

Diabetes and its complications among Pacific people in New Zealand

DAVID SIMMONS*

Introduction

The importance of non-insulin dependent (Type 11) diabetes (NIDDM) among Pacific migrants to New Zealand has been known longer than for many other populations in the world¹. The prevalence of diabetes increased from 6.1% in women and 2.3% in men prior to migration in 1968–71 to 10.8% and 4.4% respectively by 1976. The two most important lifestyle related risk factors for NIDDM, obesity and low levels of physical activity remain common in Pacific people in New Zealand². This paper reviews the current epidemiology of diabetes among Pacific people in New Zealand and current developments in attempts to control the epidemic of NIDDM. Most of the research in New Zealand has been conducted among Pacific people as a group, rather than by the individual ethnic backgrounds of the participants.

Prevalence of diabetes mellitus

Most Pacific people with diabetes have NIDDM (95%)³. The incidence of insulin dependent (Type 1) diabetes (IDDM) in Polynesians appears to be lower than that among Europeans.⁴ The prevalence of known diabetes among Pacific people in New Zealand was reported to be 6% in those aged 40–49 years, 13% in those aged 50–59 years and 15% in those aged 60–69 years.³ The proportion of those with diabetes who are undiagnosed in the community remains unclear and a high proportion with known diabetes are not

in the workforce (eg 75% of Pacific males of working age with diabetes were unemployed in South Auckland⁵).

Diabetes in pregnancy

Among women with known diabetes, 33% report having had diabetes in pregnancy.³ Undiagnosed NIDDM during pregnancy remains a major cause of morbidity and stillbirth⁶ and approximately 30% of Polynesians with gestational diabetes subsequently having NIDDM diagnoses⁷. In Auckland, Pacific women with both gestational and established diabetes have large babies (approximately 0.5 kg above non-diabetic women)⁸. This is associated with a high body mass

index. There are no published reports of other outcomes to diabetic pregnancies in New Zealand.

Non-diabetic Pacific women are relatively hyperglycaemic in pregnancy with a high plasma insulin:C-peptide ratio⁹. This is associated with increased insulin

concentrations and insulin:C peptide ratio in the umbilical cord blood of the neonates. It has been proposed that the antenatal obesity among Pacific women has led to minor maternal and thence neonatal hyperglycaemia. The abnormal insulin handling in Pacific neonates may indicate beta cell damage, predisposing to future NIDDM and fuelling the current epidemic. Further support for the hypothesis comes from the offspring of a cohort of mainly Pacific women with gestational diabetes who were followed up for almost 3 years¹⁰. The offspring of the insulin treated women, who were obese and hyperglycaemic during pregnancy, were slimmer than the offspring of diet treated women. This suggests that the antenatal administration of insulin therapy may play a role in reducing the future risk of obesity and NIDDM among the offspring of Pacific women in New Zealand.

Clinical profile of Pacific diabetics

Pacific patients are diagnosed approximately 5 years earlier than New Zealand Europeans with NIDDM³. Glucose control, the main risk factor for diabetic microvascular disease, remains poor⁵. This is not surprising in that Pacific people are

“ The proportion of those with diabetes who are undiagnosed in the community remains unclear and a high proportion with known diabetes are not in the workforce ... ”

*School of Medicine, University of Auckland, Middlemore Hospital, Otahuhu, Auckland, New Zealand.

least likely to be receiving insulin therapy and are less likely to be monitoring their own glucose concentrations¹¹. Besides their greater hyperglycaemia, other risk factors for diabetes related complications, such as smoking and hypertension seem to be less common than among diabetic New Zealand Europeans⁵. Total cholesterol concentrations are lower than Europeans, but HDL concentrations are also low⁵.

The most important self reported barriers to care among Pacific patients in Auckland and Wellington are cost, personal and cultural attitudes to diabetes and the provision of conflicting advice by different diabetes workers^{12,13}. Poor diabetes knowledge remains common¹⁴ and a high proportion of Pacific patients are worried about their diabetes¹¹. The importance of family support has been demonstrated by the high frequency of family members assisting with self blood glucose monitoring.¹¹

Diabetic nephropathy

There are 9 times as many Pacific people with diabetes as a co-morbid condition to their renal disease than expected from the national demography.^{15,16} Although not all of these have diabetes as the recorded primary renal disease, diabetes may have contributed to the development of the nephropathy, and will certainly to the morbidity and mortality of patients receiving renal replacement therapy (RRT).

