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Obesity at Late Adolescence and Incident Type 1 Diabetes in Young Adulthood

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Aims: Studies in children reported an association between increased body mass index (BMI) and risk for developing type 1 diabetes (T1D), but evidence in late adolescence is limited. We recently investigated the association between adolescent BMI and type 2 diabetes in young adulthood (Diabetes Care 2020, 43(7): 1487-95) and here we studied

on the same cohort the association between late adolescent BMI and incident T1D.

Methods: All Israeli adolescents, ages 16-19, undergoing medical evaluation in preparation for mandatory military conscription between January 1996 and December 2016 were included for analysis unless they had a history of dysglycemia (n=1,462,362; 40% women). Data were linked to information about adult onset of T1D in the Israeli National Diabetes Registry. Weight and height were measured at study entry and BMI was computed and transformed to age- and sex-adjusted BMI percentiles according to US Center for Diseases Control. The definition of T1D was determined based on anti-diabetic drugs and was confirmed for a subpopulation of the cohort to which islet autoantibodies data were available. Cox proportional models were applied, with BMI analyzed both as a categorical and continuous variable.

Results: There were 777 incident cases of T1D during 15,810,751 person-years (mean age at diagnosis 25.2 ± 3.9 years). The median follow-up period was 11.2 years (IQR 5.8-16.3), with follow-up length shorter for individuals with a higher BMI. The crude diabetes rate showed a consistent graded increase across BMI groups from underweight to obesity; 3.6 to 8.4 cases per 100,000 person-years, respectively.

In a multivariable model adjusted for age, sex and socio-demographic variables, the hazard ratios (HRs) for T1D were 1.05 (95% CI 0.87-1.27) for the 50th–74th BMI percentiles, 1.41 (1.11–1.78) for the 75th–84th BMI percentiles, 1.54 (1.23–1.94) for adolescents with overweight (85th–94th percentiles), and 2.05 (1.58–2.66) for adolescents with obesity (BMI \geq 95th percentile)(reference group, 5th-49th BMI percentile group). One increment in BMI standard deviation was associated with 25% greater risk for incidence of T1D (HR=1.25, 95%CI 1.17-1.32). when the presence of one or multiple (≥ 2) islet antibodies was added as a criterion for T1D definition, the HRs among those with adolescent obesity were 2.90 (1.80-4.68) and 3.14 (1.68-5.88) respectively. Results were marginally affected by level of adjustment for sociodemographic background, were similar when analysis was stratified by sex, and also persisted when the study population was limited to adolescents with unimpaired health in order to mitigate confounding by coexisting illness.

The fraction of type 1 diabetes attributed to adolescent overweight and obesity (Population attributable risk%; PAR %) was 10.1% (95%CI 6.3%-14.2%).

Conclusions: Adolescent overweight and obesity in apparently healthy adolescents were associated with increased risk for incident type 1 diabetes in early adulthood.

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