Socioeconomic Status and Cardiovascular Risk Control in Adults With Diabetes

Tejas Doshi, MD, Brittany L. Smalls, PhD, MHSA, Joni S. Williams, MD, MPH, Tamara E. Wolfman, MD and Leonard E. Egede, MD, MS

ABSTRACT

Objective: To examine the association between subjective social status (SSS) and objective social status (OSS) and cardiovascular disease (CVD) risk factors in adults with type 2 diabetes.

Methods: Adult study participants ($N = 358$) were recruited from 2 primary care settings. The CVD risk factors included hemoglobin A1c (HbA1c), systolic blood pressure and diastolic blood pressure (DBP) and low-density lipoprotein cholesterol (LDL-C). The OSS was assessed by income, education and employment. The SSS was measured using the validated MacArthur Scales of Subjective Social Status to demarcate self-reported perceptions of having the most money, education and respected job using a ladder scale (1 = rung 1, 10 = rung 10). Multiple linear regression was used to examine associations between CVD risk factors and SSC and OSS controlling for age, sex, race or ethnicity, marital status, employment status, income, study site, comorbidity, education and insurance status.

Results: Fully adjusted models showed that rung 2 ($P = 0.029$), rung 3 ($P = 0.032$), rung 8 ($P = 0.049$) and rung 9 ($P = 0.032$) of the SSS to be significantly associated with poorer DBP. Annual income $\geq$ $75,000 was significantly associated with lower LDL-C ($P = 0.021$). Employment was associated with lower HbA1c ($P = 0.036$), but higher LDL-C ($P = 0.002$).

Conclusions: The SSS and OSSS levels are differentially associated with HbA1c, DBP and LDL-C. Findings provide new information about patients' perspectives of the relationship between social status and diabetes-related outcomes.

Key Indexing Terms: Subjective social status; Objective socioeconomic status; Diabetes; Cardiovascular risk factor control; Adults. **[Am J Med Sci 2016;352(1):36–44.]**

INTRODUCTION

Type 2 diabetes (T2DM) has increased in prevalence and is a major health concern in the United States (U.S.) and globally.[1,2] It is characterized by either impaired insulin production or decreased sensitivity to insulin resulting in impaired glucose homeostasis. More than 29 million people in the United States have been diagnosed with T2DM, and the number continues to grow.[1] Complications attributed to T2DM include chronic kidney disease, blindness and nontraumatic lower limb amputations, in addition to numerous other complications and adverse outcomes. The T2DM is also associated with higher healthcare costs and decreased quality of life.[1,3] In 2012, direct costs such as hospital inpatient care, prescription medications and supplies and physician office visits were estimated to be $245 billion, and indirect costs including work absenteeism and decreased productivity were estimated to be $69 billion.[1,3]

Traditionally, objective social status (OSS) has been determined using annual household income, education level and current employment status. These factors have been shown to have a significant relationship with health outcomes, where those in lower socioeconomic status (SES) categories have poorer health outcomes and those with higher SES have better health outcomes.[4] These objective measures for social status have been shown to have a relationship with health outcomes related to chronic illness.[5,6] In the T2DM patient population, studies have shown that patients of a higher SES have better risk factor control and health outcomes.[7-10] Particularly in individuals with T2DM, the literature has shown that individuals of lower SES have untreated depression, greater sensitivity to out-of-pocket costs, lower trust in physicians, adverse neighborhood environments and more risk factors associated with cardiovascular disease (CVD).[9,10]

Subjective social status (SSS), an individual's perception of his or her SES, has been shown to be significantly associated with physical functioning and health outcomes in various patient populations.[11] The literature has shown psychosocial origins of health inequality, suggesting that the value of SES lies in how resources are perceived by individuals.[12,13] Thus, individuals can negatively internalize perceptions of their social status characterized as education, wealth and employment

status, which can mediate poor health outcomes.[14] Furthermore, Singh-Manoux et al[13] found that SSS is a better predictor of health status and decline in overall health. Thus, the influence of psychosocial variables as predictors of diabetes outcomes is continually increasing,[15-17] and recent research has shown that SSS may affect diabetes and other health-related outcomes.[7-9]

However, it is unclear which measure of social status best predicts health outcomes. Studies have found that SSS was a consistent predictor of health outcomes.[4,11,18,19] Yet, contrary to these findings, a study by McLeod et al[20] found that OSS better predicts health status and outcomes than SSS. Whereas, Sakurai et al[21] found that OSS and SSS differentially affects health outcomes. Additional studies have shown some indication that patients who are of higher OSS and SSS have better clinical outcomes than those of lower OSS and SSS.[22-25] However, not much is known about the relationship between SSS and OSS on diabetes-related health outcomes.