The impact of diabetic nephropathy among Pacific people with NIDDM on hospitalisation rates was first shown among in-patients at Middlemore Hospital in South Auckland in 1983.¹⁷ Chronic renal failure was reported to be present in 1% of diabetic Europeans but 28% of diabetic Pacific people. Since this time, the number of patients receiving dialysis has increased exponentially.¹⁸ Pacific people also have an excess of glomerulonephritis¹⁹ and initial theories for their excess of diabetic nephropathy included ethnic difference in either histocompatibility or immune response gene frequencies. To date, this has not been shown and the overall causes remain unclear. However, the picture has become more complete since these initial theories were propounded.

Microalbuminuria and nephropathy are more common among working Polynesians compared with working Europeans with normal glucose tolerance (12% vs 3%), impaired glucose tolerance (28–30% vs 7%) or newly diagnosed diabetes (35–50% vs 7%).²⁰ A higher prevalence of microalbuminuria in the general population in comparison

with the working population is suggested by the high prevalence of microalbuminuria among young Samoan women with and without past pre-eclampsia (40% vs 18%).²¹

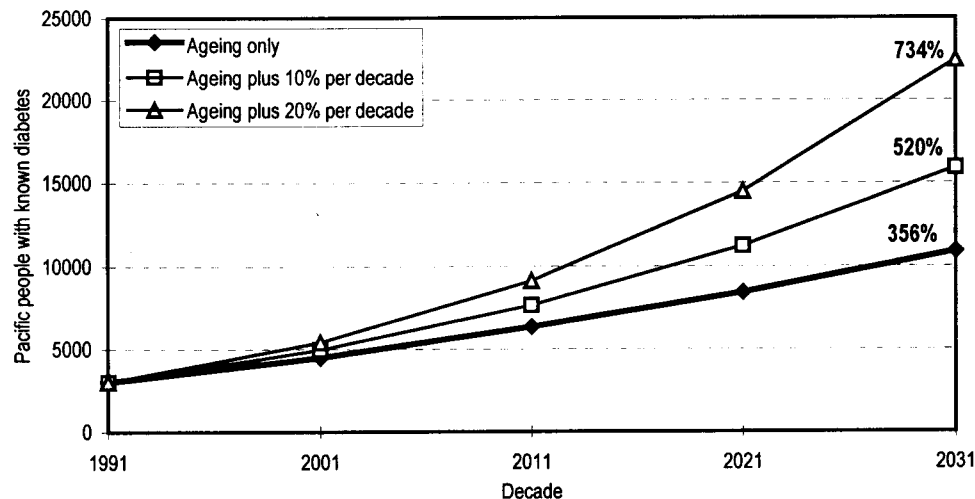
Glomerular hyperfiltration, a marker of future nephropathy, is present among young Polynesians with newly diagnosed NIDDM confirming that the processes behind the excess of diabetic nephropathy are present early in NIDDM.²² Among patients attending the Wellington diabetes clinic, the geometric mean albumin:creatinine ratio was reported as 1.9 mg/mmol creatinine in diabetic Europeans, but 11.1 mg/mmol creatinine among diabetic Pacific people respectively.²³ Diabetic clinics in New Zealand usually include a greater proportion of more "severe" patients and not surprisingly, the degree of microalbuminuria is lower in the overall population once patients are also included from primary care. This was well shown in the South Auckland Diabetes Survey where patients from both the diabetes services and a random sample of general practitioners were reviewed.⁵ The geometric mean albumin:creatinine ratio was reported as 2.2 and 4.4 mg/mmol creatinine among European and Pacific patients respectively.

Those developing microalbuminuria/nephropathy are diagnosed 4–5 years younger than their normoalbuminuric counterparts. They are also more obese, have greater central fat distribution and a higher systolic blood pressure than normo-albuminuric Polynesians.⁵ Among those with an elevated creatinine without ESRF about 60% of Pacific people have microalbuminuria or proteinuria compared with only 20% among Europeans. Similarly, among those with a normal serum creatinine, Pacific people are also far more likely to have proteinuria. Overall, 39% Europeans, but 54% of Pacific people have either microalbuminuria or nephropathy. Prospectively, a 10-fold increase in albumin:creatinine ratio is associated with a 5-fold risk of a diabetes related complication among Pacific people with NIDDM.²⁴

Once Pacific patients have CRF, there appears to be a more rapid decline in renal function even than among Europeans with IDDM (rate of decline in GRF 1.7 ml/min/month vs 1.1 ml/min/month.²⁵ Once ESRF has occurred, there is no evidence of any differences in access to RRT for Pacific people with NIDDM. Overall, the proportion of patients with NIDDM and ESRF is remarkably high (Europeans 0.3%, Pacific people 3.3%).

