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Analysis of cause-effect relationship of hip dysplasia in pre-school children

Abstract. ***Purpose:*** *to analyze and scientifically substantiate peculiarities of cause-effect relationship of hip dysplasia in pre-school children.* ***Material and Methods:*** *analysis and systematization of scientific and methodological literature, medical histories, anamneses, interviews and questionings.* ***Results:*** *it is specified that failure to timely identify and eliminate the symptoms of hip dysplasia in pre-school children leads to negative consequences, namely limited amplitude of hip joint movements; lower limp muscle weakness; valgus and varus deformations of lower limp; increasing of L-lordosis; skewness of hip bones; scoliosis; claudication.* ***Conclusions:*** *the modern state of the problem of hip dysplasia in pre-school children is analyzed. The cause-effect relationship is defined, their mutual transition is projected. All cause-effect relationships are in direct proportion and in constant interaction: the cause the forms effect and the effect influences the cause.*
Keywords: *cause; effect; hip dysplasia; pre-school age.*

Introduction. Modern physical rehabilitation recognizes determination of all pathological processes. Determination is that external influence on an organism breaks through internal conditions of its activity and hereditary mechanisms. The system research of the cause-effect relationships in the course of developing of an illness notes that the majority of diseases starts developing at the molecular level and is followed by changes of ultra-structures of a cell. These changes are determined by shifts in a complex of exchange processes of the whole organism. It is characteristic that cellular organelles answer different influence with a stereotypic reaction. There is a dialectic concept of causality in philosophy which recognizes the interrelation of cause-effect relationships. Each cause-effect relation is directly proportional also is in the continuous interaction: the reason influences a consequence, but also the consequence actively influences the reason. A causal interaction includes at itself both external and internal communication of the phenomena which serve as the reason of emergence of new phenomena. Thus, the reason of emergence and development of material educations contains in them and represents interrelation of elements which form them. Interaction, acts as the reason which is the process of mutual influence of bodies at which there is an exchange of results of this influence owing to what each of the interacting phenomena separately can't be defined as the reason. There are two types of the reasons: the first – the reason as interaction of things, elements, tendencies; the second – the reason as interaction external with internal. Understanding of the reason by the second look especially important for medico-biological researches: changes of organic systems depend by the nature of an organism and the nature of surrounding conditions; the disease depends not only on the nature of external interactions (physical, chemical, biological), but also in equal degree from the internal state of an organism (immunity, age, sex, constitution) [10].

The philosophical analysis of causality is a difficult question over which decision philosophers argued throughout the millennia. Still Aristotle researched a question of causality in the western philosophy, and hitherto it is investigated in modern philosophical magazines [11].

The cause-effect relationship has the features thanks to what it can be found and investigated. A certain following of the phenomena in time is one of them: the reason precedes a consequence. It is defined by that there is a "genetic" communication between a cause and an effect. A reason generates a consequence at a certain level of the development. However it is impossible to consider that the cause-effect relationship is established only on the basis of sequence of the phenomena in time.

The cause-effect interrelation provides them inter-transfer as the reason can act as a result of the previous (that generated it) phenomena during the general development, and the consequence is the reason which generates other actions. The concept "consequence" is what leaves, comes up from something, a result [9]. The consequence is the return reaction of an organism which is formed as synthesis external and internal. Analyzing an essence of this concept, we realize that consequences of diseases don't arise independently and without any reasons they are preceded by a set of clinical signs and symptoms, in our case.

The problem of consequences of diseases of the musculoskeletal device takes the leading place in modern children's orthopedics and traumatology, and even more often draws attention of experts of a different profile. Dysplasia of a femoral joint (DFJ) is the most widespread among deformations of the musculoskeletal device which is proved in 50–100 cases from 1000 of newborns in Ukraine according to the statistical data [3]. DFJ progresses and leads to negative consequences at untimely identification and treatment at early children's age which start being shown already at children of a preschool age. Their elimination, treatment, prevention or reduction of their manifestations, needs correctly picked up long rehabilitation course that is possible only on condition of accurate definition of symptoms and consequences of this disease.

Communication of the research with scientific programs, plans, subjects. The work is performed according to the plan of the research work of NNIFK of Sumy state A.S. Makarenko pedagogical university of MES of Ukraine for 2007-2011 by the subject "Theoretic-methodological and organizationally methodical Problems of health, physical rehabilitation and correction pedagogics" (number of the state registration is 0107U002826), and by the subject "The increases of the level of health and physical fitness of different groups of the population means of physical culture" (number of the state registration is 01111U005736) for 2011-2015.

The objective of the research: to analyze and to prove scientifically features of cause-effect relationships of dysplasia of a femoral joint at children of a preschool age.

Research task:

1. To analyze scientifically methodical literature of rather current state of a problem of dysplasia of a femoral joint at children.

