



## The signs of stress: Embodiments of biosocial stress among type 2 diabetic women in New Delhi, India



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### ABSTRACT

Biocultural models of health and illness are increasingly used to trace how social pathways shape biological outcomes. Yet, data on the interactions between social and biological aspects of health are lacking in low- and middle-income regions, where two-thirds of all type 2 diabetes cases occur. This study explored health, social roles, and biological correlates among a group of 280 type 2 diabetic and non-diabetic women ( $n = 184$  diabetic) in New Delhi, India, between 2009 and 2011. Using a biocultural framework, we developed and tested a series of hypotheses about the relationships that might exist between diabetes, psychological distress, social role fulfillment, and biological markers measuring blood sugar control, generalized inflammation, and immune stress. Although blood glucose and glycated hemoglobin levels indicated that women's diabetes was generally poorly controlled, they lacked the elevated inflammation, immune stress, and mental ill health that often accompany uncontrolled blood sugar. Qualitative work on explanatory models of diabetes and gendered models of appropriate behavior demonstrated that despite living with poorly controlled diabetes, women maintain participation in culturally valued roles involving the care of others. We suggest that behavioral congruence with these gendered roles may buffer diabetic women's mental health and perhaps even their long-term physical health, while simultaneously posing challenges for their diabetes self-care. To our knowledge, this is the first study to explore the experience of type 2 diabetes in India from an integrated biocultural perspective.

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### 1. Introduction

It is by now a truism that chronic and noncommunicable diseases are the largest causes of adult mortality in the world, and thus constitute key health challenges for our collective future (Yach et al., 2004). Yet, chronic diseases continue to increase in prevalence around the world, including in India (Joshi et al., 2008; Mohan et al., 2006). Many reasons for this difficulty have been proposed, including the complex etiologies and long durations of chronic diseases, as well as their contingency on non-medical (that is, cultural, social, and structural) factors (Worthman and Kohrt, 2005).

This study, based in New Delhi, India, uses a biocultural theoretical framework to explore the embodied experience of type 2

diabetes. Specifically, it aims to integrate Indian diabetic women's understandings and experiences of type 2 diabetes (hereafter, "diabetes") with biomarkers of physical and mental health. The goal was to assess women's physical and mental health status, obtain qualitative and quantitative information about the degree to which diabetes impinges on women's everyday lives, and determine how gendered social roles might shape the pathways between diabetes and poor physical and/or mental health.

A remarkable 66 million people are estimated to have type 2 diabetes in India; this constitutes over 8 percent of India's total population and is the second-largest population of people with diabetes in the world (International Diabetes Federation, 2014). The day-to-day management of type 2 diabetes is difficult anywhere in the world, and, as we have argued elsewhere, may be especially challenging for women in North India because of healthcare access issues, and because of cultural norms circumscribing their behavior (Weaver, 2014; Weaver and Hadley, 2011). In North India, women's adherence to powerful social norms surrounding service to others

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is a crucial part of female gendered behavior (Derné, 1995; Donner, 2008; Standing, 1991) and shifts the emphasis away from self care (Weaver, 2014; Weaver and Hadley, 2011).

The present study focuses on diabetic North Indian women's mental health because diabetes has been consistently linked with depression in other settings (Anderson et al., 2001; Egede and Ellis, 2010), and because this comorbidity can have serious consequences for diabetic people's health and wellbeing (DeGroot et al., 2001; Katon and Ciechanowski, 2002). Little is known about the epidemiology of common mental disorders in India for reasons including the strong stigma that persists around mental ill health, the relatively recent introduction of biomedical psychiatry, and the challenges of screening India's vast population. A recent population-based study, however, documented levels of depression around 15 percent in urban South India (Poongothai et al., 2009). In our discussions with women about the causes of diabetes, the strikingly common use of the generalized stress term "tension" (Halliburton, 2005; Pereira et al., 2007) led us to suspect that stress might have important connections to women's experiences of diabetes (Weaver, 2014; Weaver and Kasier, 2014; Weaver and Hadley, 2011). This study accordingly assessed mental health using standard screening tools as well as a locally-derived instrument to assess "tension" among diabetic and non-diabetic women.