“ The most important self reported barriers to care among Pacific patients in Auckland and Wellington are cost, personal and cultural attitudes to diabetes and the provision of conflicting advice by different diabetes workers. ”

Figure 1. Estimated increase in the number of Pacific people with known diabetes in New Zealand, 1991-2031



Diabetic eye disease

Significant ethnic differences in self reported diabetic eye disease were found in the household survey of known diabetes in South Auckland. Blindness in at least one eye was present in 8% of Pacific patients but only 2% of Europeans.¹¹ Laser therapy had been received by 12% and 7% respectively, while at least one cataract was reported by 16% of Pacific patients but only 6% of Europeans. Preliminary population based data using stereoscopic retinal photography have recently been reported for South Auckland which showed excess proliferative and moderate retinopathy among Pacific people and an overall prevalence of retinopathy of 29–32%.²⁶

Diabetic cardiovascular disease

Although cardiovascular disease is the major cause of death for diabetic patients, surprisingly little data is available for these complications in New Zealand. Self reports of a known “heart attack” in the household survey in South Auckland showed that 6% of Pacific diabetic patients, 11% of European and 11% Maori diabetic patients (after age adjustment) had known that they had had a myocardial infarction.¹⁰ Such data are hard to interpret in view of their questionable validity. More recently, again in South Auckland, known diabetes was found to be present in 37% of Polynesian patients but in only 15% of European patients with a confirmed myocardial infarction.²⁷ Similar ethnic differences were found among patients with congestive cardiac failure.²⁸

Diabetic foot disease

Pacific people with diabetes are least likely to report symptoms from either diabetic neuropathy or peripheral vascular disease.¹⁰ Amputation rates are comparable to

those among other ethnic groups, but foot ulcers are more common. This may be due to the higher frequency of poor skin and nail care among diabetic Pacific people²⁹ and poorer diabetes knowledge in general.

Trends in the prevalence of diabetes

Using the South Auckland data³ and the demographic profile from the 1991 census, there would have been 64,919 Europeans, 11,947 Maori and 3,126 Pacific people with known diabetes in New Zealand at that time. Numbers will exceed these now as the population is ageing and growing. For example, in South Auckland, the total numbers with diabetes were predicted to grow by 20% (Europeans), 50% (Maori) and 130% (Pacific) over the next 20 years.³⁰ Figure 1 applies the current prevalence data for NIDDM to the projections of population growth for Pacific people in New Zealand.² The figure also includes estimates of the growth in NIDDM assuming conservative estimates of the rise in incidence, a phenomenon seen in all populations studies.³¹ Even these conservative estimates suggest a rise in the number of Pacific people with diabetes in New Zealand by 350–700% over the next 40 years.

In the light of the epidemic of NIDDM among Pacific people in New Zealand, it is important to review the interventions under development to counter this growing threat. There is an urgent need for a national body for Pacific people with diabetes in New Zealand to work with health professionals to advocate for quality methods to control the diabetes epidemic.

Control of NIDDM among Pacific people

Clinical recognition of the importance of NIDDM among Pacific people led Dr David Scott in South Auckland to develop more appropriate services for Pacific people in the early 1980's. This included the establishment of an outreach clinic (the South Auckland Diabetes Centre) and the employment of Pacific women as community diabetes educators. Measures to address NIDDM among Pacific people received little further attention until 1992. Dr David Scott advocated for the use of local epidemiological data to develop a diabetes plan for local people and to address the needs of Maori and Pacific people in particular.³² The planning group included representatives from the Pacific community, city council, polytechnic institute and representatives from primary and secondary care. The South Auckland Diabetes project was established to describe the diabetes epidemic, to ensure that research data was used to drive improvements in services for diabetic patients and to implement the local diabetes plan. The plan is slowly being implemented to overcome the barriers to care.

