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SPECIFIC FEATURES OF BREATHING IN CHILDREN OF A DIFFERENT AGE

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Abstract: This research shows that a certain pattern of breathing is inherent to each age and it is a very important diagnostic feature. It is very useful and important to know all the specific features of breathing to monitor a proper development of a child.

Key words: children, breathing pattern, breathing disorder, and early age.

Introduction. Breathing is one of the key functions of the body. Breathing interacts with many body systems and performs many functions outside the absorption of oxygen and the release of CO_2. The main functions of the respiratory system include biochemical, biomechanical including secondary and non-respiratory functions of breathing. Thus, the biochemical function of breathing that is controlled by the central nervous system consists in regulating the concentration of oxygen, carbon dioxide and pH in blood. Biomechanical functions of breathing deal with the operation of the respiratory pump, and its efficiency depends on the action of the respiratory muscles, the thorax function, and breathing habits or patterns. The mechanical action of the breathing pump causes changes in alveolar, intrapleural and intra-abdominal pressure that have an effect, among other things, on the venous return to the heart, lymphatic circulation and the functions of the organs of the abdominal cavity and pelvis. Secondary and nonrespiratory functions of breathing include modulation of physiological arousal and sympathovagal balance. The

respiratory function failure can change homeostasis, resulting in the emergence of relevant symptoms, impairing the quality of life, and, as a consequence, causing disability [1, c. 56].

An issue of respiratory disorders still remains to be one of the most important problems of the contemporary medicine [2, c. 58]. Especially, the problem of understanding respiratory failures in children is of great importance. This problem was studied by Y. V. Marushko, M. V. Nevoya, L. V. Pypa, and H. Pogotova.

Objective: The purpose of these studies was to analyze the specific features of children's breathing and to inquire into the effect of the breathing pattern on the quality of life of a child.

The respiratory system has specific features of functioning that define the breathing pattern from the birth of a child. As the child matures, the morphological structure of the respiratory system is improved, respiratory parameters are changed, and functional capabilities are improved.

Human lungs begin their development in the third week of intrauterine life. In the fourth week of development, the rudiments of the bronchi and lungs are formed. Throughout the period starting from the fifth week to the fourth month of the development, a bronchial tree is formed. By the beginning of the sixth week, lobar bronchi appear and by the end of the 6th week segmental bronchi spring up. At the fourth and fifth months of intrauterine development, respiratory bronchioles are laid and the first alveoli appear. Acini were discovered by Boyden (E.A. Boyden, 1974) on the 17th week of development. Starting from the fourth month, the cartilage and smooth muscle cells are formed in the bronchi up to the 4^{th} or 5th orders. By the time of birth, the number of lobes and segments basically corresponds to the number of these formations in an adult person.

It should be noted that respiratory movements in the fetus are registered from the 11th week of development and are subdivided into 2 types: 1) short with a high respiratory rate (30 to100 per minute) and an irregular rhythm and 2) stronger and rarer with the respiratory rate of 1to 4 per minute, of a "sighs" type; these are rarely observed. Contraction of the inspiratory muscles of the fetus is accompanied by a

drop in pressure in the chest cavity. In the case of the frequent breathing, it is moderate (2 to 7 cm of water column), and in the case of «sighs" it is significantly decreased (25 to 50 cm of water column). Despite this, absorption of amniotic fluid in the lungs does not occur.

At the time of birth, the functional molding of the respiratory center had not been completed yet. The excitability of the respiratory center in infants is low; however, these show high resistance to a lack of oxygen in the air. At the age of 11, the ability to adapt breathing to different conditions of vital activities is already well pronounced.

In newborns, the lung weight is 50 g. (for an adult it is 1 kg). The number of alveoli is 24 million (300 million in an adult), their diameter is 4 times smaller. The lungs are filled with liquid before the start of ventilation. After the first exhalation, 4 to 50 ml of air remains in the lungs.

Newborns are characterized by shallow and frequent breathing, i.e. 40 to 60 respiratory movements per minute, with age the respiratory rate is decreased, reaching 16 to18. The respiratory volume in newborns is on average 17 ml (for adults - 500 ml).

From birth up to 7 or 8 years, two main processes are observed in the lungs: the differentiation of the bronchial tree and an increase in the number and size of alveoli. At the age of 14 to 16, external respiration rates attain the values peculiar for adults [3, c. 57].

It was established that babies have non-rhythmic breathing; the diaphragmatic type of breathing prevails. Starting from the age of 6, girls have chest breathing, while boys have abdominal breathing.

