

From the Research Department, General Hospital Maribor and Virological Department, Institute of Health, Ljubljana, Yugoslavia.

COMPARATIVE STUDY OF VIROLOGICAL INFECTIONS IN ASTHMATIC AND NONASTHMATIC CHILDREN

By

DRAGA ČERNELČ, MIRO GERBEC & PETER ČERNELČ

Virological infections in childhood are of great importance as they can cause a grave clinical state or even death (1, 2, 7, 9, 10, 13-16). Complications such as postvirological bronchiectasis have very often been described (3). Our aim is to show the course and consequences of virological infection in hospitalized asthmatic and nonasthmatic children. Virological infection was diagnosed by repeated serological examinations of antibody titre of different respiratory groups of viruses.

MATERIAL AND METHODS

Our analyses have been performed on 237 asthmatic (Group I) and 250 nonasthmatic children (Group II). The average age of asthmatic children was 9 years and 2 months and of nonasthmatic children, 8 years and 9 months. All patients have been investigated through 49 observations (personal data, sex distribution, age period, seasonal variations, duration of asthma laboratory findings, measurements of physical growth, immunological and functional lung tests, X-ray of lung and paranasal sinuses, electrocardiogram, bronchoscopic and bronchographic examinations, etc.). All data were put on "punched" cards (3, 6). Allergological examinations consist of skin testing (Prick method), provocation nasal (Sniff test) and inhalation tests with different inhalation allergens. The inhalation tests are performed according to Ryssing (12). The extracts of inhalation allergens are atomized in Barach-spray with an oxygen tension of about 0.5 atmosphere. The allergen is inhaled through a mask

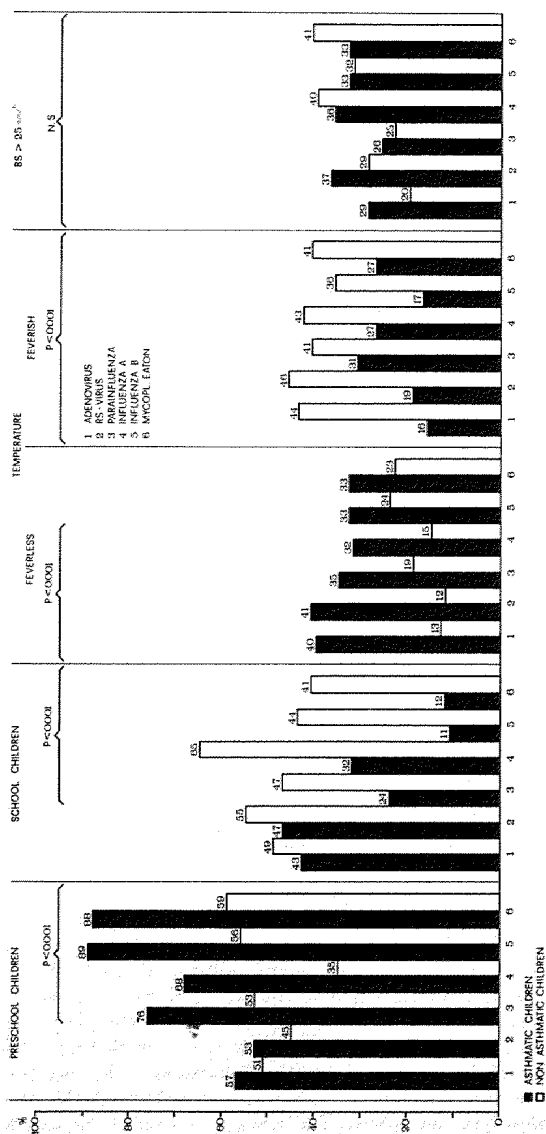


Fig. 1.

Diagnostical results in 237 asthmatic and 250 nonasthmatic children with virological infection.