A number of other districts (eg Central Auckland, Christchurch) are now attempting to address the needs of Pacific people with the employment of Pacific staff. In South Auckland, Samoan and Tongan diabetes support groups have been established by the South Auckland Diabetes Project team. An independent Niuean group has been established in West Auckland. A clinic for Pacific people has been established in Christchurch. Attempts at developing strategies for the primary prevention of NIDDM among Pacific people are also underway, including the Ola fa' autauta study. This and other church based lifestyle and education programmes run by the South Auckland Diabetes Project³³ have developed and evaluated audiovisual aids³⁴, exercise programmes and diabetes education programmes.³⁵ Early data indicate that these community development programmes are able to reduce weight gain and increase exercise.³⁶ Results of longer term studies are awaited. The training of further Pacific people to serve as community diabetes educators has been a major advance in the development of interventions to control the diabetes epidemic. A survey among Pacific staff involvement³⁷ supports the need to tailor mainstream services to the needs of Pacific people in order to optimise self care and regular clinical monitoring.

“ ... NIDDM among Pacific people has reached epidemic proportions. Improvements in service delivery, patient empowerment and the development of sustainable and effective lifestyle programmes are urgently required to address the rapid growth in need over the few years. ”

In summary, NIDDM among Pacific people has reached epidemic proportions. Improvements in service delivery, patient empowerment and the development of sustainable and effective lifestyle programmes are urgently required to address the rapid growth in need over the few years.

Acknowledgments

We are grateful to North Health, South Auckland Health, the Health Research Council, Eli Lilly, East Tamaki Trust, ASB Trust and the Lotteries Board for their support and to Christina Tapu for her guidance.

References

- Ostbye T, Welby TJ, Prior AM, et al. Type 2 (non-insulin-dependent) diabetes mellitus, migration and westernisation.. The Tokelau Island Migrant study. *Diabetologia* 1989; 32: 585-590.
- Bathgate M, Alexander D, Mitikulena A, et al. *The Health of Pacific Islands People*. Public Health Commission, Wellington, 1994.
- Simmons D, Gatiand BA, Leakehe L, Fleming C. Frequency of diabetes in family members of probands with non-insulin dependent diabetes. *J Int Med* 1995;237:-315-321.
- Brown LJ. Genetics and the environment: understanding geographical variations in the incidence of childhood diabetes. *NZ Geographer* 1993;49:2: 32-39.
- Simmons D, Shaw LS, Kenealy T, et al. Ethnic differences in diabetic nephropathy and microalbuminuria: The South Auckland Diabetes Survey. *Diabetes Care*, 1994;17,12: 1405-1409.
- Simmons D, Scott DJ, Conroy C, Ansell DA. Criteria for gestational diabetes: a cautionary tale. *NZ Med J* 1993; 106:429-430.
- McBride C, Roberts A, Knox A, Cundy T. Screening for diabetes in pregnancy. *Br Med J* 1993;306:738.
- Cundy T, Gamble G, Manual A, et al. A. Determinants of birth weight in women with established and gestational diabetes. *Aust NZ J Obst Gynaec* 1993;33:249-254.
- Simmons D. Differences in umbilical cord insulin and birthweight in non-diabetic pregnancies of women from different ethnic groups in New Zealand. *Diabetologia* 1994;37:930-936.
- Simmons D, Robinson S. Influence of maternal insulin treatment on the infants of women with gestational diabetes. *Diabetic Medicine* (in press).
- Simmons D, Gatiand B, Leakehe L, Fleming C. Ethnic differences in diabetes and diabetes care in a multiethnic community. *Diab Res Clin Prac* 1996; 34(Suppl I): S89S93.

