

Paediatrics

THE JOURNAL OF PEDIATRICS

Diabetes-related complications in people with CF

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓✓

1 This study characterised the epidemiologic study of the cystic fibrosis (CF) population in order to gain an insight into the pulmonary and nutritional status of the study participants (n=8247; comprising adolescents and adults) with respect to cystic fibrosis-related diabetes (CFRD); association of CFRD with practice patterns and other comorbid conditions were also assessed.

2 The mean age of the CFRD population was 25.9 years, compared with 22.5 years for those without. Of the total population, 45.6% were females, of whom 17.1% suffered from CFRD, compared with 12.0% of the male population.

3 Spirometry results were available for 89.2% of the total population. The CFRD population had worse pulmonary function, as defined by FEV₁ (forced expiratory volume in 1 second) values, than those without: 55.4% compared to 67.5% ($P<0.001$), respectively. A similar trend was observed in all age groups.

4 Nutritional status data were available for 97.9% of the total population and were significantly much poorer in the CFRD compared with the non-CFRD population.

5 This is the largest study of its type and, despite its limitations, it highlights many serious diabetes-related complications for people with CFRD. In conclusion, the authors state that this study has discovered new and potentially clinically important associations with CFRD.

Marshall BC, Butler SM, Stoddard M, Moran AM, Liou TG, Morgan WJ (2005) Epidemiology of cystic fibrosis-related diabetes. *The Journal of Pediatrics* 146(5): 681-7

Cystic fibrosis-related diabetes development



Krystyna Matyka, Senior Lecturer in Paediatrics, University of Warwick Medical School

Cystic fibrosis (CF) is the most common inherited recessive life-threatening disease in the Western world, affecting around 7500 individuals in the UK. Median survival has increased dramatically with improvements in disease management and is predicted to be about 40 years of age for children born in the 1990s.

Diabetes is a well-recognised complication of CF; the prevalence of diabetes has been rising in line with increasing life expectancy. Studies have suggested that cystic fibrosis-related diabetes (CFRD) is a serious development and is related to reductions in pulmonary function, nutritional status and long-term survival. Whether the development of CFRD is a risk factor or merely a marker for this clinical deterioration is not known, but small studies suggest significant clinical improvements with the introduction of insulin therapy.

In this study (Marshall et al, 2005; left) the authors have examined cross-sectional data from a large (n=8247) cohort of children and adolescents taking part in a longitudinal survey in North America, the Epidemiologic Survey of Cystic Fibrosis. Participants with treated diabetes, with either tablets or insulin, were identified and clinical

and disease-related variables were compared with those who were not on treatment. Female gender, pancreatic insufficiency and the δ -F508 genotype were all found to be risk factors for CFRD. The CFRD population had significantly worse pulmonary function, more pulmonary exacerbations and poorer nutritional status than those without diabetes.

There are a number of limitations to this study. Unfortunately no information was given on whether all centres were screening for diabetes in line with North American protocols. No predetermined guidelines were used to define CFRD and it is not clear what the treatment recommendations were for all centres. It is therefore unlikely that the same approach to management was used within all centres, with some using oral hypoglycaemic medication and others using insulin, which is likely to influence clinical, especially nutritional, status. Notwithstanding these concerns, these data confirm the findings of previous smaller studies which suggest that the development of CFRD is a potentially life-limiting complication that may merit aggressive pharmacological intervention. Further research is needed to examine the optimum methods of screening and management of these young people so that the gains in life expectancy for patients with CF seen in recent years may be maintained.

DIABETES

Pramlintide lowers post-prandial hyperglycaemia

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓✓

1 The study examined the effectiveness of pramlintide or an increased meal bolus of rapid-acting insulin in controlling post-prandial hyperglycaemia in adolescents on continuous subcutaneous insulin infusion (CSII).

2 Post-meal excursions of glucose, insulin and glucagon were compared between a group of adolescents on CSII and healthy controls. The

results confirmed that post-prandial hyperglycaemia is a significant problem even for those children on CSII.

3 Pramlintide significantly reduced the post-prandial rise in glucose when compared to a 60% increase in meal bolus insulin through the pump. Hypoglycaemia occurred in the early post-prandial phase using pramlintide but may have been related to a high dose. Delayed hypoglycaemia was seen after increased meal bolus insulin but could be corrected by repeated mini-dose injection of glucagon.

4 In conclusion, pramlintide in addition to insulin may be useful in controlling postprandial glycaemia.

Heptulla RA, Rodriguez LM, Bomgaars L et al (2005) The role of amylin and glucagon in the dampening of glycemic excursions in children with type 1 diabetes. *Diabetes* 54(4): 1100-7

‘HbA_{1c} deteriorated going through puberty but predated the onset of deterioration in adherence behaviour, which only occurred in late puberty.’

