

Association of prediabetes with adiposity in Emirati children and adolescents

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Introduction

Prevalence of diabetes and obesity has been increasing in children and adolescents in Middle East and North Africa. Prediabetes has been strongly associated with risk of developing type 2 diabetes. In the UAE, prevalence of prediabetes has been reported to be 5.4% in children and adolescents with overweight and obesity (1). This research aims to report association of prediabetes with adiposity in children and adolescents.

Methods

This cross-sectional study was conducted as part of Abu Dhabi diabetes and obesity study (Clinical trial no: NCT01843959) in an outpatient diabetes specialty clinic, Abu Dhabi. Anthropometric and metabolic parameters were collected. Body composition was assessed by bioelectrical impedance analysis (Tanita, Tokyo, Japan). Prediabetes (PD) was defined by American Diabetes Association (ADA) guidelines (2019) and included subjects diagnosed by impaired fasting glucose (IFG) only (n=98), impaired glucose tolerance (IGT) only (n=3), and both IFG and IGT (n=2). Normal glucose tolerance (NGT) was defined as absence of diabetes or any form of prediabetes, by ADA criteria. Center of Disease Control and Prevention criteria was used for BMI percentile as underweight (BMI<5), normal weight (5≤BMI<85), overweight (85≤BMI<95), obesity (BMI≥95). Non-parametric tests were carried out using STATA (15.0).

Results

In total, 103 subjects had prediabetes, 471 had NGT. PD and NGT group did not have statistically significant difference in age and sex (Table 1). PD group had higher BMI percentile (p<0.0001), fat mass (p=0.0008) and fat % (p=0.0006) as compared to NGT group. Age and sex did not show a significant association with prediabetes in univariate logistic regression. Overweight (p<0.0001) and obesity group (p<0.0001) had three times more odds of prediabetes as compared to normal weight group, after adjusting for age and sex in a multivariate logistic regression (Table 2).

Conclusion

Our findings indicate that children and adolescents with obesity have a threefold higher likelihood of having prediabetes. We have also shown the close relationship between pre-diabetes and body fat mass in this population. Healthy life promotion strategies need to start from an early age.

Reference

Al Bitar N, Afandi EZ, Parish M, et al. The prevalence, risk factors, and screening measure for prediabetes and diabetes among Emirati overweight/obese children and adolescents. BMC Public Health. 2015;15(1):1298.

Keywords: Children, Adolescents, Overweight and Obesity, Prediabetes, Adiposity

Table 1: Characteristics differences between normal glycaemic group and prediabetes group, using Wilcoxon rank-sum test and Pearson's chi-square test in children and adolescents in UAE.

Characteristics	NGT	PD	P-value
N	471 (82.0%)	103 (17.9%)	
Age, years	11.7 (8.9, 14.1)	12.2 (8.6, 13.8)	0.88
Age Category			
4-7	73 (15.5%)	14 (13.6%)	0.28
8-10	128 (27.2%)	24 (23.3%)	
11-14	185 (39.3%)	51 (49.5%)	
15-19	85 (18.0%)	14 (13.6%)	
Female (%)	339 (72.0%)	67 (65.0%)	0.16
BMI Percentile	69.0 (19.0, 94.0)	92.0 (71.0, 98.0)	<0.0001
BMI Groups			
Normal Weight	241 (51.2%)	29 (28.2%)	<0.0001
Underweight	56 (11.9%)	6 (5.8%)	
Overweight	59 (12.5%)	22 (21.4%)	
Obesity	115 (24.4%)	46 (44.7%)	
HbA1c	5.2 (4.9, 5.4)*	5.3 (5.1, 5.6)	<0.0001
BP Systolic (mmHg)	108.0 (100.0, 117.0)	108.0 (102.0, 121.0)	0.15
BP Diastolic (mmHg)	61.0 (57.0, 67.0)	63.0 (57.0, 68.0)	0.36
Fat %	23.3 (15.4, 32.3)†	30.2 (19.9, 37.4)††	0.0006
Fat Mass	9.5 (4.2, 17.3)†	13.3 (9.2, 25.0) ††	0.0008