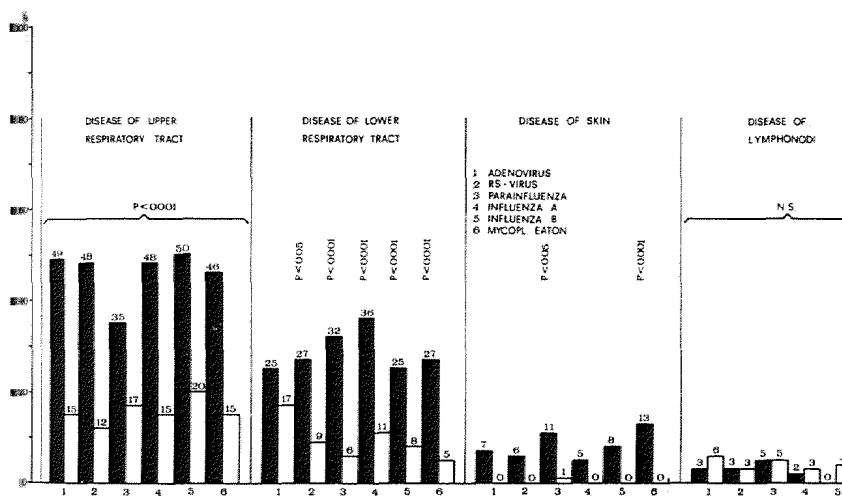


Fig. 2.

Clinical manifestations of virological infection in 237 asthmatic and 250 nonasthmatic children.

covering the nose and mouth and the time of inhalation is 5 minutes. If a high degree of sensitivity is suspected, a dilution of 1:1000 is employed to start with. If no reaction occurs the concentration is increased on the following day, according to the reaction, until 1:20. Every inhalation test is preceded by a control test with physiological saline. The vital capacity, one-second capacity and pneumometer value are recorded at 10-minute intervals for the following 35 minutes. In all cases the test was concluded by letting the patient inhale a 1 per cent solution of isolevine for 30 seconds followed a few minutes later by recording the VC, one-second capacity and pneumometer value (4).

Serological investigations of the respiratory viruses were performed by laboratory techniques after the method of Schmidt et al. and Chanock (cit. 15). For evaluation of the serological virological results we have used the increase and decrease of the antibody titres (11).

Bronchoscopic and bronchographic examinations were carried out under anaesthesia with short muscle relaxation (8). Bronchoscopic aspirate was examined cytologically and bacteriologically (5).

In all school children spirometry and gas analysis of arterial blood with and without ergometry was performed. In small children only acid-base equilibrium tests have been carried out (5).

For the obtained spirometrical values of the above mentioned groups of

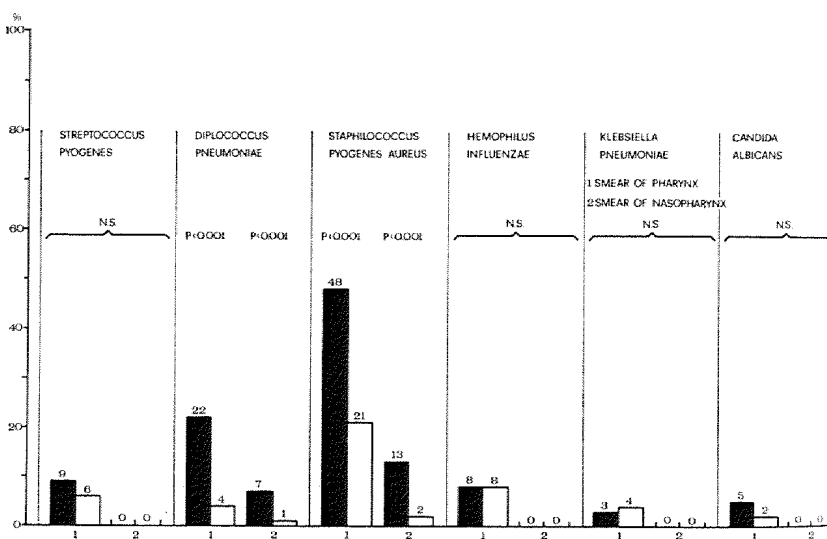


Fig. 3.

