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Prevalence of diabetes mellitus in the Seychelles

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The prevalence of diabetes mellitus was assessed in an age- and sex-stratified sample of 1081 individuals aged 25–64 living in Mahé, the main island of the Seychelles. Although ethnically mixed, the population of the Seychelles is predominantly of African origin.
Presence of diabetes mellitus was assessed by measuring blood glucose in fasting venous blood. In order to detect falsely elevated fasting blood glucose (FBG) due to food consumption, the individuals with FBG $\geqslant$ 6.7 mmol/l at the initial blood collection had, when possible (70% of individuals), their FBG measured again 90–120 minutes later. Individuals with FBG comprised between 6.7 and 10 mmol/l had another FBG measurement performed on another day within 3 months. Diabetes mellitus was defined according to the criteria of the National Diabetes Data Group, modified for measurements of whole blood instead of plasma glucose. One FBG $\geqslant$ 10 mmol/l or two FBG $\geqslant$ 6.7 mmol/l on two separate days were taken as disgnostic of diabetes mellitus. Detailed methodology and results are provided in other sections of the journal (see Tables 35–38 above).
64 out of 1081 individuals tested were diagnosed as having diabetes. Of these, 35 (55%) were unaware of their condition at the time of the survey. In contrast, 14 individuals who gave an history of diabetes mellitus had a normal FBG, after withdrawal of antidiabetic treatment if present. In the subgroup of 29 individuals aware of their disease, diagnosis of diabetes was done at the mean age of 48 years (range 37–58 years). All of them had a body mass index (kg/m^2) greater than 25. Five (17%) were currently given insulin therapy, 13 (45%) were on oral antidiabetic medication and 11 (38%) were not receiving treatment.
Prevalence of diabetes mellitus (standardized for age) was 3.4% for men and 4.6% for women. Crude prevalence increased markedly with age, from 0% and 0.8% at age 25–34 to 8.8% and 13.4% at age 55–64 in men and women, respectively. A strong relationship of excess body weight with the occurrence of diabetes mellitus was illustrated by a 2.0 fold increase (men 3.6 fold, women 1.8 fold) in the prevalence of obesity in diabetic individuals compared to their lean counterpart.
The prevalence of diabetes mellitus is relatively high in the Seychelles compared to that observed in other populations of black African origin and appears close to that observed in many western, industrialized countries and is likely to become a major health problem. The age of onset, weight status and type of therapy suggests that the prevalence of insulin dependent diabetes mellitus (IDDM) is very low in the population studied and that most cases are non insulin dependent diabetes mellitus (NIDDM).
Obesity is a known risk factor for NIDDM and appears to be associated with diabetes in the Seychelles too. The locally well recognized evolution of the traditional lifestyle towards the westernized pattern may be another precipitant of the disease. The finding that 55% of diabetic individuals were unaware of their disease stresses the need for a further development of screening programmes to detect diabetic individuals.

Workshops

Detection and control of diabetes mellitus

Detection

Screening. No mass screening for detection of DM is recommended. Instead, individuals at high risk for the development of DM should be screened.
Risk factors are:

- obesity (BMI > 25 for women, > 27 for men)
- age over 45 years old
- hypertension
- family history of DM

Patients with concomitant thiazide treatment or recurrent skin infections should also be screened.

Diagnostic criteria. Detection of urine glucose should be used as initial screening. This technique has the advantage of being inexpensive, and minimizing the incidence of false-positive tests in non fasting individuals, since glucose is usually not present in postprandial urine specimens in non diabetic individuals. One fasting blood glucose higher than 10 mmol/l on one occasion or fasting

blood glucose higher than 6.7 mmol/l on two separate days confirm the diagnosis of DM. The determination of hole blood glucose should preferably be made immediately after blood collection since storage of the blood cause a decrease in its glucose concentration with time.

Glucose tolerance test. Glucose tolerance test is unnecessary for the diagnosis of DM in adults. In contrast, glucose tolerance test should be performed in any pregnant women in whom a random blood glucose higher than 6.0 mmol/l has been measured. A fasting blood glucose higher than 5.8 together with a 2-hour blood glucose higher than 9.1 mmol/l after a 100 g glucose tolerance test is diagnostic of DM for pregnant women.

