Lung function in pediatric acute leukemia patients: diagnostic and prognostic issues

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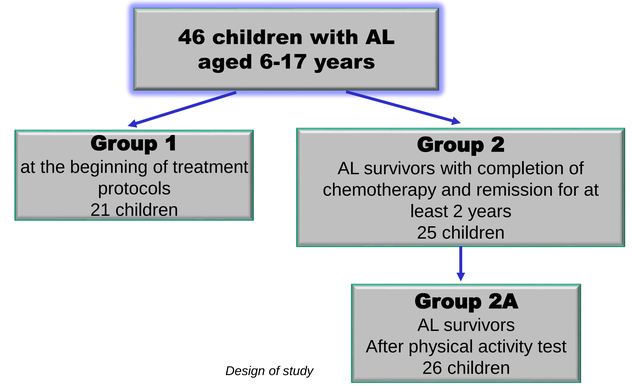
Objective

Lung function assessment and proper management of pulmonary complications in children with AL are crucial for enhancing their prognosis and quality of life.

The objectives of the study included assessment of lung function in pediatric AL patients at different periods and determination of tolerance to physical activity in AL survivors.

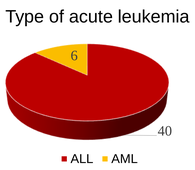
Methods

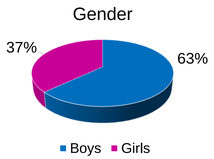
- The study was conducted at hematological department CNE “Clinical Children's Hospital № 16" of Kharkiv City Council.
- For lung function assessment spirometry was conducted in 46 children aged with AL.
- Spirometry was conducted with the help of the spinographic complex "SpiroCom", "KHAI-Medyka", Kharkiv, Ukraine.
- In AL survivors and the absence of respiratory complaints a test with physical activity was performed (10-minutes treadmill test)
- STATISTICA 8 (Tulsa, OK) and MedCalc 17.2 were used for statistical data analyses.

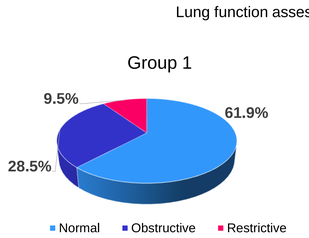


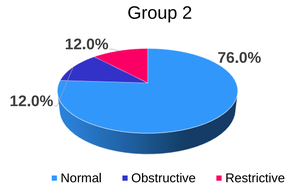
Design of study

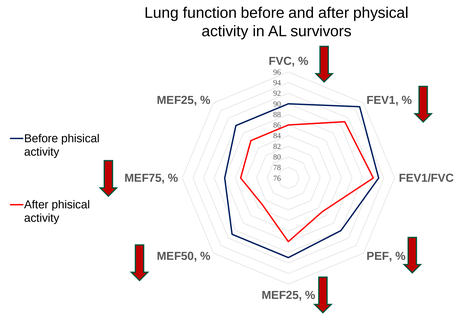
Results











Note. *FVC - Forced Vital Capacity, FEV1 - one-second forced expiratory volume, PEF - peak expiratory flow, MEF25, MEF50, MEF75, - mean expiratory flows at 25%, 50%, and 75% of FVC, MEF25-75 - mid-expiratory flow between 25% and 75% of FVC*

All Medians of lung function parameters corresponded to normative values.

Borderline values of at least one parameter of lung function were found in 33.3% of patients in group 1 and in 20.0% of children in group 2, which indicates a decrease in the functional capabilities of the respiratory system in comparison to general pediatric population.

Among children of group 1 and the presence of obstructive changes in lung function, clinical manifestations of wheezing developed in 4/6 children (66.7%) during treatment protocols.

None of children of group 1 and presence of restrictive disorders had clinical manifestation or changes on X-ray or CT scan. These restrictive changes are likely transient.

The study detected that a decline in MEF75 below 76.4% in children of group 1 significantly escalates the susceptibility to wheezing development by 12.5 times (RR 12.5 (95CI% 1.8-85.9)).

All patients of group 2 with obstructive changes in lung function had wheezing or asthma.

All children of group 2 in the presence of restrictive changes on spirometry had lung fibrosis, confirmed by a CT scan.

Conclusions

- Despite the normal values of Medians of lung function parameters in children at the beginning of treatment obstructive disorders were detected in 28.6% of children and restrictive disorders were detected in 9.5% of children. In AL survivors obstructive disorders were detected in 12.0% of children and restrictive disorders were found in 12.0% of children.
- A decrease in tolerance to physical activity in AL survivors was detected.
- The study confirmed diagnostic and prognostic value of spirometry in pediatric AL patients. A decrease in MEF75<76.4% at the beginning of chemotherapy increases the risk of developing wheezing in children by 12.5 times during the treatment of AL (RR 12.5 (95CI% 1.8-85.9)). AL survivors in the presence of restrictive changes on spirometry revealed the formation of lung fibrosis, in the presence of obstructive changes there were signs of asthma formation.
- Therefore, spirometry is a proper instrument for lung function monitoring and management of pulmonary complications in pediatric AL patients.

Children, acute leukemia, lung function, spirometry