

CONTROLLING NON-INSULIN DEPENDENT DIABETES MELLITUS AND ITS COMPLICATIONS THROUGH LIFE STYLE MODIFICATIONS AND HEALTH POLICY

Ilodigwe, E. E.

Dept of Clinical Pharmacy & Biopharmacy, College of Medicine of the University of Lagos, Lagos.

ABSTRACT

Non-insulin dependent diabetes mellitus (NIDDM) is a common, serious, under-diagnosed and under-treated chronic disease. Morbidity and mortality due to complications have increased in Nigeria. Treatment of NIDDM and its complications constitutes considerable drain of national and family resources as it requires myriads of pharmaceutical and non-pharmaceutical approaches. Studies have shown that what ever effort is put in controlling this irreversible disease, it will get worse with time. This doom time can be reasonably delayed in Nigerians if they could surmount barriers of prohibitive costs, inadequate or overburdened health infrastructure and socio-economic constraints that severely curtail the continued commitment of family or government resources. Meanwhile, adequate and efficient preventive and control measures are imperative.

INTRODUCTION

Diabetes mellitus is a group of metabolic disorder characterized by chronic hyperglycaemia due to defects in insulin secretion, action or

both. There are two aetiopathogenic categories, insulin dependent diabetes mellitus (IDDM) and non-insulin dependent diabetes mellitus (NIDDM). However, secondary forms generally account for 1 - 2% of all new cases of presentation¹. Also of importance is the gestational diabetes (pregnancy associated). Diabetes is usually irreversible and although patients can have reasonably normal life style its late complications result in reduced life expectancy and considerable uptake of health resources. The complications of long-term NIDDM hyperglycaemia is overwhelming. It is the leading cause of adult blindness, end-stage renal failure, and lower limb amputation in the United States². Although there is lack of accurate data in Nigeria, it is generally believed to be of similar pattern.

Tissue damage related to diabetes are microvascular (e.g. retinopathy, nephropathy, neuropathy) and macrovascular (e.g. coronary artery disease, cerebrovascular and peripheral arterial disease).

Neuropathies are either sensory motor or autonomic. Sensory motor neuropathies typically affect pain sensation

in the extremities and manifest as numbness, tingling or burning in the feet and hands. Neuropathies affecting the autonomic or vegetative nervous system include gastroparesis, impotence, urinary bladder incontinence, and impaired cardiovascular reflexes³.

Foot ulcers are caused by both sensory and autonomic neuropathies as well as peripheral vascular disease and are often colonized with bacteria.

Medications used to improve pain control include tricyclic antidepressants (e.g. imipramine), anticonvulsants (e.g. carbamazepine), antiarrhythmics (e.g. mexiletine) and topical therapy (e.g. capsaicin). Topical antibiotics such as silver sulfadiazine, mupirocin, and polymyxin B sulfate combined with bacitracin reduces surface colonization and contributes to wound healing. Pentoxifylline improves the viscosity and flow of blood to the extremities thereby slowing the progression of neuropathy and improving wound healing capabilities⁴. Medications for other complications demand the use of completely new set of drugs.

Unfortunately, in a depressed economy like ours

characterized by poor health facilities, chaotic drug management system, subsistent age and double digit inflation, the economic and social effects of NIDDM complications are overwhelming. Self-managed complications with disastrous consequences are now common. This paper reviews measures aimed at preventing and controlling NIDDM complications.

PREVENTION AND CONTROL

It is equally important to devote effort not only to treatment but also to prevention of NIDDM. There must be approaches aimed at identifying the population at the risk of developing overt diabetes as well as individuals at increased risk of developing complications. These strategies are comprehensive and synergistic.

Treatment of NIDDM which requires huge expense of healthcare resources does not result in complete reduction of the risk of complication considering the irreversible nature of the disease. Treatment alone has not addressed altering the risk of future development of NIDDM in the population. Consequently, there is need for primary prevention. This is imperative in this environment characterized by poor economic indices, overburdened health infrastructure and socio-economic constraints. Individuals must prevent a shift to the right of the present situation through changes in life style and health policies.

LIFE-STYLE MODIFICATIONS

Life-style modifications

could help prevent population progression from impaired glucose tolerance to NIDDM, lower blood sugar levels, avoid or reduce the use of antidiabetic drugs and prevent and control complications.

Lifestyle changes are difficult to maintain and therefore ways to sustain them must be emphasized. Improved knowledge in behavioural modification and maintenance could be helpful. Favourable interventions include dietary modifications and increase in physical activity.