Non drug therapy

Diet. Dietary advices should be given to diabetic patients, regardless of the severity of the DM, in order to obtain:

- an isocaloric diet in lean patients and an hypocaloric diet in obese patients
- total carbohydrates providing 40–50% of total calories
- restriction of simple sugars (dissacharides) to 0–10% of total carbohydrates.

Other non-drug measures. They include:

- Regular physical exercise adapted to individual cardiovascular and respiratory conditions
- A reduction in the consumption of alcoholic beverages, which may worsen DM by their pancreatic toxicity and may increase insulin resistance.

Oral drug therapy

Oral antidiabetic agents available in the Seychelles are glibenclamide and metformin. These two oral hypoglycemic agents are adequate for the control of DM in selected cases. Patients with DM associated with obesity, or with onset of DM after 30 years, and who do not present with massive glycosuria and acetonuria, may be started on oral antidiabetic agent. Metformin is more particularly active in diabetic patients who are grossly overweight. Glibenclamide is effective in most types of non insulin dependant DM, whether lean or overweight.
Diabetic patients who have been loosing weight in the period preceding diagnosis, or who present with a massive and persistent ketonuria should preferably be started insulin therapy, regardless of body weight.

Gestational DM must be managed with dietary therapy and with insulin therapy, at the exclusion of oral antidiabetic agents.

Insulin therapy

Short acting insulin, intermediate (NPH) acting insulin, and long acting insulin are required for the management of diabetic patients. Insulin available in the Seychelles are Actrapid, Monotard and (forthcoming) Ultratard.
Actrapid has a short delay in action (30–60 min) and is effective 2–5 hours. Monotard has a delay in its action, which starts 6 hours, and lasts until 10–18 hours after the injection. It was emphasized, that the effect of Monotard does not cover the whole 24-hour period with one single injection and that two insulin injections (e.g. one at 8 a.m. and one at 9 p.m.) or other insulin combination would be more appropriate. Ultratard has no peak activity and its action lasts for about 36 hours.

Follow-up of diabetic patients

Devices. Peripheral clinics must be organized for the follow-up of diabetic patients. The appropriate equipment will include mydriatics, opthalmoscope, Snellen's chart, weight scales, tuning forks, glucometers, dietary information sheets and some material for teaching of patients.

Medical follow-up. Doctors in charge at peripheral clinics must be informed and trained at the follow-up of diabetic patients. This includes monitoring of therapy in order to obtain optimal glycemic control, monitoring and therapy of dyslipidemia, prevention of immediate complications (hyperosmolar coma, keto-acidotic coma, hypoglycemic coma) and late complications (renal, opthalmic, neural microangiopathic complications [resulting in foot problems, for example] and atherosclerotic disorders).

Hypertension. Control of blood pressure is of utmost importance in diabetic patients. An antihypertensive treatment should be introduced whenever diastolic blood pressure exceeds 90 mm Hg. In addition, in presence of proteinurea (and after urinary tract infection has been appropriately ruled out as the cause of proteinurea), an antihypertensive drug should be administered, if tolerated, even in normotensive patients. The drug of first choice would be a converting enzyme inhibitor (e.g. captopril).

Flow charts. Introduction of flow charts in the routine follow-up diabetic patients is recom-

mended. It will facilitate management of DM in individuals affected, and will also facilitate further epidemiological assessments.

Fructosamine. Fructosamine and glycosylated hemoglobin (HbA1c) give reliable information on average long term glycemic control. While not necessary for routine follow-up of diabetic patients, such tests would be useful in certain groups of patients. The Ministry should look into the possibility of introducing such a test in the Seychelles.

