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DIABETUS MELLITUS:

A CHALLENGE FOR THE COUNTRIES OF THE REGION

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DIABETES MELLITUS: A CHALLENGE FOR THE COUNTRIES OF THE REGION*

I. INTRODUCTION

Control of communicable diseases, lengthened life expectancy, and cultural and environmental changes brought about by accelerated urbanization and industrial development are contributing to a notable increase in chronic diseases in countries of the Region.

On the basis of available mortality and morbidity data, it may be assumed that over the next 10 to 15 years, the present diabetes mellitus problem will increase as will the frequency of its complications. The seriousness of the problem is reflected by the large number of diabetics who die or are left disabled as a consequence of the disease and its chronic nature. The latter factor entails long periods of medical care and supervision, which result in human and economic waste, particularly in view of the fact that the disease can to a large extent be prevented and treated specifically.

A few years ago, the Pan American Health Organization conducted an inter-American investigation of mortality to compare the patterns of mortality in 10 Latin American capitals, San Francisco (United States), and Bristol (England). Data from this survey showed high death rates from diabetes mellitus and from arteriosclerotic heart disease in diabetic patients--fatalities classified as largely preventable because effective treatment for these diseases are known.^{1/}

All of these considerations led to the recommendation that the present tendency of increase in the prevalence of diabetes mellitus be reduced within the programs of control of chronic diseases related to

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overweight, along with others, like atherosclerosis and obesity.^{2/} The recommendation, included in the Ten-Year Health Plan for the Americas (1971-1980), was approved at the Third Special Meeting of the Health Ministers of the Americas.

Accordingly, the Pan American Health Organization convened an expert committee from the Region, for the purpose of focusing attention on the importance of diabetes mellitus, within the scope of general health problems, and preparing appropriate recommendations for the establishment and implementation of a control program.^{3/}

II. PREVALENCE

Data on the real prevalence of diabetes mellitus present a difficult problem since the concept of the disease has now been extended beyond the acute metabolic disorder. The increase in population groups of advanced age, as a consequence of increasing life expectancy, and the progress achieved in diagnosis and therapy of the disease have brought about a change in its characteristics and have emphasized the importance of its complications. Hospital discharges, which record only a part of the morbidity problem, show that the discharge rate per 100,000 inhabitants has increased 15-20 times over the last 50 years, whereas discharges for all causes have merely doubled.^{4/}

In many countries of the Region there is little information on the prevalence of diabetes. Furthermore, in most instances, the studies available do not reflect the real magnitude of the problem because of difficulties presented by their interpretation. For example, studies by Poon-King et al, in Trinidad^{5/} showed an overall prevalence of 1.89 per cent, a figure that is 5 percent higher in the over-40 population group. If prevalence studies do not adequately describe the characteristics of the population investigated and the diagnostic criteria are not uniform, it is difficult to draw valid conclusions and to compare results obtained by the different authors^{6/} (Table 1).

In Cuba, Mateo de Acosta used another method to estimate diabetic morbidity, through the Register of Antidiabetic Drug Consumers. There were 44,808 diabetics registered in 1970, corresponding to 0.53 percent of the population.^{7/}

The optimum design for incidence and prevalence studies will vary according to the availability of resources, the type of screening or confirmatory diagnostic tests to be used, and the objectives established for the respective programs. Mass screening programs for the entire population may be appropriate if resources and follow-up capabilities are adequate. If not, programs directed to high-risk subgroups may be elected, with a view to increasing the yield to cost ratio: first degree relatives of the diabetic; obese subjects, pregnant women, especially those with a history of perinatal mortality in a previous pregnancy, or a high birth-weight infant; persons under 50 years of age with a history of coronary heart disease or peripheral or central nervous vascular disorders, hyperlipidemias, and, in general, persons over 35 years of age.

The recommended diagnostic method for the initial examination is the test to determine the blood-sugar level 2 hours following an oral carbohydrate load. This test has certain advantages over the detection of glycosuria, since it is a more sensitive and more quantitative index of diabetes. However, local conditions, especially those of available resources, must in the final analysis determine the method to be employed.

