

OPHTHALMOLOGIC CARE AMONG DIABETIC
MEXICAN-AMERICAN ADULTS RESIDING IN A *COLONIA*

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ABSTRACT

Ocular damage with possible progression to blindness is a common complication of diabetes mellitus. These changes can be diminished by early detection through regularly scheduled eye examinations and by intervention that includes better control of hyperglycemia. In Mexican-American populations, both type 2 diabetes and the ophthalmologic complications appear to be more prevalent and perhaps more severe than in the general population. Using a survey of diabetic patients enrolled in community clinics as well as a sponsored screening program, this study shows that access to eye care is inadequate within a small survey population drawn from residents of *colonias* along the Texas-Mexico border. These individuals are exclusively Mexican-American and also possess many of the characteristics of low socio-economic status that impede access to health care. At the same time, the reservoir of ophthalmologic disorders appears to be high, based upon the findings of a comprehensive screening program. Taken together, these findings strongly suggest the need for new strategies employing provider and patient education as well as modified referral methods in order to improve the access to recommended health care services for this rural population.

Key words: diabetes, *colonias*, Mexican-American, ophthalmology, Type 2 diabetes mellitus, visual complications of diabetes. (Texas Journal of Rural Health 2003; 21(3): 19-26)

purposes of this study are to identify by means of a questionnaire, the pattern of eye care in a diabetic population residing in impoverished *colonias* along the Texas-Mexico border, and to describe the effectiveness of a screening program in identifying individuals with abnormalities of vision.

INTRODUCTION

Diabetes mellitus is the most common underlying cause of blindness in older populations (Klein & Klein, 1995). Background diabetic retinopathy develops in varying degrees in all diabetic patients, and patients are usually unaware of their disease. However, the disease can evolve into such visually debilitating complications as vitreous hemorrhage, neovascular glaucoma, retinal detachment, macular edema, and ischemic maculopathy. Some of these complications can be prevented by strict diabetic control (Diabetes Control and Complications Trial Research Group, 1995). Others can be ameliorated by early detection and intervention (Rodriguez-Villalobos, Ramiez-Barba, Cervantes-Aguayo, & Vargas-Salado, 1999). Type 2 diabetes mellitus is more common in Mexican-Americans than in the United States population as a whole (Stern & Mitchell, 1995). Thus, older Mexican-Americans might be more likely to experience ophthalmologic complications of diabetes. Indeed, there is evidence to suggest that the prevalence of diabetic ophthalmopathy is greater than predicted in this population (Haffner et al., 1988). Possible explanations for this excess include inadequate control of hyperglycemia, lack of knowledge concerning the risks of diabetes, and inadequate access to health care, particularly regularly scheduled eye examinations and early intervention. Low income has been identified as a particularly important risk factor (West et al., 2002). The

MATERIALS AND METHODS

This study was conducted in primary care clinics located in under-served, predominantly Mexican-American rural communities (so-called "*colonias*") located in El Paso County, Texas. These clinics are operated and staffed by the School of Medicine of Texas Tech University Health Sciences Center at El Paso and the College of Health Sciences at the University of Texas at El Paso. Subjects were drawn from patients who were registered in these clinics. In general, these patients received their care within the clinics, but some of the patients were new registrants. The study protocol and the questionnaires used in the study were reviewed and approved by the Institutional Review Board.

In the first phase of this study, adult (older than 21 years of age) patients with established type 2 diabetes mellitus were invited to participate in the study. After signing a written consent, enrolled subjects were asked to complete an eleven-item questionnaire concerning the duration and severity of their diabetes mellitus as well as frequency and nature of ophthalmologic care they had received. Questions were directed to age of onset, interval to treatment, interval to first ophthalmologic examination and subsequent intervals of examination, visual symptoms, other potential complications of diabetes, and modalities of treatment used by the subject for diabetes and ophthalmic disorders. The

questionnaire was provided in English and Spanish with Flesch readability score of 73.6 and Flesch-Kincaid Grade Level score of Grade 5.8 for the English version. A clinic employee fluent in the appropriate language assisted individuals who asked for assistance to complete a written document. The questionnaires contained no personal identifiers, and the completed questionnaires were collected and assigned a number for the purpose of collating and analyzing data. Some participants did not respond to all the questions, especially those related to annual income.

