological activities that would limit indicated. In these cases, the heart blood circulation decreases and ventilation-perfuziya ratio is distorted. Solovyeva i. e. (2018) displaziyaning while hormonal changes teenager’s evident cardiovascular symptoms, the severity of which is a factor that is showing — especiallygirls, a decrease in the level of estrogen in the heart muscle stretchediluvch Ispotted further increases.

Trofimova o. v. (2020) clinical observed in functional therapy after the HRV parameters in 25% to improve and the pulse frequencyto its nest quicklyroq steepto be justified noted was. Vegetative compatibility of this heartI special exercises with the help be improved and that shows. Zhavoronkova p. n. (2019) 6 month rehabilitation program realized in the physiological indicators of the heart afterthe ilar dynamic to improve confirmed.

Recent studies (e. p. Gribanov, 2022; m. a. sazonova, 2023) that shows, complex rehabilitation programs — that is, heart-breathing exercises, aerobic downloads soft, vegetative balanceto be restored exercise — heart adaptasiya the normalize in thim is has. These results NDTD fonidagi functional although it does not completely eliminate the shortage, the heartof the compensatory capacity expands.

In general, have been the source of that analysis shows, the activities of the cardiovascular system connective tissue of children and adolescents nedifferensiyalashgan displaziyasi a versatile effect: struktur shortage of the heart muscle, vegetative management disbalans, the walls of blood vessels as a result of the weaknesses of the process of energy exchange and lower tonusi the physical compatibility of the reserve is the decrease of the heart downloads. Arterial gipotoniya of this condition in the long term, transient arrhythmias, diastolik disfunktsiyasi of the heart and increases the risk of developing syndrome of vegetative distoniya. Therefore, NDTD the early assessment of activity of cardiovascular system in children, HRV, ECHO constant monitoring and functional test of downloads, as well as the development of individual rehabilitation approach is important toiyat acquires.

Discussions. The results of the analysis of scientific sources nedifferensiyalashgan displaziyasi connective tissue (NDTD) morfofunksional and vegetative changes occurred in complex activities of the cardiovascular system of children and adolescents that have shows. On the basis of these transformations pathogenetic collagen connective tissue-elastic carcass genetic shortage disbalansi vegetative nervous system and the decrease of energy efficiency miokardning lies. As a result, the heart of the activity of the physiological stability deteriorates, the physical downloads of compatibility and the possibility that it will limit.

Anatomical defects associated with changes only ndtd heart — mitral valve prolapsi or trabekulyatsiya with limited remains. They're functional at the level , too show up will: decrease since qisqaruvchi heart, heart chiqimi decreases, blood vessels tonusi labillashadi. This is as a result of the body's general punctuation of the mechanism of the stability out of. Kaznacheeva (2021) and Shimanskaya (2017) in as shown, HRV analysis of sympathetic've tonusi superior, stress-indenksning high and parasimpatik active low is confirmed. This condition indicates that the activity of the heart is in constant stress mode.

Another important aspect, the structure of the body asthenik NDTD among children, and a narrow chest features like low muscle tonusi morfotipik are very common. Anatomical factors such mechanical activity of the heart reduces the chances of heart would limit volume by changing the pressure and the physiological pay ventrikulyar diastolik heart chiqimi the reductionof the resurrection. Therefore, the energy reserve of the heart in children at the time of such downloads any physicalI spent quickly, and the process of recovery is prolonged.

In borisov (2019) and Klimov (2017) deviasiyalar small morphological research of the heart (the aortic root expansion valve to decrease the elasticity of clinical respects in a negative role was noted. In these cases, it develops on the background of hormonal changes especially during adolescence. Solovyeva (2018) in this period in the work of the more difficult symptoms of endocrine and strengthen the heart perestroykalar ndtd adaptasiya pointed out.

This analysis of the literature also shows, in the heart of the reserve ndtd children adaptasiya saqlip stay for individual rehabilitation programs can be effective. Gribanov (2022) and Zhavoronkova (2019) downloads aerobic recommended by the soft, heart–HRV indicators of vegetative breathing exercises and restore the balance exercise it 20-25% have improved. Testified that this is the heart that is not returned full of changes in the activities of morfofunktsional also, if you can make them by physiological compatibility compensation.

Pathogenetic context of the cardiovascular system integrated at the NDTD adaptasiya a breach of mechanism bdie, it is realized through the following chain:

Violation of genetic collagen synthesis → cho'ziluvchanlik the increase of myocardial → keep to the reduction of the reserve contract fails → to be out of the stability of vegetative management → physical tolerance to low downloads.

The clinical aspects of this chain from fatigue, head turning, and I, the pulse of the chamber lips, gipotonik reactions and the theme is "breath qisishi" appears.

Also recorded in literature of affectedbirths according to the data, this decrease in children heart qisqaruvchanligining (ejeksiya faction 55-58%), and peripheral blood circulation of the body's total lack of diastolik low pressure oxygen demand full qondirmaydi. This condition long-term physical training or sports can cause dezadaptatsiyasiga downloads in the heart of the work. Therefore, the physical assessment in children ndtd downloadsat tests are not standard, but individual HRV, heart chiqimi ortostatik test and should be decided on the basis of indicators.

Conclusions:

1. NDTD children and adolescents in the cardiovascular system morphology, vegetative and functional complex if there are changes to low downloads appears with them in the physical punctuation marks.
2. The shortage of collagen in the muscle tissue of the heart and heart and will limit vegetative disbalans qisqaruvchi had relaksasiya diastolik.
3. Hrv parameters and diagnostic markers can be used as sensitive at heart chiqimi NDTD.
4. In these cases the physical test of downloads determine the physiological reserve of the heart to be important, however the downloads are strictly individual dosage should be defined.