12. Simmons D, Voyle JA. Psychosocial and behavioural aspects of NIDDM among Pacific Islands people in South Auckland: Perspective from the South Auckland Diabetes Project. *Pacific Health Dialog* 1996; 3;1: 100-106.
13. Moata'ane L, Muimui-Heata S, Guthrie B. Tongan perceptions of diet and diabetes mellitus. *Journal of the New Zealand Dietetic Association*, 1996, 50: 52- 56.
14. Simmons D, Kenealy T, Scott DJ, Scragg R. Ethnic differences in diabetes knowledge and education: The South Auckland Diabetes Survey. *NZ Med J* 1994; 1 07: 197-200.
15. Department of Statistics. 1991 *New Zealand Census of Population and Dwellings*. Wellington: Department of Statistics 1991.
16. ANZDATA Report 1994. *Australia and New Zealand Dialysis and Transplant Registry*. Disney APS (Editor). Adelaide, South Australia. 1994.
17. Isaacs RD, Scott DJ. Diabetic patient discharges from Middlemore Hospital 1983. *NZ Med J* 1987; 1 00: 629-631
18. Thompson TJ, Fisher M, Hatfield PJ, et al. Diabetic end stage renal failure—the Wellington experience 1975-88. *Aust NZ J Med* 1991;21:29-35.
19. Neaie TJ, Bailey RR. Chronic renal disease in Polynesians in New Zealand. *NZ Med J* 1990; 1 03:262.
20. Metcalf PM, Baker JR, Scragg RK, et al. Microalbuminuria in a middle-aged workforce: Effect of hyperglycaemia and ethnicity. *Diabetes Care* 1993;16-. 1445-1493.
21. North R, Simmons D, Upjohn M, Barnfather D. What happens to women with pre-eclampsia? Microalbuminuria and hypertension following pre-eclampsia. *Aust NZ J Obs Gynae* 1996 36:233-238.
22. Bruce R, Rutland M, Cundy T. Glomerular hyperfiltration in young polynesians with type 2 diabetes. *Diab Res Clin Pract* 1994;25:155-160.
23. Lunt H, Lim CW, Crooke MJ, Smith RBW. Clinical and ethnic characteristics associated with urinary albumin excretion in non-insulin dependent diabetic subjects attending the Wellington Hospital diabetes clinic. *NZ Med J* 1 990; 103: 143-145.
24. Lunt H, Graham PJ, Jury DR, et al. The prognostic significance of urinary albumin in Polynesians with non-insulin dependent diabetes. *Diab Res Clin Prac* 1994;25:141-145.
25. Bruce R, Williams L, Cundy T. Rates of progression to end stage renal failure in nephropathy secondary to Type 1 and Type 2 diabetes mellitus. *Aus NZ J Med* 1994; 24: 390-395.
26. Clover G, Simmons D, Hope C, Buimer R, et al. Prevalence of diabetic retinopathy in Maori, Pacific Islands people and Europeans in South Auckland. *Presented at NZSSD*, 1995.
27. Simmons D, Bhoopatkar H. Diabetes and hyperglycaemia among patients with myocardial infarction in a multiethnic population. *Aust NZ J Med* 1996; 1 09:268-70
28. Bhoopatkar H, Simmons D. Diabetes and hyperglycaemia among patients with congestive cardiac failure in a multiethnic population. *NZ Med J* 1996;109:268-270
29. Simmons D, Shaw LS, Kenealy T, et al. Foot care in a multiethnic community: The South Auckland Diabetes Survey. *NZ Med J* 1995;108:106-108.
30. Simmons D. The epidemiology of diabetes and its complications in New Zealand. *Diabetic Med* 1996; 1 3:371-375.
31. McCarty D, Zimmet P. *Diabetes 1994 to 2010: Global Estimates and Projections*. International Diabetes Institute, Melbourne, Australia. 1994; 46.
32. Wilson P, Simmons D. The development of community orientated recommendations for diabetes care in South Auckland. *NZ Med J* 1994;107:456-459.
33. Simmons D, Voyle J, Swinburn B, O'Dea K. Community based approaches for the primary prevention of non-insulin-dependent diabetes mellitus. *Diabetic Medicine* (in press).
34. Fleming C, Simmons D, Leakehe L, Voyle J. Ethnic differences in the perception of a video developed for a multiethnic diabetes prevention programme in South Auckland, New Zealand. *Diabetic Med* 1995; 701 - 707.
35. Simmons D, Fleming C, Cameron M. Evaluation of a diabetes and exercise programme in a multiethnic workforce. *NZ Med J* 1996.1109:268-270.
36. Simmons D, Fou F, Leakehe L, et al. A pilot church based diabetes control programme among Pacific people: The South Auckland Diabetes Project. *Annales d'Endocrinologie* (in press).
37. Mitikulena A, Smith RBW. Views of Pacific people with non-insulin dependent diabetes: A Wellington Survey. *NZ Med J* 1996; 1 09:467-469. □

**It requires a very unusual mind to
undertake the analysis of the obvious.**

**A.N. Whitehead
In Science and the Modern World**