During puberty, temporary changes in the breathing regulation occur. A teenager's body is less resistant to insufficient oxygen. In the course of growth and development, the need for oxygen is provided by improving the regulation of the respiratory apparatus. Breathing becomes more economical. As the cortex of the large hemispheres of the brain develops, the ability to arbitrarily change of breathing is improved; a person can stop breathing or perform maximum lung ventilation.

During physical exertion, junior schoolchildren cannot significantly change the depth of breathing and increase respiratory rate movements. Breathing becomes more frequent and even shallower, and it reduces the efficiency of lung ventilation. The body of teenagers quickly reaches a maximum level of oxygen consumption, but cannot maintain this process at a high level for a long time [4, c. 76].

Nasal breathing is of great importance for the growth and development of a child, and the obstruction of it results in certain disorders, for example, disturbance of sleep or digestion, and even physical and mental retardation. Recently, the rate of corrections of occlusion disorders has been increasing, and the need for it in childhood makes up 36.9%. The reason for that the teeth do not stand straight in line is a failure of the functions of nasal breathing. In diseases of the ENT organs, the disorders of the maxillofacial system are found in 60% to 90% of cases and the younger the age, the more often it happens. A child with nasal breathing problems cannot fully breathe through the nose. According to the obtained research data, when the lips are closed, the muscles of the face work helping to form the jaws, but when the mouth is constantly open these muscles do not work. In this case, the child experiences the disturbance of the architectonics of the entire dental and jaw system. As a result, there is a change in the shape of the face, malocclusion, crooked teeth and other problems with them. Another problem is the quality of the teeth themselves, in particular caries. About 80% of teenagers have carious teeth, and 95-98% of adults have filled teeth [5].

Such phenomena as apnea and instability of the breathing rhythm occur very often, these happen due to the incomplete differentiation of the respiratory center and its hypoxia. The volume of breathing is quite low at birth; it is in the range of 15 to 20 ml. During this period, the body is supplied with oxygen due to an increase in respiratory rate movements. The minute volume of breathing in newborn children is 600 to700 ml. In the process of growing up, this indicator is gradually increased and it reaches 6 to 9 liters in an adult person. In infants, gas exchange is more intense due to the rich vascularization of the lungs and high diffusion capacity.

The team of authors, headed by M.V. Nevoi, state that a disorder of respiratory

function can affect homeostasis, worsen the quality of life, and reduce a person's work capacity [6, 540]. The problem arises relating to the discovering a number of functional respiratory disorders, and these, in addition to the hyperventilation syndrome, include disorders combined under the name "dysfunctional breathing" (DB). Dysfunctional breathing is a condition that is characterized by an irregular breathing pattern that occurs either in the absence of concomitant diseases or secondary to cardiopulmonary diseases. It occurs mostly in children that set too high demands and aspirations for themselves, and these can become a source of internal stress.

In addition to organic lung diseases that cause breathing disorders, there are also functional respiratory disorders that mostly occur with emotional disorders. The data are available that are indicative of subclinical disorders of the respiratory system and homeostasis, although at first glance it may seem that the physiology of breathing remains intact in these people. Numerous respiratory disorders are revealed in the case of anxiety disorders, especially panic attacks (PA). People with PA experience sudden panic attacks, combined with anxiety and fear, resulting in a number of respiratory symptoms.

It is difficult for children to express their emotions and feelings verbally, so psychological stress can manifest itself in the form of somatic symptoms that include DB (dysfunctional breathing) [7, c. 55].

Each age inherits a certain breathing pattern, and it is also an important diagnostic feature. Weakened breathing is peculiar for newborns and children under the age of 6 months or with significant physical weakness, in case of obesity, due to strong development of the muscular system, as well as with pathologies.

Enhanced breathing is characterized by the prolonged exhalation; it is 2/3 of the inhalation phase. It is heard in children after physical exertion, or in asthenics with a thin thorax. In children older than 7 years with normal development and in adults, vesicular breathing is observed over the entire surface of the lungs. Such a pattern as puerile breathing is heard in healthy children from 6 months to 7 years. Bronchial breathing is observed in healthy children above the trachea and larynx.

Conclusion: Having analyzed all the specialized literature, we can state that such a vital physiological process as breathing really has its own specific features and it is changed throughout the life. The studies given as an example prove that the emotional state of a person, and especially of a child, has a significant impact on the respiratory system, and these also show that a responsible attitude to seemingly insignificant problems with a child's breathing serves as a basis for prevention of the impaired quality of life of adult members of our society.

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