In the second phase of the study, individuals were recruited to a vision-screening session to be held at one of the community clinics. Participation was solicited by posted notices at a single clinic site and by direct contact with or telephone calls to individuals who had been seen in the clinic with the diagnosis of type 2 diabetes mellitus. However, it was not required that participants have the diagnosis of type 2 diabetes mellitus. Participants were invited to come to the clinic on a designated date at which time the Texas Commission for the Blind conducted a screening program for visual problems. Screening included a brief questionnaire

about general health and diabetes mellitus as well as tests for visual acuity, peripheral vision, oculomotor status, tonometry, and ophthalmoscopy. A trained optometrist conducted the testing. Individuals who were identified to have previously undiagnosed or progressive ophthalmic abnormalities were referred to a participating ophthalmologist for further evaluation and management.

RESULTS

In the first phase of the study, 39 subjects completed the survey with questionnaires that were sufficiently complete for evaluation. Not all participants responded to all questions. In particular, only 24 participants reported on family income. Of the completed questionnaires, 33 were in Spanish and 6 were in English. Demographic characteristics of the subjects completing the survey are shown in Table 1. The population was exclusively Hispanic, and over three-fourths were women. Subjects were from an older age group with a mean age of 57.7 years. The average age at the time of diagnosis of diabetes was 47.0 years, so that patients had lived with the diagnosis of diabetes for a mean duration of

Table 1. Demographic Characteristics of Diabetic Subjects Responding to the Questionnaire

Characteristics	n	
Ethnicity	39	100% Hispanic
Gender	39	76.9% women
Age	39	57.7±12.08 *
Age at diagnosis	32	47.0±12.46 *
Annual household income	24	\$9,424±\$4,935 *

* (mean±SD)

10.7 years. These subjects also came from a low socio-economic status (SES) in that the mean annual family income of the 24 individuals reporting this information was \$9,424.

The relative poverty of the population is also reflected by the source of funding for health care services (see Table 2). Over half the subjects had no third-party health care coverage. An additional one-quarter relied on Medicaid alone. Only 5% reported having commercial insurance.

Methods of diabetes control most commonly included use of oral hypoglycemic agents (data not shown). Some subjects did not include the use of diet and/or exercise in their treatment. A few (5%) subjects reported using herbal remedies in their treatment plan. No effort was made to assess diabetic control or the effectiveness of a particular treatment strategy in either diabetic control or prevention of ophthalmologic and other complications.

Only 37 of the 39 subjects reported on the interval between diagnosis of diabetes and the first detailed eye examination. Of these, nine (24%) reported never having had an examination. Of the remaining 28 subjects, the interval ranged from one week to 19 years with a mean of 3.8 months. Of 29 subjects who reported on the interval since their most recent eye examination, the range was as

recent as one month and as long as 10 years.

The mean interval was 2.8 years. Twenty-one subjects reported experiencing changes in their vision while only seven subjects reported treatment for eye disorders. Concerning other possible complications of diabetes, nine subjects reported loss of peripheral sensation that they attributed to diabetes. Only one subject described foot ulcers. There were five subjects who said that they had diabetes-related renal disease.

In the second phase of the study, 47 subjects participated in the vision screening. Of these subjects, 27 had the diagnosis of type 2 diabetes mellitus while 20 did not. A total of nine subjects were referred for further evaluation. Seven of the nine referred subjects also had diabetes mellitus. Reasons for referral included evidence of cataract, possible visual field defects, and vitreous hemorrhage.

DISCUSSION

This small, descriptive study of eye care in a diabetic population residing in the *colonias* provides evidence for shortcomings in the quality of that care and the receptivity of the population to improved access to such care. These observations form the basis for specific

Table 2. Health Care Insurance Coverage of 39 Subjects Responding to the Questionnaire

Type of Coverage	n	%
Medicare	7	17.9
Medicaid	6	25.4
Medicare and Medicaid	5	12.8
Commercial or other	2	5.1
None	20	50.3

suggestions to improve the quality of and access to eye care in *colonias* populations. Those recommendations will be discussed below.

Although the study is hampered by problems associated with sample size and the qualitative methods using self-administered questionnaires, it is consistent with other observations about diabetes mellitus and its management in a Mexican-American population. There are now numerous studies that document that the Mexican-American population is at greater risk than the population as a whole for the development of type 2 diabetes mellitus (Stern & Mitchell, 1995). Genetic predisposition as well as sociologic and environmental factors such as diet and level of exercise may all play a role (Duggirala et al., 1999; Mitchell et al., 1999; Mitchell et al., 1996). There is also evidence that Mexican-Americans may have a higher incidence of the late-term complications of diabetes including cardiovascular events such as myocardial infarction and stroke, nephropathy and renal failure, and retinopathy and blindness. Many of these complications can be delayed or even prevented by weight loss, exercise, and careful regulation of hyperglycemia (Tuomilehto et al., 2001). Practice guidelines describe prevention measures to be used in the long-term care of diabetes patients, including a complete eye examination after the initial diagnosis of diabetes, at least annual follow-up examinations by an experienced ophthalmologist or optometrist, and prompt consultation following changes in vision (Fong et al., 2003). These measures depend upon patient compliance as well as access to health care services and effective lifestyle counseling and intervention. Thus, access to care is essential for the reduction of long-term complications in diabetic patients.