DIABETIC MEDICINE

Adolescent treatment adherence and metabolic control

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 This study analysed the correlation between adherence to treatment, diabetes knowledge and metabolic control in a group of adolescents going through puberty at entry to the study and then again 4 years later.

2 HbA_{1c} deteriorated going through puberty but predated the onset of deterioration in adherence behaviour which only occurred in late puberty. Diabetes knowledge increased during puberty.

3 Deteriorating metabolic control during early adolescence may be due to physiological factors, despite stable adherence and self-care, and may impact adversely on subsequent self-care behaviour despite increasing diabetes knowledge. These results suggest a bidirectional relationship between glycaemic control and adherence.

Du Pasquier-Fediaevsky L, Chwalow AJ, Tubiana-Rufi N et al (2005) Is the relationship between adherence behaviours and glycaemic control bidirectional at adolescence? A longitudinal cohort study. *Diabetic Medicine* **22**(4): 427–33

DIABETES CARE

Prevention of type 1 diabetes by mothers

Readability	✓✓✓
Applicability to practice	✓✓
WOW! factor	✓✓

1 This study examined spontaneous efforts to prevent diabetes in 192 children found to be genetically predisposed to diabetes 4 years after screening.

2 Interviews were carried out to observe cognitive, affective, coping and sociodemographic variables among the women. One or more diabetes prevention behaviours were reported by 67 % of mothers, of which monitoring behaviours were the most common. They also included decreasing sweet consumption and increasing exercise.

3 Despite there being no proven methods to avoid the development of diabetes, the knowledge of a child's diabetes risk status did influence maternal behaviour. These results need to be borne in mind when interventional studies to delay the development of diabetes in genetically at-risk children are planned.

Baughcum AE, Johnson SB, Carmichael SK et al (2005) Maternal efforts to prevent type 1 diabetes in at-risk children. *Diabetes Care* **28**(4): 916–21

AMERICAN JOURNAL OF NEURORADIOLOGY

New marker for DKA in children investigated

Readability	✓✓✓✓
Applicability to practice	✓✓
WOW! factor	✓✓✓

1 Using magnetic resonance spectroscopy (MRS) the brains of 25 children with diabetic ketoacidosis (DKA) were analysed for the presence of β-hydroxy butyrate (βOHB) and acetoacetate (AcAc).

2 The children underwent brain MRS within 4, 4–8, or 8–12 hours after starting treatment for DKA.

3 Changes in cerebral βOHB and AcAc mirrored those seen in the serum during DKA. Lactate, an indicator of anaerobic metabolism, was present in several patients and was seen more frequently in those with mental status abnormalities.

4 Future MRS studies may inform the pathophysiology of cerebral oedema formation during DKA.

Wootton-Gorges SL, Buonocore MH, Kuppermann N et al (2005) Detection of cerebral β-hydroxy butyrate, acetoacetate, and lactate on proton MR spectroscopy in children with diabetic ketoacidosis. *American Journal of Neuroradiology* **26**(5): 1286–91

DIABETES CARE

Predictors of glucose levels in obese youth

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 Oral glucose tolerance tests (OGTTs) were used to determine the glucose tolerance levels of 117 obese adolescents. Eighty-four had normal glucose tolerance (NGT) and

33 impaired glucose tolerance (IGT). OGTTs were carried out at baseline and approximately 2 years later.

2 At 2 years, OGTT results and weight changes were examined in order to identify youth who were at risk of developing type 2 diabetes.

3 Eight study participants, all of whom had IGT, had developed type 2 diabetes at 2 years. Of these, seven were of African-American background. Fifteen (of 33; 45.5 %) who had IGT at the start of the study had reverted to NGT at 2 years.

4 The most important predictors of developing type 2 diabetes in obese youth which emerged from this study were: severe obesity; IGT; and African-

American background. Fasting blood glucose, C-peptide and fasting insulin levels, however, were non-predictive.

5 Approximately 10 % of those who were classified as NGT developed IGT at study end.

6 The study investigators state that their data suggest that beta-cells deteriorate faster in adolescents than in adults.

7 In conclusion, the investigators state that OGTT should be carried out for all adolescents at risk of developing type 2 diabetes, especially those of an ethnic background.

Weiss R, Taksali SE, Tamborlane WV, Burgert TS, Savoye M, Caprio S (2005) Predictors of changes in glucose tolerance status in obese youth. *Diabetes Care* **28**(4): 902–9

‘Oral glucose tolerance tests should be carried out for all adolescents at risk of developing type 2 diabetes.’