Workshops

Promotion of the healthier lifestyle

The incidence of cardiovascular diseases (CVD) is a major concern in the Seychelles. The Seychelles Cardiovascular Diseases Survey provided substantial information on the risk factor profile in the population. Hypertension was the main risk factor in both sexes. As many as 31% of women were found to be obese while 60% of men were cigarette-smokers. Only 10% of men and 2% of women reported doing any physical exercise. The control of lifestyle factors such as obesity, smoking, physical and diet habits would have a substantial favorable impact on the prevalence of hypertension, hypercholesterolemia and diabetes.

Regarding diet, most people reported using one type of fat for cooking and for spreading on bread. Most of these commonly used oils contain a high proportion of saturated fats. Polyunsaturated fats and margarine are more expensive and are used by only about 7% of the population. Fish consumption is high but it would seem that more people are seeking to eat more meat more often. Vegetable and fruit consumption is low and only 40% of all subjects reported having taken any fruits or vegetables the day before the interview. Consumption of sugary and fried snacks is very popular.

A healthier lifestyle may help to prevent the occurrence of CVD and following basic recommendations should be specifically addressed in the Seychelles: (a) maintaining and increasing fish consumption; (b) promoting a broader use of unsaturated oils and varying the types of oils/margarines used; (c) increasing fruit and vegetable consumption; (d) discouraging cigarette smoking; (e) decreasing the consumption of fried and sugary snacks and alcohol.

Healthy diet

Fruit and vegetables. Fruit and vegetables are to be encouraged in the usual diet. Unfortunately, the high price of these products will be a major constraint towards getting people to change some of their eating habits. The prices of imported products is dependent on the price of the country of origin, freight and tradetax, which, in the case of imported food items, was high (about 38%). It was felt that the Health Ministry should draw up a list of recommendations and/or policy statement on the food items that should be encouraged for health. This will then be circulated to all the ministries concerned, and it is hoped that it would be a reference point when determining priorities for production, distribution, importation and setting taxation levels. The discrepancy of prices between locally produced and imported foods is not motivating farmers to produce. Imported foods cost more than locally produced foods and farmers want the imported price for local products: this does not benefit consumers. It was felt that farmers must be given other incentives to produce more.

Regarding acceptability, it was felt that, in general, the Seychellois public preferred to buy imported fruit rather than eat local ones. The public tended to underrate the value of local fruit and vegetables and buying imported items is seen as a measure of sophistication.

The availability of fruit and vegetables is seasonal, and in most times, even during glut periods, there are not a lot of fruit on the market. The agricultural representative pointed out that only 10% of all the fruit grown and available in Seychelles is actually consumed. The major constraint was a lack of an established mechanism to ensure that all the fruit are harvested. He also stressed that the present increase in tourism activities results in a reduction in agriculture production per capita, because of a manpower shift from agriculture to tourism activities and because the increased demand in fruit and vegetables coming from the hotels. Because of the lack of available land, a substantial amount of fruit and vegetables will continue to be imported. The representative from the Seychelles Marketing Board (SMB) informed those present that this organization had a fruit collection team, who collects fruits on request by the public. It appeared that the public was not aware that such services were available. It was recommended that a mechanism should be set up, to enable fruit to be collected efficiently. The SMB's collection team should be given more publicity and the public

made aware of its existence. It was proposed that an education campaign is launched to educate people about the nutritional value of local fruit and vegetables and their benefit to health improvement and maintenance.

Fish and meat. Fish is a major issue in the promotion of healthier eating habits. It was noted that fish is not as readily available as it used to be and with the increase in the number of working women, few of them have sufficient time to prepare the fish. Frozen fish is available, but appears not as acceptable as the fresh one. It was felt that the problem of availability of fish be explored much further. Meat consumption is on the increase and is seen as a measure of prestige. Moreover, the food industry's policy is to encourage production and consumption of meat and meat products. It was proposed that the education component should include information on nutritional value of fish and its benefit to health improvement and maintenance. It was noted that people should be able to discern between high fat meats and meats with lower fat contents.

Fats. The price of polyunsaturated and monounsaturated fats will discourage the population from buying these products. Recommendations as for "fruit and vegetables" apply here too. The population should be shown how to prepare meals using very little fat and advised to reduce consumption of fried snacks. They should also be instructed to vary the types of fats used.