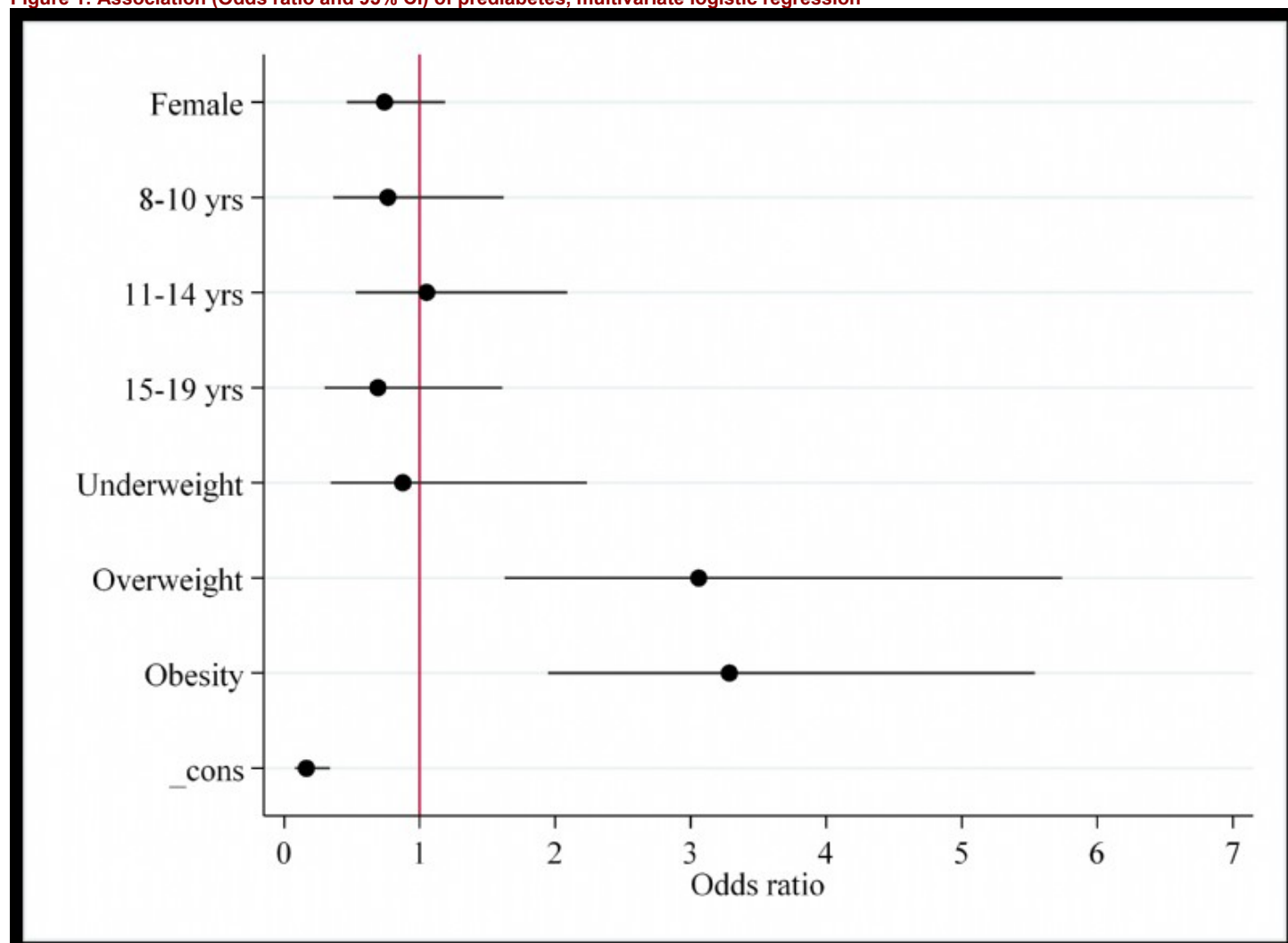
Data are presented as median (IQR) for continuous variables and numbers (%) for categorical variables. *NGT Group: n=467 for HbA1c; †NGT Group: n=312 for Fat% and Fat mass; ††Prediabetes: n=76 Fat%, Fat mass

Table 2: Multivariate Logistic Regression for probability of prediabetes among children and adolescents (N=574) adjusted for age, gender and BMI groups.

	Odds Ratio	95% Confidence Interval		P-value
Gender				
Male	Ref.			
Female	0.74	0.46	1.19	0.212
Age Groups				
4-7 years	Ref.			
8-10 years	0.77	0.36	1.62	0.486
11-14 years	1.05	0.53	2.09	0.884
15-19 years	0.69	0.30	1.61	0.394
BMI Groups				
Normal Weight	Ref.			
Underweight	0.88	0.34	2.23	0.782
Overweight	3.06	1.63	5.74	<0.0001
Obesity	3.29	1.95	5.54	<0.0001

Model was a good fit, Hosmer-Lemeshow goodness-of-fit $p=0.165$

Figure 1: Association (Odds ratio and 95% CI) of prediabetes, multivariate logistic regression



Details

Status : In author: Saved draft
Presentation Type : Poster Presentation
Abstract Category/Topic : Childhood and Adolescent Obesity » Other
Language : English
Saved: : 01.02.2021 10:48:54
Submit: :

Confidential to Author and Editor

Note to Editor : No conflict of interest
No funding
Presenter : Maria Majeed (mamajeed@icldc.ae)

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