Design and interpretation of the glucose-tolerance test also requires a certain uniformity of criteria. The American Diabetes Association has recently promulgated guidelines that include four plasma glucose values (fasting, one-, two-, and three-hour levels) and considers abnormal plasma glucose values of 185 mg/100 ml; one hour, and 140 mg/100 ml, two hours after the administration of a carbohydrate load. It also assumes that these levels will increase by 10 mg/100 ml for each decade after 50 years of age.^{8/}

The 2-hour value is the best discriminating factor. Values higher than 230 mg/100 ml apply in general to persons who have a reduced glucose tolerance, and levels lower than 140 mg/100 ml seldom show abnormal tolerance. Various facts indicate the desirability of using relatively high standards.

However, one must consider the cost of repeating the tests in doubtful cases and especially the existing uncertainty as to the efficacy of present therapeutic methods in certain subgroups with mild diabetes.

The Cleveland Diabetes Association, in a comparative study of cases detected by measurement of glycemia in capillary blood 2 hours after a carbohydrate load, and the presence of glycosuria, showed that the first-named method identified 12 times as many cases of diabetes as did the other ^{9/}(Table II).

III. MORBIDITY AND MORTALITY

All available data support the assumption that the diabetes problem will be exacerbated in coming years. Moreover, improved understanding of the disease and progress made in treating metabolic deficiencies have focused attention on the chronic vascular and microvascular complications. These are often associated with blindness, amputations, nephritis, diabetic neuritis, and infections. In addition, there is a significant relationship between diabetes and cardiovascular diseases, such as myocardial infarction, central nervous vascular accidents, and arterial hypertension. In Chile, the average length of hospitalization for the diabetic patient is 53 per cent greater than for the nondiabetic.^{4/}

Mortality from diabetes is the index most commonly used to express the importance and distribution of the disease. However, death rates reflect only part of the problem. Medical certificates are not usually uniform, and the Sixth International Revision of Diseases and Causes of Death^{10/} requires that one disease only be specified as the primary cause of death, even when there are other diseases directly related to the death. Diabetes mellitus is not usually mentioned as the basic cause of death since there are other conditions that are more obvious although they are often the direct or indirect consequence of diabetes.

Tokuhata et al^{11/} have recently brought this problem into focus. A review of 1968-1969 death certificates in Pennsylvania showed that

mortality attributed to diabetes is only a fraction of the true rate, if other conditions, clearly related to that disease and given as the primary cause of death in diabetics, are analyzed. The investigators also demonstrated that diabetes was not mentioned in the death certificates of 8 percent deceased patients. Of the 20,000 deaths occurring among diabetics in 1 year, 2,700 only were attributed to diabetes, thus giving a false picture of the magnitude of the problem.

Table III shows mortality from diabetes in 22 countries of the Region, clearly evidencing the extent of the problem in the Caribbean countries.^{12/}

IV. PERSPECTIVES

Diabetes control requires organized efforts within a country. The first step in this direction is the establishment of adequate diabetes registries. Primary preventive programs are difficult to conceive at the present time, with the possible exception of the control of obesity. On the other hand, secondary preventive measures must be stressed, through mass education programs for the patient and his family, the public and the health professionals; and through early detection of high-risk groups; case reporting, and follow-up; and the provision of comprehensive medical care.

At the present time it is difficult to correlate therapeutic measures for control of diabetes with prevention of its complications. However, special emphasis should be placed on the necessity of instituting the best possible course of treatment for each individual case. This would have a special connotation in the Latin American and Caribbean countries, where the bulk of diabetic patients are found in the low social, economic, and cultural levels. In the experience gathered by the participants in the PAHO expert committee mentioned above, there seems to be an excessive use of the oral hypoglycemic agents at the expense of diet therapy alone (60 percent and 20 percent respectively). The latter should play a much more important role, especially in the stable obese adults who constitute

the majority of cases. The fact that such a small number of patients are treated exclusively with dietary therapy is, to a large extent, attributable to professional's lack of training, to the difficulty of changing ingrained dietary habits, especially in the obese, and the difficulty of adapting the classic diabetic diet, usually expensive, to the social and economic level of the patient.

Excessive use of hypoglycemic drugs must be studied with care, based on the study made by 12 groups in the United States (University Group Diabetes Program).^{13/}^{14/} This study demonstrated an association between the use of such drugs and higher mortality from cardiovascular diseases in diabetic patients. Although the ad hoc Committee of the Biometric Society, that recently reviewed the data from the study, is more cautious in its conclusions,^{15/} this fact should be taken into account and should, at the same time, stimulate development of similar studies.

