ISSN: 2181-3337 | SCIENTISTS.UZ VOLUME 5 ISSUE 8 AUGUST 2026

AGE-RELATED FEATURES OF THE MORPHOLOGICAL AND MORPHOMETRIC STRUCTURE OF THE BRONCHI IN THE SECOND CHILDHOOD

Sadikhova Zumrat[1], **Djaxangirov Gayrat**[2]
Professor of Human Anatomy and OSTA Department, Tashkent State Medical University[1]
Lecturer, Department of Medical Biology, EMU University[2]

DOI: 10.67620/sai.58d0010

ABSTRACT

Today, respiratory diseases are considered one of the groups of diseases that have a serious impact on children's health worldwide. According to WHO, respiratory diseases are one of the leading causes of morbidity, medical care, hospitalizations, and preventable deaths among children. Asthma and bronchiolitis are among the most common causes of childhood respiratory distress and wheezing. In particular, lower respiratory tract infections, particularly pneumonia, are of particular epidemiological importance among children. The WHO also found that pneumonia is responsible for more than 700,000 deaths each year among children aged 5-8 years worldwide. Globally, there were more than 1400 pneumonia cases per 100,000 children. When looking at the incidence rate across regions, it was noted that in South Asia, there were approximately 2,500 cases per 100,000 children, while in West and Central Africa, there were 1,620 cases. It was found that the relevance of respiratory diseases remains high, especially in school-age children. Also, according to global assessments in 2024, lower respiratory infections, including pneumonia, among children aged 5-9, were one of the leading causes of death, with several leading diseases accounting for more than 40% of the main causes of death in this age group. The bronchi, as the air-conducting part of the respiratory system, are an important anatomical and morphofunctional structure in the development of respiratory diseases. The structural condition of the mucous membrane of the bronchial wall, the mucous membrane, the smooth muscle floor, the passage of airflow and the connective tissue components, the expansion and narrowing of the bronchi, the transport of mucous secretions and plays an important role in the mechanisms of local protection.

ACCEPTED

08.09.26

Keywords: *Bronchial tree, morphological changes, control group, children.*

CC BY

Introduction

Studies have shown that a number of scientific studies are being conducted to optimize the indicators of postnatal ontogenetic development of the bronchial tubes of the lungs in humans in the second childhood period. Of particular importance in this regard are scientific studies aimed at assessing morphometric indicators of Wall morphology of trachea and lung bronchi in school-aged children, morphometric indicators of Wall morphology of trachea and lung bronchi in second childhood i.e. 8-12

years of age, morphometric indicators of Wall morphology of trachea and lung bronchi in children from birth to.

Purpose of the Research

study of postnatal ontogenetic development of the bronchi in children of different ages in the second childhood.

Materials and Methods

The study was conducted on 61 children's corpses who died in the second year of life, which arrived at the Republican Center for Pathological Anatomy of the Ministry of Health of the Republic of Uzbekistan in the second quarter of 2025-2026. The resulting children's corpses were studied in children's corpses who died as a result of mainly heart birth defects and other causes that did not have diseases in the pulmonary bronx pathways. The causes of death and underlying disease have been identified in forensic medicine and pathological anatomy conclusions. The examination material was obtained from the following parts of the lung: the right and left lungs were dissected and examined from the external and internal bronchi to the terminal bronchi of the lobar bronchi. In our study, instrumental (using a caliper), histological and histochemical, and morphometric methods were used. In our study, instrumental (using a caliper), general histological and histochemical, and morphometric methods were used. The obtained materials were fixed in formalin and then 5-8 μm sections were prepared. They were stained with hematoxylin-eosin and Schiff's reaction. The data in the pathoanatomical examination report, outpatient card, medical history, and autopsy reports were comprehensively studied for each case. Passport information (residence address, name, age of the patient, and other necessary information) was obtained from the medical history. The outpatient card collected information about what diseases the patient had and how they were treated before they arrived at the hospital. Also, in our study, we considered the following cases to be excluded from the material study, taking into account those with acute pathological changes in the bronchi, the detection of pneumonia, the observation of active inflammatory processes, as well as the fact that other pathological conditions are qaacdbhyuhb bhgv vgy6ytgvbhyd. The analysis of the data obtained is presented in Table 1 by age group. A total of 61 child corpses were obtained in our study. Of this, group 1 (8 years old) had 21 children (34.4%) of whom were two childhood children, divided into the following subgroups: Group A) counted 9 boy corpses and made up 14.7%, Group B) were 12 girl child corpses, accounting for 19.7%. And the 2 groups of our study (9-10 years old) were 18 (29.5%) second-childhood children, also divided into the following subgroups: (a) group was 11 boys 'corpses, accounting for 11%, and (B) group was 7 girls' corpses, accounting for 11.5%. And the 3 groups of our study (11-12 years old) were 22 (36 %) children of second childhood who also separated into the following subgroups: (a) group 10 were considered boys ' corpses and made up 16.4%, (B) group 12 were girl child corpses and made up 19.7%.