2. To systematize and generalize the anamnesis and clinical manifestations of symptoms of dysplasia of a femoral joint at children.

3. To characterize consequences of dysplasia of a femoral joint at children of a preschool age.

Material and methods of the research: analysis and synthesis of data of scientifically methodical literature, medical cards; conversations; questioning.

Results of the research and their discussion. The tendency to dysplasia of a femoral joint, according to data of B. I. Simenach (2005), I. V. Pozdnikin (2006), O. and Korolkov (2006), is inherited generally on a polygenic type, and the formation of dislocation of a hip depends on many endogenous and exogenous factors. Family inspections state the existence of not only a congenital dislocation of a hip, but also other diseases of a femoral joint (FJ) which emergence is often connected with its hypoplasia (Perthes' disease, osteoarthritis, valgus or varus defects), and also the existence of "family" relaxation of a capsule of joints [1; 2; 5]. There is a concept about "a relative immaturity of tissue and a disproportion of ripening" which can be the cause of the development of pathological conditions of FJ. In quality of the etiologic factors which lead to deviations in the normal development of FJ and surrounding muscles, call defect of their primary bookmark during the pre-natal development (violation of a metabolism, a hypoxia, a thyrotoxicosis, hormonal insufficiency). The mechanical theory of emergence of a dysplasia is explained by the wrong position of a fetus in a uterus, the raised tone of its walls, lack of water which breaks the internal pressure of the articulate ends [8]. A close swaddling, hypofunction of a thyroid gland, weakness of the capsular-copular device, the last is caused constitutionally are distinguished among major factors of the post-natal period [3; 7].

The analysis of the last researches and publications testifies that the untimely, and also the remote process of treatment of DFJ promotes its numerous complications which start being shown already at a preschool age, and further there are the reason of degenerate and dystrophic changes of FJ and, as a result, the patient's invalidation. A considerable contribution to treatment, renewal and prevention of violations of the development of the musculoskeletal device, such scientists as O. D. Dubogai (2001), I brought. V. Roy (2009), Y. O. Lyannoy (2011), Y. M. Korzh (2013).

I. A. Norkin (2000), I. V. Pozdnikin (2002), N. H. Bakhteyeva (2003), S. S. Kuvin (2004), O. A. Sokolovsky, S. L. Weinstein (1999), P. D. Pizzutillo (2000) specify that anatomic-functional and trophic violations in FJ without an adequate treatment progress during the growth of a child and lead to complex structural changes in a joint, causing the malfunction of a support and the movement, thus the provision of a pelvis changes, there is a curvature of a backbone and many other consequences at teenagers and adults.

The underdevelopment of anatomical structures, weakness of the articulate and copular device which remain by the beginning of walking of a child, even at timely treatment in 5–20% of cases, don't promote the stable maintenance of a head of a hip in a acetabulum and in 60% of cases instability is combined with damages of elements of a joint, and also ischemic violations, as a result of use of inefficient (inadequate) orthopedic and renewal methods of treatment (A. Z. Bovtunova, 2000; V. M. Krestyashin, O. Y. Litenetskaya, 2003; A. M. Volkov, V. V. Popov, 2004; A. V. Gankin, 2007; S. Suzuki, 1999; N. Feller, 2000).

The clinical symptomatology of DFJ is not always accurately expressed, their vast majority is observed both together, and partially. X-ray diagnosis is appointed in addition for the establishment of the correct diagnosis and degree of dysplasia. The knowledge of symptoms is an important component of the prevention of the subsequent consequences, and also their progress (tab).

The comparative table of symptoms and consequences of DFJ in the course of ontogenesis

Classification of DFJ	Symptoms (0–3 years old)	Consequences (3–6 years old)
Hip predislocation	– limited assignment of a hip; – asymmetry of skin folds (sciatic and femoral)	– restriction of amplitude of movements in a femoral joint; – weakness of muscles of the lower extremity; – asymmetric bearing
Incomplete dislocation of a hip	– symptom of sliding or symptom of "clicking"; – external rotation of an extremity; – the Duchenne-Trendelenburg positive symptom; – shortening of the lower extremity	– weakness of muscles of the lower extremity; – restriction of amplitude of movements in a femoral joint; – valgus or varus deformation of the lower extremities; – increase in L-lordosis; – mown of pelvis bones; – scoliosis
Hip dislocation	– relative shortening of the lower extremity; – the Duchenne-Trendelenburg positive symptom; – late beginning of walking	– weakness of muscles of the lower extremity; – restriction of amplitude of movements in a femoral joint; – valgus or varus deformation of the lower extremities; – mown of pelvis bones; – increase in L-lordosis; – lameness; – scoliosis

In the table it is shown that DFJ has negative consequences which are followed by different degenerate and dystrophic changes of the musculoskeletal device at out of time found symptoms, namely at the age from a birth till three years old.