The biocultural theoretical framework employed in this study asserts that culture shapes political economy, influencing the range of choices available to individuals for managing their health (Goodman and Leatherman, 1998), and that culture and biology exist in a dialectical relationship (Hruschka et al., 2005). The power of structural-cultural factors as both mediators and moderators of disease risk (Singer, 2009) may be particularly pronounced in the case of diet- and lifestyle-related illnesses like type 2 diabetes, because their courses and outcomes are highly dependent on personal choices, which are in turn shaped by cultural and political-economic forces (Brown and Krick, 2001; Worthman and Kohrt, 2005). Medical anthropologists long have emphasized the importance of explanatory models, or our narratives about the causes and consequences of our own illnesses, for actual health outcomes (Kleinman, 1988). Along with these narratives, biomarkers that index hard-to-quantify facets of life, such as chronic stress, have proven useful for biocultural anthropologists interested in integrating qualitative data with physiological processes (Worthman and Costello, 2009), and are used in this study. For instance, the acute phase protein CRP is a marker of the chronic low-grade systemic inflammatory processes implicated in pathogenesis of several chronic conditions, including heart disease and diabetes (King et al., 2003; Ridker et al., 2003). These relationships have been documented among South Asian populations (Chambers et al., 2001; Forouhi et al., 2001). CRP has been directly linked to BMI (Yudkin et al., 1999) and also to insulin resistance independent of obesity in Western groups (Esposito et al., 2003; McLaughlin et al., 2002) and North Indian (Mahajan et al., 2009). Additionally, circulating levels of antibodies to Epstein–Barr virus (EBV) consistently have been linked to daily stress levels in individuals infected with the virus (Glaser and Kiecolt-Glaser, 2005), which constitutes 80–90% of adults in Western settings by the age of 40 (Jones and Straus, 1987). EBV has been linked to a wide array of social and psychogenic stressors such as relationship problems, social isolation, and depression (Cacioppo et al., 2002; Esterling et al., 1993; Kiecolt-Glaser, 1999).

### 1.1. Hypotheses

The analyses presented here are designed to address two hypotheses: First, we expect that diabetic women will experience higher levels of psychological distress (depression, anxiety, and

"tension") than non-diabetic women (H1). We further anticipate that diabetic women with suboptimal diabetes control will report greater distress than diabetic women with optimal diabetes control (H1a), and that the relationship between diabetes control and distress will be moderated by the degree to which diabetic women experience disability in key daily tasks (H1b). Second, we anticipate that biomarkers of generalized inflammation and immune stress will be related to women's diabetes and/or mental health (H2). Specifically, C-reactive protein (indexing inflammation) will be associated with body mass index and age (H2a), blood sugar control (H2b), and mental health (depression, anxiety, and "tension") (H2c). Epstein–Barr virus antibodies (indexing immune stress) will be associated with variables that indicate stress, which in this study include socioeconomic status (low socioeconomic status being a potent stressor; Dressler and Bindon, 2000), depression, anxiety, "tension" scores, stressful life events, and the measure of disability related to diabetes (H2d).

## 2. Methods

We conducted research on type 2 diabetes and mental health among diabetic and non-diabetic women in New Delhi, India. The study included a pilot phase in 2009 to develop locally derived survey instruments, followed in 2011 by administration of a survey and concurrent collection of biomarkers, as well as a set of case study interviews. All study participants gave oral informed consent before participating, no incentive was provided for participation, and all study procedures were pre-approved by the Institutional Review Boards of Emory University, USA, the University College of Medical Sciences, India, and the Indian Council of Medical Research.

During research phases in 2009 and 2011, convenience samples of women were recruited from 10 public and private outpatient clinics staffed by endocrinologists or diabetologists. We asked all adult female patients present in the clinic waiting room if they would like to participate in an interview while waiting to see the physician. Diabetic women were excluded if they were unable to respond to interview questions for any reason. Non-diabetic women were often at the clinic accompanying diabetic family members or seeking treatment for other conditions, but were excluded if they suffered from any chronic disease or endocrine disorder. Although the constant movement of people in and out of the clinic spaces during sampling precluded a precise determination of response rate, we estimate that 75 percent of women we approached agreed to participate.

The 2009 pilot work used freelist and domain analysis (Borgatti, 1999) to assess the most common responses of 62 diabetic and non-diabetic women to the questions, "What activities should a woman like you do every day to care for herself? Her community? Her family?" (Bolton and Tang, 2002) and "What are the symptoms of 'tension'?" We then converted the most common responses into survey modules to measure disability in daily tasks (20 items) and symptoms of "tension" (14 items; for details see (Weaver and Hadley, 2011)). Both modules were then pilot tested with diabetic women to ensure reliability and validity (Weaver and Hadley, 2011).

In 2011, we administered an epidemiological survey to a sample of 280 women ( $n = 184$  diabetic) about demographics, mental health, and disability, including the modules developed during pilot work. The survey assessed symptoms of depression and anxiety using a Hindi-validated version of the Hopkins Symptoms Checklist (HSCL; Weaver and Hadley, 2011), a 25-item survey in which respondents are asked to score the intensity of each mood-related item in the last week (Mollica et al., 2004). Number and severity of depression symptoms was dichotomized as clinically relevant versus not clinically relevant by summing HSCL items

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