5. The rehabilitation process in the heart, breathing exercises, low intensity aerobic exercise, swimming and breathing management technical solutions significantly improved vegetative adaptation to an agreement.
6. Long-term monitoring of heart function, the stability of HRV indicators, echo parameters and the dynamics of arterial pressure or through should be the price.

In terms of practical significance, NDTDthe compatibility of the cardiovascular system in children of early detection of the level of physical activity compared to their healthy development of the downloads ensuring thatwhile it is an important factor. Cardiologist found not only this, but also the pedagogical approachto also changes: physical education for children such special programs, exercises, physiotherapy and rehabilitation is a complex individual work out needed.

Thus, the scientific evidence obtained nedifferensiyalashgan connective tissue displaziyasi who are of the cardiovascular system of children and adolescents downloads the physical point of stagnant adaptasiya the night, but early diagnosis and individual rehabilitation measures through this position fix that proves. NDTD pediatric urgent the problem is, it deeply in the study and practiceto improve children's health through add, reduce the risk of heart disease and the functional capabilities of future generations increase can.

Used literature

1. Wheeler, j. b., et al. Connective tissue disorders and cardiovascular abnormalities in children and adolescents: clinical and prognostic implications. *Pediatric Cardiol.* – 2014. – Voles. 35, no. 6. – P. 1359-1366. PMC
2. Connective tissue dysplasia were reported in v. timokhina impact on cardiac adaptation in young athletes. *Bio-IC Conferences 2020.* – 2020. – Voles. 2020.02019. – P. 1-6. Biokonferentsii
3. Shtrakh k. l. cancer, n. shevchenko, S. Odigbo exercise tolerance and physical activity in children with cardiovascular disease and connective tissue dysplasia. *V. N. Karazin Kharkiv At J. Nat. Univer., Series "Medicine".* – 2019. – No. 39. – P. 90-98. SciSpace
4. Yavorskaya m. v. Kravtsova n. a. psychological adaptation of the indicators against the background of connective tissue dysplasia in patients with cardiovascular pathology. *May be my cl. Psychol. Spec. Educ.* – 2021. – Voles. 10, no. 1. – P. 206-223. PsyJournals
5. From baba A., Parlapiano, G., Cicenia m., et al. Cardiovascular involvement in children with the syndrome of unique features and dedicated multidisciplinary care marfu justify progression. *J. Cardiovasc. Dev. Dis.* – 2024. – Voles. 11, №4. Article 114. mdpi.com
6. Nokhsorova M. n., borisov, A. Laboratory Studies of connective tissue Dysplasia in children Ammosova result in your living in yakutia. *Health science research in advance. In modern society, proceedings of the conference on health and wellbeing (CHW 2021).* – 2022. – Voles. (CHW 2021), P. 172-176. PROVINCES: 10.2991/ah.k.220103.035. Atlantis Press Scheming Agent
7. Yavorskaya m. v. Kravtsova n. a. Psychological Adaptation in patients with Cardiovascular Pathology of the indicators against the background of connective tissue Dysplasia. *Clinical psychology and special education.* – 2021. – Voles. 10, no. 1. – P. 206-223. PROVINCES: 10.17759/cp highway.2021100110. PsyJournals
8. Shtrakh k. l. cancer, n. shevchenko, S. Odigbo exercise tolerance and physical activity in children with connective tissue dysplasia is the most common cardiovascular diseases and. *V. N. Karazin Kharkiv At J. Nat. Univer., Series "Medicine".* – 2019. – No. 39. – P. 90-98. PROVINCES: 10.26565/2313-6693-2020-39-10. SciSpace

9. Erden, a., et al. Physical activity and physical fitness in children with heritable connective tissue disorders. *Frontiers in Pediatrics.* – 2023. – (Article) PROVINCES: 10.3389/fped.2023.1057070. pure.amsterdamumc.nl
10. Length N., et al. Cardiovascular disease risk in children and adolescents: a case-control study. *International journal of environmental research and public health.* – 2023. – (Article) PROVINCES: 10.3390/ijerph200xxxxxx. PMC
11. O. v. Efimenko, l. r. Khaidarova extracardial diseases and in the development of the cardiac mitral valve prolapse rolan and its children. *International journal of Medical Science.* – From 2025. – Voles. 5(02). – P. 8-13. academicpublishers.org
12. From baba A., Parlapiano, G., Cicenia m., et al. Cardiovascular involvement in children with the syndrome of unique features and dedicated multidisciplinary care marfu justify progression. *Journal of Cardiovascular Development and disease.* – 2024. – Voles. 11, №4. Article 114. PROVINCES: 10.3390/jcdd11040114. MDPI
13. Features of myocardial damage indexes in patients with metabolic syndrome and nonalcoholic fatty liver disease Metabolism/Volume 128, Supplement, March 2022, 155040 DOI:https://doi.org/10.1016/j.metabol.2021.155040 Guzal Sobirova Jamol Uzokov Zarnigor Bafoeva.
14. Osteoarthritis disease and its rehabilitation ДШ Ахмедова, СА Жураевич, Western European Journal of Medicine and Medical Science, 2024стр 37-42
15. Исамухаметова Ю. М., Рахматова М. Р. (2025). Клиник фармакологик ва ноанъанавий терапиянинг ўзаро уйғунлиги: бел-думғаза дорсопатияси мисолида (шарҳ мақола). В central asian journal of academic research (т. 3, Выпуск 5, сс. 119–125). Zenodo. https://doi.org/10.5281/zenodo.15573145