

## Association between Cholesterol Levels and Atopy among Adolescents with and without Sufficient Amount of Physical Activity

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**Abstract :** Objectives: Atopic diseases are increasingly prevalent among children and adolescents, both locally and internationally. One of the possible contributing factors could be the hypercholesterolemia which leads to cholesterol accumulation in macrophages and other immune cells that would eventually promote inflammatory responses, including augmentation of toll-like receptor (TLR). Meanwhile, physical activity is well known for its beneficial effects against the condition of hypercholesterolemia and incidence of atopic diseases. This study, therefore, explored whether atopic diseases were associated with increased cholesterol levels and whether physical activity habit influenced this association. Methods: This is a sub-study derived from the longitudinal cohort study which recruited a group of children at five years of age in Kindergarten 3 (K3) to investigate the long-term impact of family socioeconomic status on child development. In 2018/19, adolescents (average age: 13 years old) were asked to report their physical activity habit and history of any atopic diseases. During health assessment, peripheral blood samples were collected from the adolescents to study their lipid profile [total cholesterol, high-density lipoprotein (HDL)-cholesterol, and low-density lipoprotein (LDL)-cholesterol]. Regression analyses were performed to test the relationships between variables of interest. Results: Among the 315 adolescents, 99 (31.4%) reported to have allergic rhinitis. There were 45 (14.3%) with eczema, 17 (5.4%) with a food allergy, and 12 (3.8%) with asthma. Regression analyses showed that adolescents with a history of any type of atopic diseases had significantly higher total cholesterol ( $B=13.3$ ,  $p < 0.01$ ) and LDL cholesterol ( $B=7.9$ ,  $p < 0.05$ ) levels. Further subgroup analyses were conducted to examine the effect of physical activity level on the association between atopic diseases and cholesterol levels. We found stronger associations among those who did not meet the World Health Organization recommendation of at least 60 minutes of moderate-to-vigorous activities each day (total cholesterol:  $B=15.5$ ,  $p < 0.01$ ; LDL cholesterol:  $B=10.4$ ,  $p < 0.05$ ). For those who met this recommendation, the associations between atopic diseases and cholesterol levels became insignificant. Conclusion: Our study results support the current research evidence on the relationship between an elevated level of cholesterol and atopic diseases. More importantly, our results provide preliminary support for the protective effect of regular exercises against elevated cholesterol level due to atopic diseases. The findings highlight the importance of a healthy lifestyle for keeping cholesterol levels in the normal range, which can bring benefits to both physical and mental health.

**Keywords :** atopic diseases, Chinese adolescents, cholesterol level, physical activity

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