Results

As a result of our research, we studied in depth the morphological and morphometric changes of the bronchioles of the lung in the second childhood periods, segmental bronchi, intercostal bronchi, colon bronchi, intraosseous bronchioles. It is also observed that during the second childhood period, the processes of growth and development in the child's body accelerate. When studying the bronchi, a macroscopic examination was performed to study the general shape and diameter of the bronchi, including the thickness of their walls. Indicators were also determined during these periods.

- total length of the bronchus;
- external diameter;
- internal diameter;
- wall thickness;
- branching characteristics of the bronchi.

We also used the organometallic method in our research. In this, we mainly focused on the following. Organometry of the bronchi is a complex of methods for measuring anatomical and

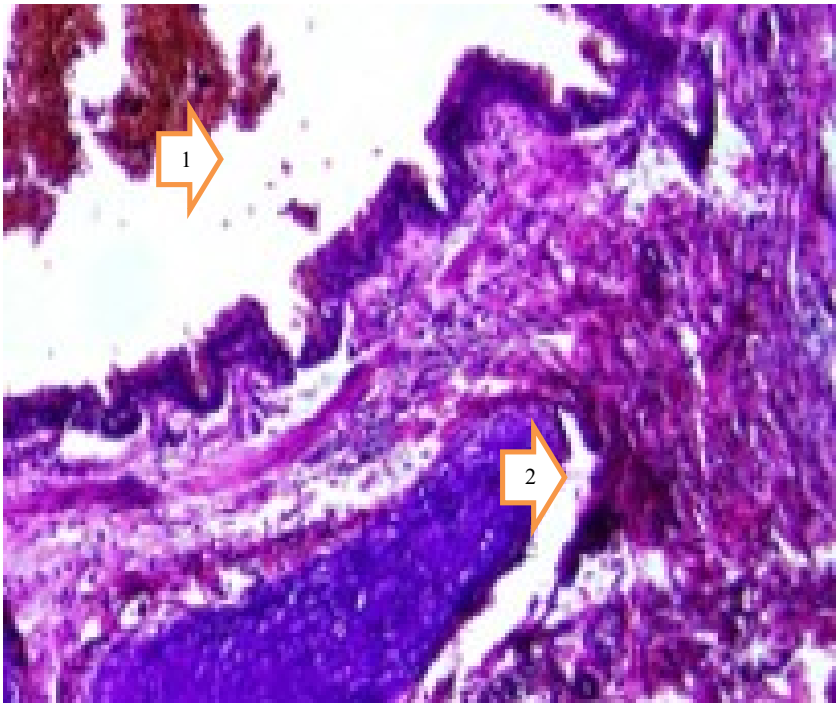
ISSN: 2181-3337 | SCIENTISTS.UZ

morphometric indicators of the bronchi and includes the following parameters organometric examination of the bronchi carried out by determining their length, external and internal diameter, wall thickness, mass and size. The measurements were taken under standardized conditions, and the results were compared by age group, which included children from 8 to 12 years old, who are considered to be in the second childhood period.

