ABSTRACT

Deep clinical, exposome, and multi-omics assessments of the Danish COPSAC$_{2000}$ birth cohort at age 18 years

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Background

Atopic diseases, obesity, and neuropsychiatric disorders are lifestyle- and environmental-related chronic inflammatory disorders and the incidence has increased in the last years.

Objective

To review the 18-year follow-up visit of COPSAC$_{2000}$, where risk factors of atopic diseases, obesity, and neuropsychiatric disorders are identified through extensive characterisation of the exposome, including environmental exposures and lifestyle.

Methods

COPSAC$_{2000}$ is a Danish prospective clinical birth cohort study of 411 children born to mothers with asthma, who were enrolled at 1 month of age and closely followed at the COPSAC clinical research unit through childhood for the development of atopic diseases. At the 18-year follow-up visit, biomaterial (hair, blood, urine, faeces, throat and skin swabs, nasal lining fluid and scraping, hypopharyngeal aspirates) and extensive exposome information were collected along with deep metabolic characterization and multiorgan investigations including, heart, lungs, kidneys, intestines, bones, muscles, and skin.

Neuropsychiatric diagnoses were captured from medical records and registers accompanied by electronic questionnaires on behavioral traits and psychopathology.

Results

A total of 370 (90%) of the 411 children completed the 18-year visit. Of these, 25.1% had asthma, 24% had a BMI >25, and 38% had a psychiatric diagnosis in childhood, where attention deficit hyperactivity disorder was the most prevalent affecting 9%. The mean screen time per day was 6.7 hours for males and 5.9 for females. A total of 68% drank alcohol monthly and when drinking 22% drank > 10 units. Almost one-fourth had tried taking drugs and 20% reported having done self-destructive behaviour. The absence of a neuropsychiatric disorder was protecting against asthma.

Conclusion

This huge dataset on health and habits, exposures, metabolism, multiorgan assessments, and biosamples from COPSAC$_{2000}$ by age 18 provides a unique opportunity to explore risk factors and metabolic mechanisms underlying atopic disease and other lifestyle-related, non-communicable diseases such as obesity and neuropsychiatric disorders, which are highly prevalent in the community and our cohort.

Keywords:

Asthma, microbiome, inflammation, chronic diseases, allergy, childbirth cohort, randomised clinical trial, obesity, dyslipidemia, attention deficit hyperactivity disorder.