THE EPIDEMIOLOGY AND PREVENTION OF NON INSULIN DEPENDENT DIABETES - A POLYNESIAN PERSPECTIVE

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Summary

Non insulin dependent diabetes (NIDDM) and obesity are increasing in New Zealand and the South Pacific, as they are in most countries around the world. The classic risk factors for the development of NIDDM are similar among Polynesians although definitions of obesity will need to be revised because of differences in body composition compared to Europeans. The prevention of NIDDM is largely the prevention of obesity. A broad-based approach, using the Ottawa Charter principles is currently being pursued in New Zealand. In addition, specific health promotion projects are being tested in churches, marae and other settings in New Zealand and in the village setting in the Cook Islands. These projects are being carefully monitored to assess their impact on health knowledge, behaviours and outcomes.

I. INTRODUCTION

The Polynesian triangle spans the Pacific Ocean from New Zealand to Hawaii to Easter Island and includes the islands of Samoa, Tonga, Cook Islands, Niue, Tokelau, and French Polynesia. The high prevalence of NIDDM among Polynesian populations has been well documented (Zimmet et al. 1990; Scragg et al. 1991). The prevalence is increasing over time (Hodge et al. 1994) and, for island populations, with migration to countries such as New Zealand (Prior and Davidson 1966). The mean age of Pacific Islands people with diabetes is considerably younger than the European diabetic population (by about 10 years), largely reflecting an earlier age of onset (by 5-9 years) (Simmons et al. 1995). In addition, a higher percentage of prevalent diabetes is undiagnosed (Scragg et al. 1991). The range of complications from diabetes is similar among Polynesian people, but compared to the European diabetic population they appear to have high rates of renal disease (Simmons et al. 1994), retinopathy (Simmons et al. in press a), poor foot care (Simmons et al. in press b), and poor glucose control (Simmons et al. 1994).

In places like South Auckland the sheer volume of diabetes is a major health burden and this is likely to increase substantially over the next 20 years as the prevalence increases, the population ages, and the population increases in size from migration and a high birth rate. A major effort is needed to not only cope with this increased burden from diabetes, but hopefully to prevent some of the increase.

II. RISK FACTORS FOR DIABETES

In general, these are the same risk factors which have been described in other populations: increasing age, previous abnormal glucose tolerance, obesity, and lack of physical activity. The relative strength of each of these risk factors in Polynesian populations continues to be debated, however, it should be remembered that the comparison group for most studies is Europeans and in a global sense it is probably the Europeans who represent an unusual population with particularly low rates of NIDDM. Some risk factors for diabetes warrant special attention in this population.

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(a) Body mass index

Body mass index (BMI = weight in kg/[height in m]^2) is a commonly used anthropometric surrogate measurement for degree of obesity. The European-based normative values have been widely applied across ethnic groups and this is almost certainly inappropriate because of differences in body frame and body composition. In general terms, a BMI of 27 kg/m^2 may well be obese for an Indian or Aborigine, overweight for a European, and normal for a Polynesian. Polynesian people have a large muscular body frame and preliminary data suggest that kilo for kilo, Polynesians are significantly leaner than Caucasians (Swinburn et al. 1995). At equivalent degrees of adiposity (percent body fat) the Polynesian BMI value may be between about 3-5 kg/m^2 higher. Previous conclusions about Polynesian populations being fatter than European populations (based on BMI value) need to be reassessed.

Even if the prevalence of obesity (as defined by excess body fat rather than BMI) is lower than previously thought, a given degree of over-fatness may have worse implications for Polynesian populations because of their greater predisposition to NIDDM compared with Europeans.

(b) In utero factors

The role of in utero exposure to fetal under- or overnutrition is of increasing interest. Offspring of diabetic females are more likely to develop diabetes, particularly if the mother had past diabetes (Simmons et al. 1995). Normal Polynesian women when pregnant (without gestational diabetes) have a higher fructosamine than Europeans suggesting an increased glucose supply to the fetus. Such offspring were hyperinsulinaemic with a higher insulin C-peptide ratio when compared with Europeans (Simmons 1994). An increased fuel supply to the fetus as a result of the obesity in the mother could also help explain the larger babies that are often delivered to Polynesian mothers (Cundy et al. 1993).