In addition, organometric examination of the bronchi allows for quantitative determination of the macroscopic dimensions and geometric parameters of the bronchi in the second childhood, in particular, to assess their dependence on age, gender, and anthropometric indicators. It was also found that the organometallic method allows for an assessment of the general morphological state of the bronchi at the macroscopic level. Therefore, the use of this method in combination with histological and morphometric studies helps to comprehensively characterize the age-related morphological development of the bronchi. In particular, geometric parameters of the bronchi, such as length, internal and external diameter, are still used as key parameters in modern morphometric studies. In our study, we tried to obtain samples of bronchi that were as free of pathological changes as possible and were anatomically well preserved. We also used the following equipment to conduct the study: vernier caliper, millimeter ruler, micrometer, anatomical measuring instruments, and electronic scales. In our study, we prepared the bronchi for organometric examination as follows. First, we determined the anatomical orientation of the bronchial sample before examination and determined the following.

Figure 1

Bronchus of the Lung Lobe, 8 Years Old



Note. 1-The folds of the mucous membrane are reduced, 2-The smooth muscle bundles are thickened. Stain: H-E. Category: 10x10.

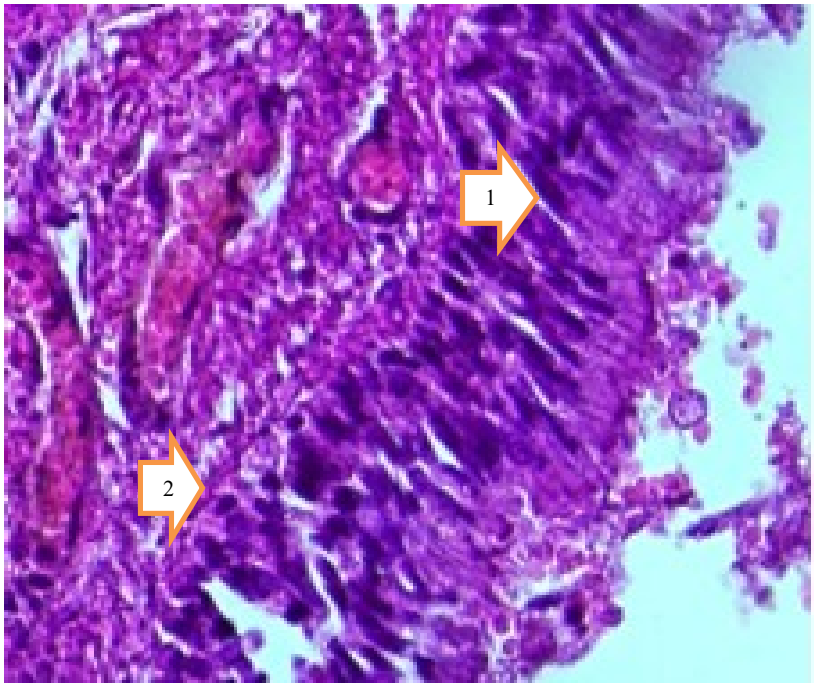
In our study, the hematoxylin-eosin method was used to study the histological structure of the bronchi in the second childhood period (8-12 years). This staining method allowed us to distinguish the main structural components of the bronchial wall and assess their morphological state. In particular, when stained with hematoxylin-eosin, it was found that the inner surface of the bronchial wall was covered with a multilayered ciliated epithelium. The basal membrane and lamina propria were also identified under the epithelium, and beyond that, the submucosa, smooth muscle elements, cartilage plates, and connective tissue components. At the same time, it was found that under the influence of hematoxylin-eosin, cell nuclei appear blue-violet, while the cytoplasm, muscle, and connective tissue elements appear pink-red in varying degrees. This also allowed for the microscopic delineation of the layers of the bronchial wall. In

ISSN: 2181-3337 | SCIENTISTS.UZ

group I of our study, which included children aged 8 years, the bronchial mucosa was relatively thin, with an orderly arrangement of epithelial cells and preservation of the ciliated epithelial layer. In particular, the presence of small folds in the mucous membrane was detected. In addition, connective tissue elements are observed in the lamina propria. Bronchial glands were also observed in the submucosal layer. It was also found that the secretory parts and excretory ducts were well differentiated. In particular, it was found that the smooth muscle layer was relatively thin, and the muscle fibers were arranged in an orderly manner along the bronchial wall. There are also cartilage plates that serve as a mechanical support component for the bronchial wall. At the same time, it was found that, although the main structural components of the bronchial wall are formed in this age group, their morphometric parameters are smaller than in older age groups.