In principle, there is no special diet for a diabetic or those at the risk of developing NIDDM. Diet should consist of unrefined carbohydrate rather than simple sugars (e.g. sucrose). Carbohydrate is absorbed relatively slowly from fibre-rich foods, preventing the rapid swings in circulating glucose seen when refined sugars are ingested. Calories should be tailored to the needs of the diabetic patient. The total amount of carbohydrate in the diet should provide 50 - 55% of the total calories, with fat 30 - 33% and protein 15%¹. An overweight patient should be started on a reducing diet of approximately 4 - 6MJ (1000-1600kcal) daily. A lean patient is put on an isocaloric diet. Patients who are underweight because of untreated diabetes require energy supplementation. Glucose intolerance is closely correlated with increased body weight. Weight reduction has beneficial effects on insulin resistance. It is estimated that up to 90 per cent of patients with NIDDM are overweight. A modest weight reduction of 4.5kg can markedly improve glucose

tolerance⁵. Overweight diabetics should therefore be counselled to undertake a structured and supervised weight-reduction programme by reducing dietary energy intake and increasing energy expenditure through regular exercise.

Regular exercise is beneficial for both prevention and treatment of NIDDM. Exercise improves glucose tolerance by improving insulin action in peripheral muscles and reduce cardiovascular risk factors such as hypertension and dyslipidemia. However, pre-exercise evaluation for silent ischaemia may be necessary because of the long duration of NIDDM before diagnosis in some patients. This evaluation is usually clinically indicated in older patients with a history of sedentary life style. The exercise programme should be individualized and appropriate for the patient's age, coexisting medical conditions and lifestyle.

Preventive exercise prescribed dynamic isotonic exercise such as walking. Brisk walking for 30 - 60 minutes a day or 3 - 5 times a week is possibly better than more strenuous forms of exercise such as running.

HEALTH POLICY

The natural history and pathophysiology of NIDDM offer an opportunity for prevention. This can be done using two complementary approaches: the population or public health approach and the individual or clinical approach.

The goals of the population approach should include increasing the population awareness that elevated blood sugar level is a major problem even though it may not be

apparent; help direct individuals who have NIDDM or may be at risk of developing it and advocate lifestyle modifications. The population approach relies on educating the public, health professionals and patients.

The Public must be informed about the nature, causes and complications of NIDDM; its preventable and controllable nature; the lifestyle measure useful for its prevention and management and the role of risk factors.

People at the risk of developing NIDDM must be identified through campaigns for mass screening and glucose tolerance test. This is necessary because people who develop NIDDM pass through a stage of impaired glucose tolerance (IGT), the duration of which varies depending on several factors. This is sometimes called the target approach. It also affords the opportunity of identifying the hidden cases of NIDDM in the community. The population must know that NIDDM shows familial aggregation. In contrast to IDDM, 38 per cent of the siblings and 33 per cent of the offsprings of the people with NIDDM have diabetes or IGT⁷. The prevalence and incidence is more in males and there is a correlation between age and incidence of NIDDM especially for those born with the genetic pattern.

They must recognize that NIDDM is associated with a cluster of disorders, including obesity, hypertension, dyslipidemia and atherosclerotic heart disease. The name syndrome X, or insulin resistance syndrome has been used to identify this

pathological entity. The base problem has been recognized as reflex hyperinsulinaemia due to insulin resistance, which has several adverse effects including aggravation of macrovascular disease by insulin acting like growth factors, worsening hypertension, raised very low density lipoprotein (VLDL) production from the liver, etc. Hyperinsulinaemia worsens insulin resistance by down-regulating the insulin receptors.

The community should be aware of the association between obesity and NIDDM as proved by extensive studies in Pima Indians⁸. Obese people who had other risk factors for developing NIDDM (e.g. family history, previous gestational diabetics) manifest the disease at an earlier age than expected. On the other hand, if they are not obese, the disease may appear at a later age or may never become manifest. Gestational diabetes is a pointer to development of the disease in future. The population should be aware that intake of refined carbohydrates and fatty foods, a sedentary lifestyle and higher socio-economic status are associated with increased incidence of diabetes. We must avoid coca-colonisation and consumption of spurious, cheap and uncontrolled refined carbohydrate based drinks marketed in Nigeria under various names and packages. Studies have shown a higher prevalence of NIDDM in urban areas than in rural areas, possibly, due to refined carbohydrate diet and sedentary lifestyle in the urban population. Malnutrition-related diabetes (now classified

as secondary diabetes due to pancreatic disorder) occurs probably extensively in the tropical developing countries including Nigeria. It has been associated, at least in some cases, with the consumption of cassava root, which contains several cyanogenic glycosides. There should be demonstrations in communities on how to process cassava. If possible processing centres should be established within communities to ensure compliance and adequate monitoring.