III. PREVENTION STRATEGIES

The primary strategy for preventing NIDDM must be to decrease the prevalence of obesity. This is easier said than done and indeed the international experience in obesity prevention is virtually nil. The Polynesian populations need to develop their own strategies as they struggle, along with the rest of the world, to combat the increasing prevalence of obesity. More intensive screening and individual interventions amongst high-risk individuals may play a part in the overall prevention of NIDDM. This would entail intensive follow-up of patients with gestational diabetes or impaired glucose tolerance and more intensive screening of people with other risk factors such as age, obesity and family history. Such risk factors are so common, that this virtually equates to screening the majority of the adult population. However, based on the experience of prevention of coronary heart disease, the most likely gains in disease prevention will come from public health or population measures. These strategies do not identify individuals (at high risk), but instead aim to influence the wider environment and general population.

The two public health measures which are obvious candidates for reducing obesity (Ravussin and Swinburn 1992) are:

1. To reduce the fat content of the national diet
2. To increase recreational physical activity.

A possible third strategy which is often mentioned by Polynesian people themselves is to decrease the total volume of food eaten at social and festive occasions. Feasting is a central component to festive occasions and food in general is integral to the cultural expression of hospitality and generosity. While on face value it may seem like an appropriate target, as a weight-reduction strategy, its close association with cultural values makes this potentially more difficult. A better strategy may be to focus on the type of food presented on these occasions such that the volume of fat is reduced and the vegetable content increased.

The traditional Polynesian dish features a central starch component (such as taro or rice) with an accompanying dish (such as corned beef or fish) (Pollock 1992). This meal structure is quite different from European style and the place of salads and green vegetables can be limited given this pattern of cuisine.

IV. THE PREVENTION OF DIABETES AND OBESITY IN NEW ZEALAND

Obesity is recognised by nutrition agencies as the major nutrition challenge facing New Zealand. The National Heart Foundation, Te Hotu Manawa Maori, Nutrition Foundation, Cancer Society, and NZ Dietetic Association have formed a joint group called 'Agencies for Nutrition Action' whose prime focus is the maintenance of healthy body weight throughout life. The group's objective is 'to prevent any rise in the prevalence of obesity by the year 2000'. While this may seem a modest goal, it would be a major achievement considering the current rate of rise of obesity prevalence. The Ottawa Charter format is used below to give a broad perspective for describing current activities and planning future action.

(a) Building healthy public policy

The aim is to increase the awareness among decision-makers of the problems of diabetes and obesity and to move it up the agenda for funding and action. For example:
- Scientific papers, position statements, and lay articles to increase awareness of the problems.
- Development of national and regional plans (National Diabetes Plan, South Auckland Diabetes Plan, Nutrition Plan for Action) with a strong element of public health and prevention.
- Establishment of a National Maori Diabetes Organisation (Te Roopu Mate Huka o Aotearoa).
- Lobbying to include maintenance of healthy body weight among programmes purchased by Regional Health Authorities, Public Health Commission and Hillary Commission.
- Lobbying to include food and nutrition in the curricula of schools and colleges of education and on the New Zealand Qualifications Authority framework.

(b) Creating supportive environments

This means working with the food industry from the growers and manufacturers to the advertisers and caterers to influence products and their marketing, to increase their access to nutrition information, and to encourage development of nutrition policies. For example:
- National Heart Foundation programmes: Pick the Tick, Heartbeat Catering, Workplace Health, School Food, Under 5's Nutrition.
- Working with manufacturers of corned beef and salted beef to reduce the fat and salt content.
- Influencing chef training, food writers, food awards.

(c) Strengthening community action

This entails community development programmes and action within sub-groups of the population who have particular nutrition needs, or where the programme delivery needs to be tailored to the group. The community strength within Maori and Pacific Island life offers great potential for synergy between this strong social structure and health promotion activities. For example:
- Church-based health promotion programmes to reduce obesity and prevent NIDDM (South Auckland Diabetes Project and Ola Fa'autauta Project).
- Village-based health promotion programme in the Cook Islands (Tutakimoa Lifewise Project).
- Marae-based intervention programme (South Auckland Diabetes Project).