Despite the fact that scientific research has expanded tremendously over the last decade and has resulted in impressive advances in knowledge of the pathophysiology of the disease, a long list of questions about diabetes mellitus still remains to be answered. The discovery of pro-insulin by Steiner et al^{16/} was the first indication of the mechanism for insulin-synthesis in the pancreas and the presence of two forms of immunoreactive insulin. More recent studies have made it possible to demonstrate the presence of insulin receptors in the liver and fatty tissues, and in the thymic lymphocytes of rodents by the use of marked insulin of high specific activity. It has been established that insulin resistance may play a role in the deficiency of these receptors.^{17/} Other studies have provided excellent data on the mechanisms by which stress produces the disease through the secretion of growth hormone and the production of an insulin-antagonist;^{18/} on the pathogeny of renal lesions of diabetes^{21/} and the possible viral etiology of the disease;^{20/} on the treatment of diabetic retinopathy by photocoagulation, using laser beams;^{21/} the use of glucose sensors linked to an artificial insulin-triggering device,^{22/} and transplantation of cells from the islets of Langerhans.^{23/}

There is no doubt that such continuing effort in basic and clinical research has contributed to the knowledge of the nature of diabetes mellitus.

Meanwhile, health authorities, health professionals, the general public and the patients themselves face an important challenge: to solve the problem of a disease that seems to be so widely prevalent and that is revealing a constant upward trend in the consequences of its chronicity and its complications.

V. RECOMMENDATIONS

To meet this challenge, the PAHO Study Group has prepared the following general recommendations:

(1) Bringing to the attention of the health authorities of the Governments of the Region the available background data demonstrating the importance of diabetes mellitus, in association with obesity and atherosclerosis, as a public health problem.

(2) Organizing technical units for diabetes or noncommunicable chronic diseases at the level of health ministries or health services.

(3) Helping to improve the knowledge of the real magnitude of the problems by means of a simple system of registration of diabetic patients. The registry would start with known cases in specific areas of countries where diabetes is a serious problem.

(4) Carrying out multinational studies on the prevalence and incidence of diabetes in the countries of the Region, using standardized methods and covering representative population groups.

(5) Organizing programs of comprehensive care of the diabetic patient, in line with the existing health systems in each of the countries. These programs should be designed to increase coverage through the decentralization of patients from specialized centers to the community care level. This is the only way of ensuring the usefulness of large-scale detection programs.

(6) Promoting the teaching of diabetes in school of medicine, nursing, nutrition and related subjects, in programs commensurate with the magnitude of the problem. At postgraduate level, promoting the

training of specialists, courses for non-specialist physicians on the care of diabetic patients, and the training of ancillary medical personnel in the field of diabetes mellitus and chronic diseases in general.

(7) Identifying and strengthening approved centers in the Region with a view to research, teaching, and specialized care in regard to diabetes.

(8) Promoting educational activities for diabetic patients and the general public, with the active participation of the community and of interested organizations.

(9) Within each country, adapting the present methods of treatment to the local socioeconomic and cultural situation. This is particularly important for dietetic treatment and the correct prescription of insulin and oral hypoglycemic drugs.

(10) Promoting within the Region basic, clinical and epidemiological research designed to cope with local problems and help to inculcate a better knowledge of the nature of the disease and its complications. Stress is laid on the importance of: studies on the poor showing of dietetic treatment; the factors affecting the development of vascular complications; operational research into systems of care; and the association of obesity as a target factor in diabetes.

(11) Urging the Pan American Health Organization, in view of the increasing importance of diabetes mellitus in the Region, to provide continuing attention to the problem, taking an active role in the implementation of the recommendations of the Study Group. The Group recommends:

- (a) The establishment of a permanent monitoring mechanism, to insure that these recommendations are translated into collaborative actions with the countries of the Region in their programs of control.
- (b) The coordination of multinational activities, with the collaboration of agencies, such as the American Diabetes Association and local associations. Among these activities, epidemiological research, the

registry program and educational programs are considered as first priority.