Clinical results in 237 asthmatic and 250 nonasthmatic children with virological infection.

children, coefficients of correlation and regression have been calculated. For the calculation of statistically significant differences between the two groups (I and II) the Student's t-test was applied.

RESULTS AND DISCUSSION

Fig. 1 represents the diagnostic findings in 237 asthmatic and 250 nonasthmatic children according to different types of viruses. As is evident from the Figure, there are statistically more preschool children than school children infected.

Statistical analyses show that between the preschool and school groups there is a statistically significant difference in temperature but not in blood sedimentation rate. Further, we can conclude, that in both groups the infections with adenovirus, RS virus and parainfluenza virus prevail, while others are present to a lower degree. Preschool children are signi-

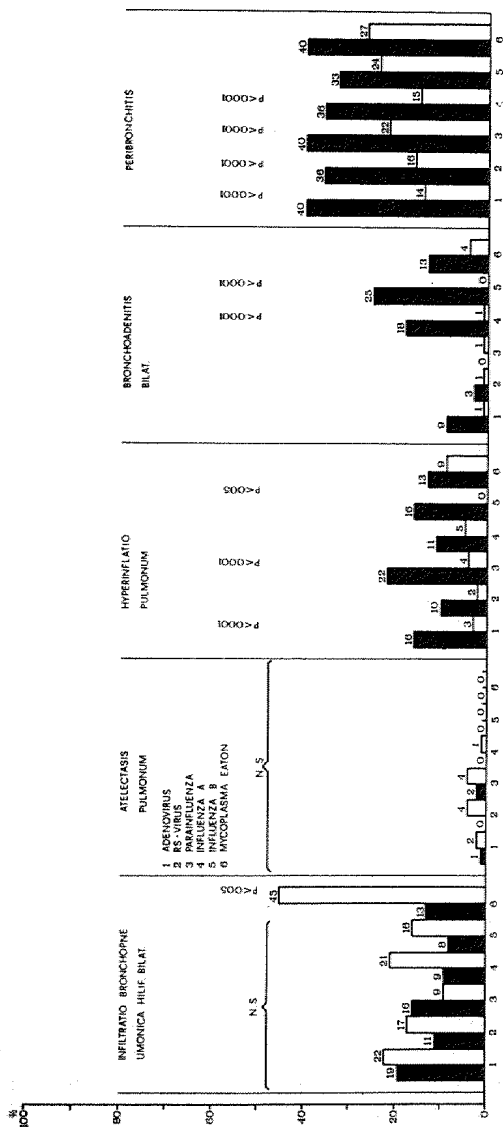


Fig. 4.

X-rays findings in 237 asthmatic and 250 nonasthmatic children with virological infection.

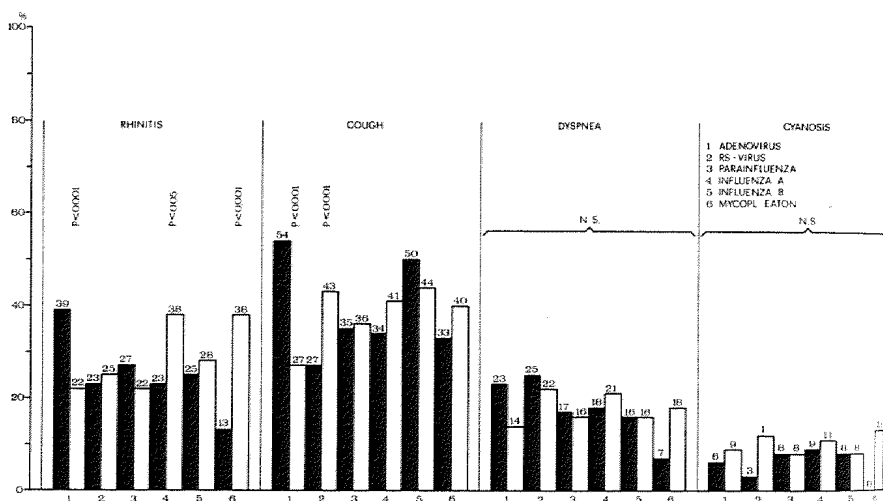


Fig. 5.