Amplitude of movements in FJ significantly changes at DFJ. Measurements of amplitude of movements in FJ are taken round three mutually perpendicular axes. The passive movements are measured at children as the volume of passive movements at DFJ gives the most complete idea of a condition of mobility to a joint, and loss of function of muscles at dysplasia isn't observed. If the movements in FJ are limited through bending contractures, the residual volume of movements is measured only after the elimination of lordosis. Amplitude of movements in the sagital plane, both at a dislocation of a hip, and at an incomplete dislocation, doesn't experience considerable changes, but a dislocation contracture in a joint takes place at a high dislocation at children of more advanced age. Assignment at DFJ is always limited. The size of restriction of assignment depends on the extent of shift of a head of a hip and on shortening of transmission muscles. Assignment restriction, unlike other types of the movement, in FJ is observed in different age groups and can be observed even at very small children.

There is an increase in amplitude of rotational movements for the account of external rotation at congenital to a dislocation of a hip. On the contrary, the excess amplitude of rotational movements occurs at the expense of increase in internal rotation at a congenital incomplete dislocation of a hip in half of children. Thus an internal rotation at bent femoral and knee joints can reach 70–90° children of younger age. The amplitude of rotational movements decreases at an incomplete dislocation with age the child [4].

Weakness of muscles of the lower extremity is noticeable when carrying out the Duchenne-Trendelenburg symptom which testifies to hypotrophy of gluteuses, and is a sign of DFJ. The buttock of other side rises in norm at a support on a healthy extremity. In case of DFJ at a support the buttock of other party falls by the affected extremity irrespective of, whether there is DKS on this party. This symptom is display of a condition of gluteuses of an extremity on the same party. When standing on the affected foot, the trunk bends for the maintenance of balance in the same party, but gluteuses aren't capable to approach the points of an attachment (a big swivel and a crest of iliac bone). An opposite half of a pelvis falls under the weight of a trunk (the positive symptom – the lowered buttock) [4; 6]. This symptom is more expressed with age at children with incomplete dislocations.

The main changes happen in a knee joint at valgus deformation of the lower extremities and are characterized by the uneven development of runners of a femur (more rapid growth of internal runners, than external) which leads to that the articulate crack becomes wider inside and already from the outside. Sheaves which fix a joint, stretch especially from the inside, a knee loses its stability. A shin deviates outside; there can be a curvature of bones of a shin camber inside in hard cases. Such children have hyperextension in knee joints in the sagittal plane. This deformation is combined from plainly valgus feet. The curvature of feet appears most often after a while after a child got on feet and began to go. Especially it often occurs if a child got on feet beforehand if he stood much, but crept a little. It is explained by weakness, underdevelopment of his muscular-copular device and excess loads of the lower extremities.

There is an uneven development of a knee joint at the varus deformation of the lower extremities. The increase in an external runner of a femur and reduction internal leads to squeezing of an internal meniscus, the articulate crack becomes wider from outer side and narrow of the internal. Sheaves stretch, which fix a knee joint, especially from outer side. Bones of a shin are often bent by a camber outside. There is an incomplete leg extension in the sagital plane at such child. In hard cases there is a rotation of a hip outside, and the lower third of a shin inside.

Mown bones of a pelvis occurs through shortening of an extremity which in turn leads to a pelvis inclination forward and slanted it in the struck party. It in turn promotes the increase in lordosis in the lumbar department of a backbone and to developing of scoliosis. There is lameness through shortening of an extremity, a pain, a contracture in FJ. It is caused by shortening of a neck of a hip, an easy incomplete dislocation of a hip and weakness of gluteuses. At the same time the limping is predetermined by desire of a child to unload quicker a sore extremity when walking and to correct the same contracture of FJ.

Conclusions. The current state of a problem of DFJ is analyzed at children of preschool age. It is proved that DFJ starts developing at the molecular level and is followed by changes of ultra-structures of a cell by the system researches of relationships of cause-effect. The interrelation of a cause and effect is defined which provides them inter-transition. Each cause and effect relation is directly proportional also in the continuous interaction: the reason influences a consequence, but also the consequence actively influences the reason.

The anamnesis of patients is systematized and generalized, and also manifestations of clinical symptomatology of DFJ are studied at children. On the basis of the analysis of symptomatology the following consequences which arise at DFJ were allocated: restriction of amplitude of movements in a femoral joint; weakness of muscles of the lower extremity; valgus and varus deformations of the lower extremity; increase in L-lordosis; mown pelvis bones; scoliosis; lameness.

Prospects of the subsequent researches consist in the development of the program of physical rehabilitation for children of preschool age taking into account features of consequences which result from the untimely and incorrectly picked up treatment of DFJ in the conditions of special preschool educational institutions.

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