Specifically for T2DM, there is conflicting evidence to determine whether OSS or SSS is a better predictor of health outcomes. A study showed that OSS has a greater effect on health outcomes than SSS,[20] whereas others have shown that SSS is a better predictor of health outcomes.[13,22,24] Thus, more evidence is needed, especially in patients with T2DM. Therefore, the first objective of this study is to assess the relationship between SSS, OSS and risk factors for CVD in patients diagnosed with T2DM. The second objective is to examine which measure of social status, OSS or SSS, is the best predictor of poor health outcomes in patients with T2DM. We hypothesize that OSS measures would be better indicators of health outcomes in this patient population.

METHODS

Research Design, Sample Characteristics and Setting

A convenience sample of patients 18 years of age and older with T2DM ($N = 358$) was recruited from 2 primary care clinics—an academic Internal Medicine clinic and a Veteran Affairs Medical Center primary care clinic. At the academic medical center, at the beginning of each week, a member of the research team printed out the internal medicine clinic schedule and identified adults with T2DM by cross-checking the electronic clinic schedule with patients' medical history. Eligible patients were approached to participate in the study. At the VA medical center, a member of the research team approached patients in the waiting room to ask if they had T2DM. If patients indicated they had been diagnosed with T2DM, they were asked if they were interested in participating in the study. Patients who chose to participate were given verbal and written instructions on how to complete each section of the survey. Additionally, each participant had the option to complete the survey on his or her own or to have it administered by a member of the research team. Each survey was a compilation of 7 validated self-report surveys to assess stress, anxiety, perception of patient-centered care, depression, self-care management, comorbidities and socioeconomic or demographic information. For the purposes of this study, we used demographic information, SES and SSS. The CVD risk factor values were extracted from the electronic medical records.

For the purposes of this study, the primary predictors were subjective and OSS. The outcomes of interest were CVD risk factors that included hemoglobin A1c (HbA1c), blood pressure and low-density lipoprotein cholesterol (LDL-C).[26,27] A priori timeframes for extraction from the medical records were determined for the CVD risk factors before study commencement and were the previous 6 months for HbA1c and the previous 12 months for all remaining CVD risk factors (systolic blood pressure [SBP], diastolic blood pressure [DBP] and LDL-C). For laboratory data that were not collected during the previously established a priori dates, no laboratory data were extracted from the charts. For each of these cases, missing values were accounted for in the data analyses. Before study commencement, this research was approved by the Institutional Review Board.

STUDY VARIABLES

Demographic Characteristics

Demographic variables collected for this study included age, sex, race or ethnicity, marital status, educational level, employment status, annual income level and health insurance.[28] Age was categorized into the following 4 categories: 18-49 years, 50-64 years, 65-74 years and 75-89 years old. Sex was dichotomized into 2 groups: men and women. Marital status was categorized into 5 groups: (1) never married, (2) married, (3) separated, (4) divorced or (5) widowed. Ethnicity was based on self-report as (1) Hispanic or Asian or American Indian, (2) non-Hispanic White (NHW) or (3) non-Hispanic Black (NHB). Years of education was categorized into 4 groups: (1) $<$high school, (2) high school, (3) college or (4) graduate-level education. The 8 income levels were defined as (1) $0-9,999; (2) $10,000-14,999; (3) $15,000-19,999; (4) $20,000-24,999; (5) $25,000-34,999; (6) $35,000-49,999; (7) $50,000-74,999 and (8) $>$$75,000. Insurance status was divided into 6 groups: (1) no insurance, (2) private insurance, (3) Medicare, (4) Medicaid, (5) VA/military insurance or (6) other insurance.

INSTRUMENTS

Subjective Social Status

The MacArthur Scales of Social Subjective Status[22,29] is a validated instrument that was used to assess the participants' perceptions of their social status. The scale is depicted as a ladder and asks