Bacteriological results of the smears of pharynx and nasopharynx in 237 asthmatic and 250 non-asthmatic children with virological infection.

significantly more often infected by myxoviruses, *Mycoplasma Eaton*, but they are mostly feverless.

Fig. 2 represents clinical manifestations of virological infections in 237 asthmatic and 240 nonasthmatic children. The virological infection of the respiratory tract is significantly more frequent than the infection of the skin and lymphonodi in both groups. All types of viruses are found equally in both groups.

Fig. 3 illustrates the clinical findings in 237 asthmatic and 250 nonasthmatic children with virological infection. The statistical analyses show significantly more cases of rhinitis and cough, but there is no significant difference in dyspnea and cyanosis. In relation to different types of viruses there is no significant difference in the various clinical symptoms.

Fig. 4 shows X-ray findings in 237 children and 250 non-asthmatic children. Hyperinflation pulmonum, bronchoadenitis

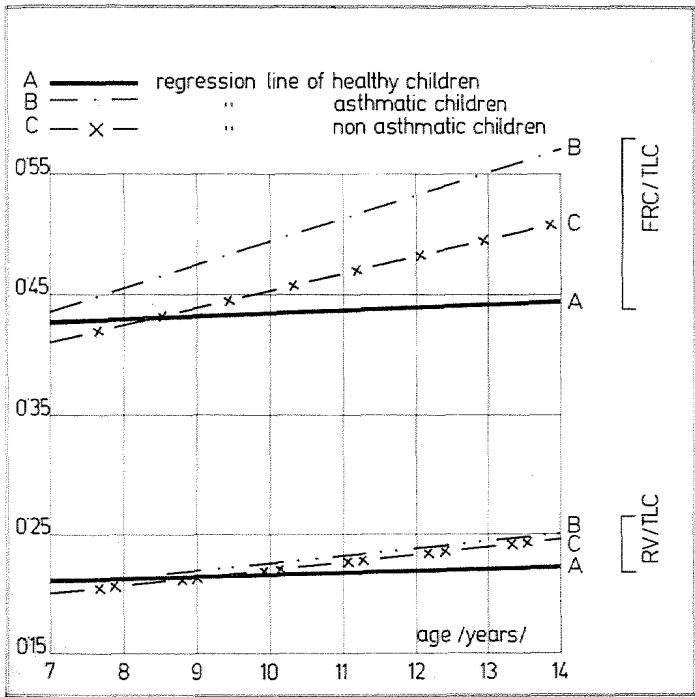


Fig. 6.

FEV%VC and FIV%VC of 1293 healthy /A, D/, 130 asthmatic, and 150 non-asthmatic children in school age in relation to height.

bilat. and peribronchitis are more often diagnosed in asthmatic than in nonasthmatic children. X-ray changes do not depend on the different types of viruses.

Fig. 5 represents bacteriological findings of the pharynx and nasopharynx in 237 asthmatic and 250 nonasthmatic children with virological infection. *Diplococcus pneumoniae* and *Staphylococcus pyogenes aureus* are more frequently found in asthmatic than in nonasthmatic children. The results of pharynx smears are significantly more often positive with *Diplococcus*