Figure 2

Bronchiole Inside the Lung, Age 10 Years



Note. 1-The covering epithelium is cylindrical, the lamina propria is rich in fibers, and the blood vessels are dilated. Paint: H-E. Category: 10x40.

In group III of our study, which included children aged 11–12 years, it was found that the structural components of the bronchial wall were more developed. It was also found that the bronchial epithelium was well formed and the arrangement of the cells along the layers was relatively orderly. However, the thickness of the mucous membrane and the degree of development of the lamina propria were found to be higher than in previous age groups. In particular, the development of glands in the submucosal layer and their location in the bronchial wall were clearly visible. In addition, an increase in the thickness of the smooth muscle layer and a denser arrangement of muscle fibers were found. It was also identified as a morphological marker associated with the structural strength of the bronchial wall and its functional improvement. In addition, it was observed that the cartilage plates were also well developed, and their area and thickness were found to change with age. It was also found that in the preparations of bronchi of this age group, the main structural components of the wall are highly formed. In particular, it was observed that the epithelial floor was relatively well developed and the morphological features of the arrangement and nuclei of ciliated cells were clearly visible.

Discussion

At the same time, the development of bronchial glands in the mucous membrane was also noted. It was also found that the smooth muscle floor is thicker compared to previous age groups. In addition, the cartilaginous plates were well-defined and were identified as an important structural component that

ISSN: 2181-3337 | SCIENTISTS.UZ

provides the mechanical support function of the bronchial wall. Also, in the 11-12 age group, the morphological structure of the bronchial wall helps to approach a relatively mature state before the transition to the next growth period. During this period of the study, microscopic examination of the structures of the terminal bronchiolar wall showed that the covering epithelium had thinned, and the dimensions had decreased and become prismatic compared to previous periods. It was observed that the nuclei of these cells were relatively darkly stained and were located in a disordered manner. Also, microscopic examination of the bronchioles of the lung lobes of children of this age showed that they were located between the segments of the lung tissue. On the other hand, the lower ring was found to be made up of large and small fragments, mostly isolated, in contrast to the bronchi. By this stage of the examination, it was determined that the bronchi retained their tubular shape and were slightly elongated in length. It was also noted that the wall was thin, the cartilage rings were relatively well-developed, and the wall was thin and soft. In particular, it was observed that the cartilage rings consisted of several pieces. In contrast, by the age of 12, the togai ring was found to have a slightly flattened shape, compacted, relatively immature in composition, meaning that its cells were tiny and numerous and densely packed, with only some of its cytoplasm appearing vacuolated. In particular, it was observed that the intermediate chondroid substance of the cartilage was dense and darkly stained, and that the number of connective tissue bundles connecting the cartilage rings from the inner and outer surfaces was relatively increased. In addition, it was found to be surrounded by a thin, serous membrane on the outside. It was also noted that the mucous membrane folds were absent, smoothed, the surface was covered with a single-layered multi-row cylindrical epithelium, and in some areas the epithelium was reduced in height and depressions appeared.

Conclusion

1. The biliary bronchiole wall layers were formed from an incomplete state at a young age of children and were found to have a tactile finding State, a covering epithelium with folds, biliary cells smoothed from a low state, biliary cells into a multi-state, a private plate formed with fibers from a swollen, unformed connective tissue and muscle handles arranged in order.
2. At a young age, it was proven that the wall of the terminal bronchioles is semicircular, with a one-story cylindrical epithelium on one side, the other side is in a state adjacent to the alveoli, improved at the age of two, the covering epithelium turns into a prismatic type, a one-to-one junction consisting of connective tissue and muscle fibers, the private plate of which.

