Risk factors for prediabetes in Auckland primary school children

Lawgun, D.; Conlon, C.A.; Beck K.L., Gammon, C.S., von Hurst, P.R.

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND
COLLEGE OF HEALTH
TE KURA HAUORA TANGATA

Background

- Type 2 diabetes mellitus (T2DM) is increasing in the NZ population
- Strongly linked to ethnicity and obesity
- Diagnoses are occurring at an earlier age
- Earlier onset leads to earlier progression of complications
- Identification of at-risk children is a priority for early intervention
- Reliable, simple indicators of risk need to found

T2DM Screening recommendations for children and young people in New Zealand

- Obese children and young adults. (BMI > 30kg/m2 or BMI > 27kg/m2 for Indo-Asian* peoples)
- The NZSSD# recommends screening if:
  - there is a family history of early onset type 2diabetes mellitus; or
  - they are of Maori, Pacific or Indo-Asian*ethnicity

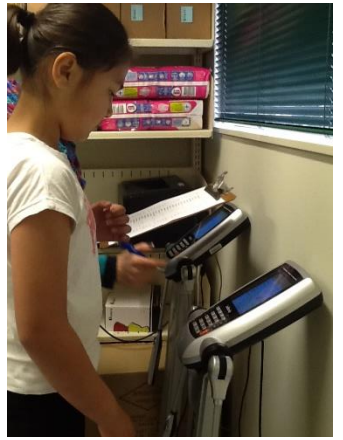
* Indo-Asian Indian, including Fijian Indian, Sri Lankan, Afghani, Bangladeshi, Nepalese, Pakistani, Tibetan.

Source New Zealand Primary Care Handbook. (2012) (New Zealand Guidelines Group, 2012)

NZSSD – New Zealand Society for the Study of Diabetes

The Children's Bone Study

- A cross-sectional study of 8-11 year-old children (n=730) recruited from 6 primary schools across Auckland.
- Glycated haemoglobin (HbA1c) was measured from a finger-prick blood test (Roche Cobas) in a subset
- Anthropometry included weight, height, waist circumference (WC) and percentage body fat (InBody 230).
- Ethnicity, gender, age, and physical activity (PA) were assessed by questionnaires completed by the child and/or parents.
- Stepwise multiple linear regression analysis was used to explore which independent variables best predicted variance in HbA1c.



Study Aim

- To identify reliable indicators of prediabetes risk in children, using HbA1c as the dependent variable.




Results

- HbA1c samples from 451 children
- Mean (SD) age 10.4(0.63) years
- 54.8% female
- 65.6% normal BMI
- A wide range of ethnicities was represented
  - European 35.7%
  - Maori 12.7%
  - Pacific 24.0%
  - South Asian 10.0%
  - Asian 9.5%
  - South East Asian 4.5%

Results

- We defined normoglycaemic as HbA1c ≤39mmol/mol (<5.7%) and prediabetic as HbA1c >39mmol/mol (>5.7%) (American Diabetes Association, 2014).

- 71 (15.7%) children had HbA1c >39mmol/mol
  - Mean (SD) HbA1c 40(2.0)mmol/mol
  - 32 of these had BMI in the normal range (IOTF BMI cut-offs)
  - 54 had waist circumference within the normal range
  - 24 were within normal %BF range
  - South Asian children had highest % with normal anthropometric measures

Comparison of characteristics between normal and elevated HbA1c groups

	Total group (n=451)	≤ 39nmol/mol (n=380)	> 39nmol/mol (n=71)	P-value
Age (years)	10.40 (0.63)	10.39 (0.63)	10.48 (0.60)	N/S
Height (m)	1.44 (0.8)	1.44 (0.8)	1.46 (0.80)	<0.05
Weight (kg)	39.7 (11.3)	38.4 (10.2)	46.9 (14.2)	<0.001
BMI (kg/m2)	18.8 (4.0)	18.3 (3.5)	21.7 (5.0)	<0.001
Waist circumference (cm)	63.1 (10.8)	61.6 (9.7)	71.3 (12.9)	<0.001
Waist/height ratio	0.44(0.07)	0.43 (0.06)	0.49 (0.08)	<0.001
Body fat (%)	22.9 (9.3)	21.7 (8.4)	30.1 (10.7)	<0.001
Physical activity (hours)	3.6 (2.4)	3.75 (2.3)	3.07 (2.7)	N/S
HbA1c (mmol/mol)	36 (3)	35 (2)	40 (2)	<0.001

Determinants of elevated HbA1c

- Ethnicity
  - South Asian
  - Pacific Island
- Anthropometric
  - Body fat percentage
  - Waist circumference
  - Waist to height ratio

Conclusion

- T2DM risk can be identified early in life
- Opportunity for intervention in children in high risk populations
- High BMI is not necessarily a good indicator of increased risk

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The Team:

- Pam von Hurst (PI)
- Cath Conlon
- Kathryn Beck
- Cheryl Gammon
- Owen Mugridge
- Donna Lawgun
- Maryam Delshad
- Emma Smirk
- Mia David
- Maya Carryer
- Hajar Mazahery
- Alex Tava
- Jasmine Foote
- PC Tong
- Tara Lemmon
- Emma Ternouth
- David Alsford