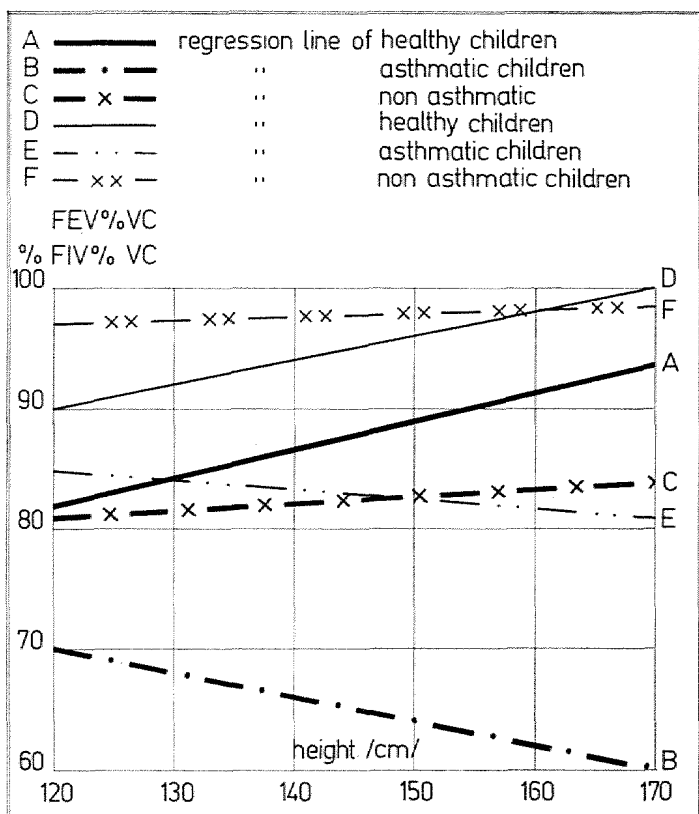


Fig. 7.

FRC/TLC and RV/TLC of healthy /A/, 130 asthmatic /B/ and 150 nonasthmatic children in school age in relation to age /years/.

pneumoniae than the nasopharyngeal smears. Other kinds of bacteria are seldom found in the two groups of children and the two types of smears.

Fig. 6 shows the results of FEV₁ and FIV₁ in 237 asthmatic and 250 nonasthmatic children. The calculation of both measured dynamic values has proved that asthmatic children

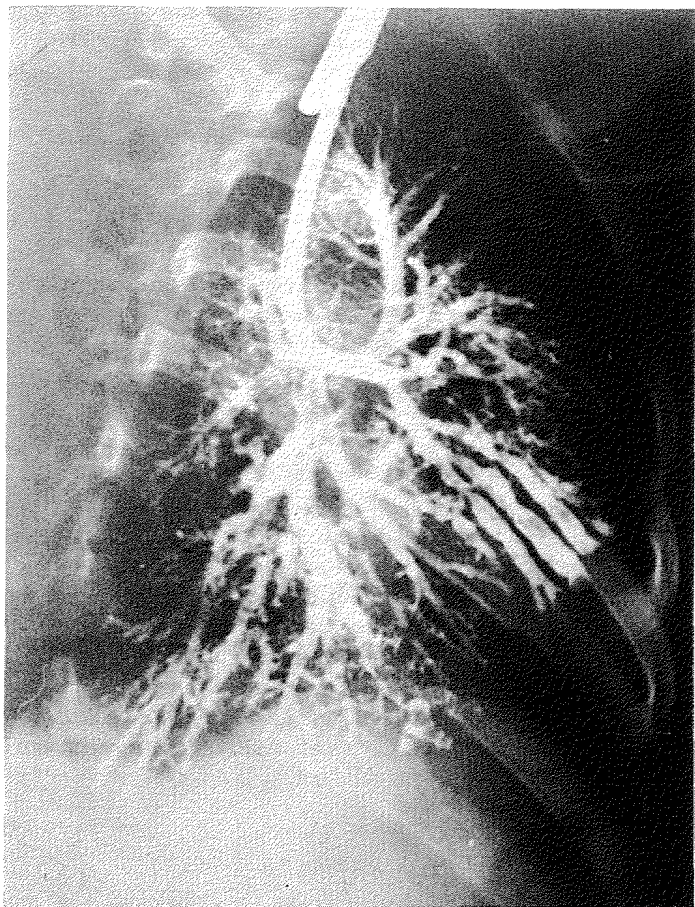


Fig. 8.

Bronchogram of an asthmatic girl with virological infection.

with an obstructive ventilatory insufficiency frequently have pathological values of FEV_1 while nonasthmatic children with chronic bronchitis frequently have pathological values of FIV_1 .