(d) Developing personal skills

This emphasises health education and training targeted at consumers. For example:
- Recipe books, pamphlets, posters, and videos on nutrition.
- Pacific Island Heartbeat sessions which train people in small groups about nutrition, heart disease and obesity.
- South Auckland Diabetes Project diabetes/nutrition training.
- Community nutrition training programmes in five Maori communities.

(e) Reorienting the health services

This aims to move the purchasers and providers of health services towards a greater emphasis on public health, health promotion and greater community responsiveness. For example:
- Stimulating gyms to cater for 'couch potatoes'
- Lobbying for an increased proportion of health funding for public health
- Developing more community-based clinics rather than large hospital-based out patient clinics.

V. EXAMPLES OF CURRENT COMMUNITY-BASED PROJECTS

(a) Church-based projects in South Auckland

The South Auckland Diabetes Project and Ola Fa'autauta (Lifewise) Project utilise the existing strengths of Pacific Island churches in South Auckland to run health promotion programmes aimed at the prevention of obesity and diabetes. The projects attempt to gain a balance between scientific research and public health action and between outside expert input and community training.

An initial health survey of the church community is followed up with a variety of activities such as aerobic sessions, food demonstrations, small group sessions on nutrition, diabetes support groups and training of community members in the delivery of these health promotion activities. Some churches are involved in their first year as control churches so that the impact of the interventions can be better measured. The whole process puts health care professionals and the community on steep learning curves as the programmes evolve. The enthusiasm of the church leaders and the community for these activities is evident and the impact of the projects is being closely assessed.

(b) Community-based projects among Maori

A variety of settings in the Maori community are currently being employed to increase nutrition knowledge and promote healthy lifestyles. The pilot and demonstration projects being developed and assessed in marae, community trusts and kohanga reo (language nests) have common themes of an holistic approach to health and tino rangatiratanga (self determination).

(c) Village-based programme in the Cook Islands

Tutakimoa Lifewise Project is a pilot health promotion programme in the village of Tutakimoa on Rarotonga during 1993 with follow-ups in 1994 and 1995 (Swinburn et al. 1995; Swinburn 1993). The village chosen was as close as one gets to an 'urban migrant community' in the Cook Islands. The majority of the residents were from the outer islands and they lived in a small village near the main town centre on small plots of land.

Throughout the intervention year a variety of nutrition sessions and demonstrations were held, which undoubtedly got the message across about reducing dietary fat and increasing the proportion of vegetables and fruit in the diet. This was complemented by a very successful home-gardening programme which saw the number of homes with home-gardens increase from about

22% to about 69%. Aerobic classes and walking groups started with enthusiasm but the effort dwindled as the year went by. The publicity and media coverage of the project around the island meant that the influence of the project was far wider than the village. There were monthly check-ups where blood pressure and body weight were assessed by the co-ordinator.

Over the year there was increased knowledge in nutrition and an increase in use of low-fat foods and cooking methods. Reported nutrient intake showed a decrease in total calorie intake but this was proportional across fat and carbohydrate. Women were the only group who reported increases in moderate physical activity. Unfortunately, there was no impact on body weight, which remained static over the first year and increased slightly in the second year. Previous surveys by the South Pacific Commission have shown this community to have gained considerable weight over the last 20 years.

Interestingly, a village around the other side of the island was taken as a control group and while there was no formal programme in that village they did, on their own initiative, institute a number of nutrition and exercise activities and over the two years they showed a slight decrease in body weight. Part of the differences between the two villages may be related to selection bias in the control village, but it is more likely to reflect the self-help approach and greater capacity to make lifestyle changes in a community which is relatively high up on the socio-economic scale in that country. The lessons learned from this pilot project are currently being assessed for assimilation into future projects.

VI. CONCLUSIONS

An enormous challenge faces the Polynesian populations in New Zealand and the islands as the rates of obesity, NIDDM and other chronic diseases increase. Both the unique nature of these communities and the fact that internationally there are no well-tested models for the prevention of NIDDM, mean that the solutions being sought are different in each community. Recurrent themes across all programmes are the strength of the community as a health promotion vehicle, the need for training and upskilling of community members, and the need for a broad-based population approach with local ownership of community development programmes.

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