REFERENCES

1. Akinshin, I. I., Sinelnikova, Ye. V., Chasnыk, V. G., & Kornishina, T. L. (2020). Issledovanie vzaimosvyazi ultrazvukovыx fenomenov legkix s pokazatelyami gazoobmena u novorojdennыx detey. *Vizualizatsiya v meditsine, 2*(2), 8–17.
2. Altit, G., Dansea, A., Renaud, K., Perreault, T., Lands, L. S., & Santanna, G. (2017). Patofiziologiya, skrining i diagnostika legochnoy gipertenzii u detey s bronxolegochnoy displaziey (obzor literaturы). *Neonatologiya: novosti, mneniya, obuchenie*, 1(15), 24–38.
3. Amirova, V. R., Valiulina, A. Ya., Zalalova, A. A., & Rыbalko, O. V. (2019). Sostoyanie zdorovya detey pervogo goda jizni, rodivshixsya nedonoshennыmi. *Meditsinskiy vestnik Bashkortostana, 14*(1[79]), 69–77.
4. Basiy, R. V., Vasilev, V. A., Zdixovskiy, I. A., Dovgyallo, Yu. V., Beshulya, O. A., & Selivanova, Ye. S. (2018). Anatomiya legkix. *Vestnik gigienы i epidemiologii, 22*(4), 87–90.
5. Batman, Yu. A., Polyakov, K. V., Bessonov, D. A., & Pavlyuchenko, V. V. (2012). Morfologicheskie osobennosti legochnoy tkani u nedonoshennыx detey, obuslovlennыe bronxolegochnoy displaziey. *Neonatologiya, xirurgiya i perinatalnaya meditsina, II*(1[3]), 59–64.

ISSN: 2181-3337 | SCIENTISTS.UZ

6. Blinova, S. A., Oripov, F. S., & Dexkanov, T. D. (2020). Morfofunksionalnыe osobennosti neyroepitelialnых teles v respiratornom otdele legkix. *Vestnik nauki i obrazovaniya*, 10(88), Part 3, 82–85.
7. Blinova, S. A., & Xamidova, F. M. (2020). Sostoyanie immunnых i regulyatornых struktur slizistoy obolochki bronxov pri patologii legkix u detey. *Tibbioytda yangi kun*, (2), 101–104.
8. Blinova, S. A., Xamidova, F. M., & Ismoilov, J. M. (2019). Izmenenie strukturnых komponentov bronxialnogo sekreta pri bronxoektaticheskoy bolezni u detey. *Voprosы nauki i obrazovaniya*, (27), 16–23.
9. Blinova, S. A., Xamidova, F. M., & Yuldasheva, N. B. (2021). Strukturnыe i molekulyarnыe osobennosti endoteliyakrovenosnых sosudov legkix. *Problemы biologii i meditsinы*, (2), 251–255.
10. Blinova, S. A., Yuldasheva, N. B., & Xotamova, G. B. (2021a). Morfofunksionalnыe svoystva sosudov legkix pri bronxoektaticheskoy bolezni u detey. *Voprosы nauki i obrazovaniya*, 10(135), 60–65.
11. Blinova, S. A., Yuldasheva, N. B., & Xotamova, G. B. (2021b). Vegetativnaya innervatsiya legkix v postnatalnom ontogeneze. *Voprosы nauki i obrazovaniya*, 19(144).
12. Boysova, Ye. V., Zapevalova, Ye. Yu., Klyuxina, Yu. B., & Speranskaya, A. A. (2017). Techenie bronxolegochnoy displazii i yee isxodы: nujno li menyat kriterii diagnostiki. *Pediatriya, 96*(2), 8–13.
13. Nortaeva, N. A., & Nortaev, A. B. (2022). Morphological changes in teeth against the background of experimental hypothyroidism. *Topical issues of modern scientific research* (p. 168).
14. Nortaeva, N. A., & Nortaev, A. B. (2022). Morphological changes in the tooth in experimental hypothyroidism. *Issues of innovative development of science, education and technology* (pp. 273–275).
15. Sadikova, Z. Sh., & Koldosheva, M. N. (2026). Features of morphometric parameters of bronchi in postnatal ontogenesis. *Образование наука и инновационные идеи в мире, 90*(3), 455–457.

ISSN: 2181-3337 | SCIENTISTS.UZ