Fig. 7 presents the ratio of FRC/TLC and RV/TLC in both groups. The statistical calculation shows that asthmatic children more often manifest hyperinflation than nonasthmatic children.

Table 1 represents the results of bronchoscopic and bronchographic examinations in asthmatic and nonasthmatic children with viral infections. The statistical analyses show that positive cytological and bacteriological findings of bronchoscopical smears are found more often in asthmatic children than in nonasthmatic children with virological infections.

Fig. 8 shows a bronchogram with bronchiectasis of the lingula in an asthmatic girl with virological infection.

SUMMARY

The author shows complex analyses: clinical, laboratory, X-rays, bronchoscopical, bronchographical and measuring lung function tests as well as the serological examinations in blood serum in both groups of asthmatic and nonasthmatic children with virological infection. The calculation of statistically significant differences between the various diagnostical results of both groups has confirmed that in asthmatic children virological infection of the respiratory tract, pathological findings in X-ray and lung function tests, bronchiectasis and secondary bacteriological invasion occurs statistically significantly more often than in nonasthmatic children.

REFERENCES

1. Burnet, F. M. (1960): Principles of animal virology. Academic Press, New York and London.
2. Carpenter, R. G. & Shaddick, C. W. (1965): Role of infection, suffocation and bottle feeding on cot deaths. *Brit. J. prev. soc. Med.* 19, 1-7.
3. Černelč, D. (1965): Comparison of climate and specific hyposensitization treatment in asthmatic children. *Acta allergol.* 20, 105-116.
4. Černelč, D. (1966): Our results of inhalation test with Hop-Allergen in asthmatic children. *Allergie u. Asthma* 12, 273-278.
5. Černelč, D., Kokalj, J., Vreščaj, B., Kolšek, V. & Welle, K. (1969): Die

Bedeutung von Bronchiektasien bei asthmatischen Kindern, Allergie u. Asthma 15, 311-319.

6. Černelč, D., Černelč, M. & Sinkovič, K. (1971): Comparative study of growth in children with chronic disease related to a control group. Proceedings of XIII International Congress of Pediatrics, Wien, 117-121.
7. Cooke, R. T. & Welch, R. G. (1964): A study in cot death. Brit. med. J. 2, 1549-1554.
8. Doesel, H. (1966): Bronchoscopical and bronchographical examinations in childhood. Chir. Praxis 10, 557.
9. Emery, J. L. & Crowley, E. M. (1956): Clinical histories of infants reported to the coroner as cases of sudden, unexpected death. Brit. med. J. 2, 1518-1521.
10. Forfar, J. O. (1965): Prospects and practice in child health. Lancet, i, 615.
11. Gerbec, M., Matjašič, M. & Snoj, B. (1969): Results of three years research on acute virus infections of the lower respiratory system in children (1965-1968). Medical Journal of Slovenia 7, 247-250.
12. Ryssing, E. (1959): The method of inhalation tests in bronchial asthma. Acta allergol. 14, 433.
13. Sheddon, W. I. H. & Emery, J. L. (1966): Immunofluorescent evidence of respiratory syncytial virus infection in cases of giant cell bronchiolitis in children. J. Path. Bact. 80, 343.
14. Stuart-Harris, C. H. (1961): Bronchitis. Royal Van Gorcum, Assen, Netherlands, Charles C Thomas, Springfield.
15. Sutton, R. N. P. & Emery, J. L. (1966): Sudden death in infancy: a microbiological and epidemiological study. Arch. Dis. Child. 41, 674-677.
16. Swain, R. H. A. & Dodds, T. C. (1969): Clinical Virology. Williams and Wilkins 1967, Baltimore.
17. Wedgwood, R. J. & Benditt, E. P. (1964): Sudden death in infants. In Proceedings of a Conference on Causes of Sudden Death in Infants. U.S. Department of Health, Education and Welfare, National Institutes of Child Health, Bethesda.

Author's address:

Dr. sc. dr. med. D. Černelč,
Research Department,
General Hospital Maribor 62000,
Ljubljanska c. 5, Yugoslavia.

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