Measures aimed at educating the public on the prevention of NIDDM should consider cultural, religious, economic, environmental and geographical differences in developing appropriate messages and effective methods of delivery. In Nigeria, public announcements using radio, television, community centres, schools, publications and religious centres are effective ways of communicating these messages. The messages should be simple and repeated. Achieving success in educating the population will depend on the selection of the right approach for a given population and developing a message that is culturally and socially acceptable. Recognizing the cost of such programmes and monitoring and evaluating the results of the programme are equally crucial. The community must also be empowered by educating and training the indigenes to ensure sustainability and guarantee participatory rather than prescriptive programmes.

Professional education involves physicians, pharmacists, and other health professionals. They should be

better trained to detect, manage and prevent NIDDM. This requires training and certification procedures. The skill of health professionals to counsel individuals with NIDDM and play advocacy roles in the community for the adoption of healthier lifestyle must be promoted⁹.

Individuals with NIDDM must be educated about their condition and its consequences, the need for effective management and the benefit of lifestyle changes. Emphasis should also be on the importance of adhering to health care advice, regular monitoring and periodic visits to the physician to discuss the effects of the therapy.

The individual approach involves individuals with established NIDDM. The implication for the patient of being diagnosed as diabetic, the prognosis and the advantages of medical care need to be carefully and effectively communicated at the first meeting with the physician. Using a combination of instruction and dialogue, the physician should guide the

patient on ways to control NIDDM and associated risk factors if present. Compliance with a recommended therapeutic/preventive regimen is a long term or even permanent issue, requiring ongoing education efforts on the part of the physician, pharmacist or other health worker. The accessibility of the pharmacist positions him for this function and ensures total pharmaceutical care of the patient.

Nigeria must have a cogent health policy relevant to its identified needs, based on lifestyle changes in the community as a whole and the drug therapy in individuals with established NIDDM. Such policy should include issues on public health education, promotion of consumption of healthy food, provision of outdoor recreational sports and leisure time, provision of inexpensive NIDDM drugs, integration of NIDDM preventive measures in health care services especially primary health care and provision of health subsidy for diabetic patients.

Planning and implementing programmes to control NIDDM should involve health professionals, policy makers, and various governmental and non-governmental organizations. National and State diabetes societies and leagues should act in concert with health policy makers and health care providers to develop and deliver these programmes.

CONCLUSION

NIDDM is an irreversible heterogenous disease and a major cause of disability and hospitalization arising from its complications. Management of NIDDM and its complications is a major drain on national and individual health resources. The United Kingdom Prospective Diabetic Study (UKPDS)¹⁰ has shown clearly that whatever effort that is put in controlling NIDDM, it will worsen with time. This time can be cost-effectively extended in a depressed economy through appropriate health policy. This is the key to preventing and controlling NIDDM and reducing the complications arising from it.

REFERENCES

1. Parveen K and Michael C (2002): Clinical Medicine. Harcourt Publishers, London
2. Diabetes 1996 vital Statistics. Alexandria: American Diabetes Association, 1996; 1 - 102
3. Stephen MS; Anthony P and Campbell RK (2002): Current and future therapies of diabetes neuropathy.
4. Campbell RK (1993): Clinical update on pentoxifylline therapy for diabetes-induced peripheral vascular disease. *Ann Pharmacotherapy*. 27:1099 - 1105.
5. William TC (1996): Treatment of type II diabetes. *Postgraduate Medicine* 99(3): 109 - 112.
6. American Diabetes Association (1993): Technical review: exercise and NIDDM. *Diabetic care* 16:54 - 8.
7. Bhattacharyya A (2001): Aetiology and pathology of type 2 Diabetes Mellitus 8 : 5 - 9.
8. Knowler WC; Pettitt DJ; Savage PJ; Bennett PH (1981): Diabetes incidence in Pima Indians: contribution of obesity and parental diabetes. *Am. J. Epidemiol.* 113: 144-56.
9. Report of a WHO Expert Committee (1996): Hypertension Control p49-50.
10. UK Prospective Diabetes Study 16 (1995): Overview of 6 years' therapy of type 2 diabetes. A Progressive disease. *Diabetes* 44:1249-58.