Education through mass media. In the area of education, it was felt that all stratas of the population should be addressed and a unequivocal message should be given to all groups. One means of education is through the mass media, who should inform the public about the consequences of different aspects of their lifestyles. Screening programmes which promote healthier choices should be encouraged. Health issues are already being given time and space on radio, television and the local press. Health programmes are scheduled presently once a week in the press, twice a week on the radio and twice a week on the television. In addition, magazine items on healthy living feature on the news frequently. However, the success of these programmes depends on input from the Ministry of Health, who must ensure that input is sustained. Participants felt that the timing of the programmes is important and suggested that Information Division should find out when these programmes should be broadcast to ensure a maximum audience.

Education through institutions. Participants felt that health workers and others who are putting across these messages should set examples by trying to implement these recommendations themselves. In particular, government institutions that provide meals e.g. school meals' centers, hospitals, National Youth Service, etc., should be the first to implement these recommendations. They should provide meals that are balanced, but at the same time containing low proportions of saturated fats and sugar and high enough proportions of polyunsaturated fats and fibre. It was also suggested that a Health Food Shop ("Health Corner") should be started in collaboration with the nutritionist who should advise on the type of products to be displayed.
Children were identified as one of the groups to which specific messages should be given. It was felt that there should be stronger cooperation between Ministries of Health and Education. Recommendations could be put across through the School Health Programme, the Family Life Educations Programmes and through the Parent-Teacher's association. The cooperation should not only be to review content and curriculum of the programmes but to give training to the teachers who teach these programmes.

Smoking

It was felt that there needs to be an established policy as regards smoking. It was agreed that smoking should be banned in public places, and local cigarette boxes should carry a warning of the danger of cigarette smoking to health and should indicate the tar content of the cigarettes. Opportunities should be created for people not to smoke. One suggestion was that the Youth League's discotheque being a non smoking area, the Youth League should look into the possibility of not selling cigarettes. It was also proposed that support groups are established to help individuals wishing to give up smoking.

Alcohol

It was shown that the tradetax had an important influence on the importation of alcohol. The higher the tradetax, the less alcohol is imported. But from the Cardiovascular Diseases Survey, it seems that people drink more of the locally produced alcohol, e.g. baka, kalou and lapire. These products are known to contain 10 to 15% of alcohol and possibly contain impurities. These may be toxic in large quantities. However, it is felt that it would be very difficult to control the production of these local brews and that it would be easier to make people aware of the potential dangers to health if these brews are consumed in high amounts. It was also felt that there needs to be stricter legislation on the sale of alcohol, es-

pecially to youngsters under 15 years. It was reminded that the Information Division's policy is not to advertise alcohol and tobacco.

Physical exercise

Exercise should be encouraged as much as possible and whenever possible. Use can be made of the Physical Education sessions during school hours to teach children the value of exercise. It is felt that the physical education sessions now in schools put more emphasis on drill rather than exercise as such. It was pointed out that exercise should not be used as punishment as is sometimes the case in schools and at the National Youth Service (NYS). Children and adults should be encouraged to walk and children should be taught how to swim. A representative of The Ministry of Education assured that such a program is being developed. The Mass Sports Program of the Sports Division is another program that could encourage and mobilizes more people to exercise. To encourage people to participate in sports, it was suggested that tradetax should be removed or decreased on certain sports equipment.

Towards practice

In order to ensure that recommendations become action and to monitor action, it was suggested that a working group (committee) be set up, consisting of all departments and ministries represented at the workshop, i.e.:

- Ministry of Health (Hospital Services, Primary Health, Nutrition, Epidemiology Division, Dental, Health, Education, Nursing and Environmental Health Divisions)
- Ministry of Education (Primary Schools Division, School of Health Studies)
- Ministry of Agriculture and Fisheries
- Ministry of Information, Culture and Sports (Information Division)
- Seychelles Marketing Board
- Seychelles People's Progressive Front (SPPF)
- Youth League.