- (c) That the registry program should be started with a common model design, only in specific areas of some countries where diabetes is a serious problem.

(12) Urging the World Health Organization to incorporate a system of multiple cause coding in the 1978 Death Certificate to facilitate meaningful analysis of diabetes-related conditions, and to increase the usefulness of the death certificate data in all chronic and multisystem diseases.

VI. SUMMARY

The Pan American Health Organization convened an Expert Committee for the purpose of underlining the importance of Diabetes Mellitus among the various health problems, to make suitable recommendations to assist the countries of the Region to establish programs of control.

Existing data on the prevalence of the disease in different countries are not comparable since the samples are not representative of the population, and the methods and the diagnostic criteria used are different. In 10 countries a range of 1.2% to 6.9% is found according to these factors.

Mortality from Diabetes is the index most used to show the importance of the disease, but death rates express only part of the problem, due mainly to certification problems. Available figures, however, show an important magnitude of the problem in the Caribbean countries: Barbados, Trinidad and Tobago, and Jamaica are rated first, second, and third among 22 countries.

The data available in the Region on morbidity and mortality, the expected population increase, the expected age-group changes in terms of a higher proportion of older people, make it likely to assume a worsening of the problem of Diabetes Mellitus, together with an increase of the frequency of its complications.

The programs of control require the promotion of educational activities for the patients, public and health professionals, early detection of the disease in the high risk groups, systems of registry and follow-up, and the organization of programs of comprehensive care. It is strongly recommended also, to promote within the Region basic, clinical, and epidemiological research, designed to cope with local problems, and help to inculcate a better knowledge of the nature of the disease and its complications. Within each country, a study of the adaptation of the present methods of treatment to the local socio-economic and cultural situation should be made. This is particularly important for dietetic treatment and the correct prescription of insulin and the controversial oral hypoglycemic drugs.

Despite the important contributions of research to the better knowledge of the disease, the health authorities, the patients and the public will have to face an important challenge: to cope with the problem of a disease of high prevalence, that is progressively showing, in our Region, the consequences of its chronic nature and its complications.

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TABLE I

SOME STUDIES ON DIABETIC MORBIDITY
IN LATIN AMERICA AND THE CARIBBEAN^{6/}

Country	Year	Prevalence (Percentage)	Population	Method
Argentina	1967	6.0	37,000	0 and PPG
Brazil	1966	2.7	1,000	PPG
Colombia	1971	6.8	10,293*	PPG
Cuba	1970	3.8	8,186	PPG
Chile	1958	1.2	16,306	0 and PPG
Jamaica	1961	1.3	4,516	0 and PPG
Mexico	1970	4.5	53,285	0 and GTT
Trinidad	1961-1967	1.9	23,700	0 and PPG
Uruguay	1966	6.9	484	GTT
Venezuela	1970	2.7	6,000	0

* Relatives of Diabetics

0 Glycosuria

PPG Postprandial Glycemia

GTT Glucose-tolerance Test

TABLE II

COMPARISON OF DIABETES MELLITUS DETECTION PROGRAMS
(South Euclid, Ohio)^{2/}

	Urine ^{1/}	Blood Capillary ^{2/}
Total cases	802	3,810
Screening - positive	8	450 ^{3/}
GTT - cases	5	382
GTT - positive	4	242
Percentage positive	0.5%	6%

- (1) Clinistrix, glucose oxidase
- (2) 2 hours after carbohydrate load
- (3) > 140 mg/100 ml

TABLE III

GROSS MORTALITY AND AGE-ADJUSTED RATES PER 100,000 INHABITANTS
IN 22 COUNTRIES OF THE REGION (1968-1970)*

Country	Grouping by Magnitude of Problem	Group Rates	Age-adjusted Rates
Barbados, Trinidad and Tobago, Jamaica, Uruguay, and Argentina	1 - 5	39.0 to 20.3	19.0 to 11.0
United States, Mexico, Canada, Costa Rica, Chile, and Cuba	6 - 11	18.7 to 10.3	8.0 to 7.6
Panama, Venezuela, Paraguay, Colombia, and Nicaragua	12 - 16	4.7 to 2.5	5.6 to 3.6

*Health Conditions in the Americas, 1969-1972. PAHO Scientific Publication
No. 287, 1974.