However, access to health care is depen-

dent upon a number of socioeconomic factors. Age, poverty, poor acculturation, language incompatibilities, and lack of medical insurance are all indicators of low socioeconomic status (SES) that favor limited access to health care. The population of the *colonias* along the Texas-Mexico Border possesses most of these characteristics. The *colonias* are unincorporated rural communities, usually on the outskirts of a large urban area, that have developed rapidly without planning or regulation. Until very recently, none of these communities had utilities including water and sewage services. Many of the residents are recent immigrants from Mexico, and in the great majority of homes, Spanish is the preferred language. Unemployment is high, and those who do work are often employed in entry-level jobs.

In this small study population, the subjects with diabetes who received their health care within the community came from a low SES. Average annual household income was \$9,424 or 78% of the poverty level for a family of 2 (Federal Register, 2003). Over half had no third-party medical insurance coverage. As mentioned above, these factors are especially strong indicators for poor access to health care. However, the diabetic patients who participated in the survey had additional risk factors for poor health care access: they were relatively older and had known about their disease for a number of years; Spanish was clearly their preferred language; and some individuals had only a rudimentary level of reading abilities in that language.

It is not surprising, then, to observe that the majority of these patients had received no or inadequate screening for ophthalmologic complications even in a university-sponsored clinic. One must keep in mind that screening referrals are also dependent upon patient compliance as well as the availability of

consulting physicians who are willing to see patients without reliable insurance coverage. This is a growing national problem, but our study did not consider these issues. We also did not consider the level of diabetes control achieved by the study subjects although most patients were on a treatment regimen including diet, exercise, and medications. Irrespective of medical management, it is clear that the study population had neither received adequate preventive evaluation nor care for potential ophthalmologic complications of their diabetes.

Conversely, there is evidence that the reservoir of eye disease within the *colonias* community is large. Recruitment for participation in the screening clinic was remarkably easy. Relatively few published notices and patient alerts were used and yet turnout was much higher than had been anticipated, suggesting that individuals within the community wished to take advantage of a resource that was not readily available, or that they had concerns about potential eye disease that could be diagnosed and treated. Not all of the individuals who were screened had diabetes, but over half did have that diagnosis. Nearly twenty percent of the participants were referred for further evaluation including one-tenth of those without diabetes and over one-fourth of those with diabetes.

Taken together, the low SES of *colonias* residents, the low level of preventive eye care, the enthusiasm for ophthalmologic screening, and the number of referrals for secondary screening and care, all strongly suggest the need for more effective processes for the preventive care of *colonias* residents with diabetes. These measures include ongoing education of providers and patients, development of reliable referral capabilities, and targeted use of screening services provided

by governmental agencies.

There are several potential remedies that should be explored. Perhaps most obvious is the need for a rational, comprehensive health care funding policy. There are other specific potential solutions. First, care providers should employ protocols in their management of patients with diabetes mellitus to assure that recommended evaluations are requested on schedule. Appropriate follow up and patient counseling are also important. Second, educational programs for diabetic patients should be reevaluated to make sure that they contain information about the importance of ophthalmologic care and also information about how to access health care. *Promotores de salud* (community health workers) may be the most effective individuals in the health care team to convey this information. It is essential that training programs for these individuals incorporate these concepts and emphasize their importance. Third, providers of care to uninsured or underinsured patients should seek practical alternatives to referrals to unwilling specialists. State agencies such as the Texas Commission for the Blind often have excellent screening capabilities as well as highly developed referral resources. These agencies are often eager to provide expanded services and may be underutilized by busy practitioners.

Prevention of blindness should be a major treatment objective in the management of patients with diabetes. Failure to accomplish this potentially achievable objective leads to patient discomfort and disability as well as increased later burdens on the health care system. Individuals with poor access to health care because of socioeconomic status or level of education should enjoy efforts at prevention that are comparable to the population as a whole. Improved clinical practices, renewed and reinforced efforts at

patient education, and the use of additional resources such as *promotores de salud* and governmental agencies may all serve to effect positive change.

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