Birth Weight as a Risk Factor for Type 2 Diabetes and Gestational Diabetes Mellitus Among South Asian Women Living in the US

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Abstract

Research exploring the relationship between birth weight and type 2 diabetes mellitus (T2DM) and/or gestational diabetes mellitus (GDM) among South Asian (SA) women in the United States (US) is insufficient. This research investigates the presence of such a relationship through a cross-sectional survey (N=2634) and aims to address birth weight as an indicator for diabetes among SA American women 18 or older living in the US. This study found that there is a compelling association among SA American women being born very low birth weight (VLBW) or low birth weight (LBW) and developing T2DM and GDM.

Introduction

- Fast-growing population: Currently, there are 5.4 million SAs living in the United States, representing a fast-growing population since the 2010 US census, which reported only 3.5 million SAs at that time.[1-2]
- High prevalence of diabetes: Approximately 23% of South Asians in the US have diagnosed or undiagnosed diabetes, with Asian-Indian women exhibiting the highest incidence of GDM at 16.7%.[3-4]
- Birth weight disparities: Globally, 48% of babies with LBW (<2500g) are born in South Asia. Being born LBW has shown to be a major determinant of infant mortality in the US, yet there have not been many studies to indicate so.[5-6]
- Health implications: LBW is associated with a two-fold higher risk for GDM among women. Women with GDM are also 7.4 times more likely to develop T2DM compared to women without a GDM diagnosis.[7-8]

Research Aim and Hypothesis

The purpose of this research is to reduce the data gap on this subject and serve as an instrument for the development of culturally salient interventions.

Research Question: Among South Asian women living in the US, what is the relationship between a woman being born with a VLBW or LBW herself and having a later diagnosis of T2DM and/or GDM?

Hypothesis: South Asian women who are born with VLBW or LBW will experience higher rates of T2DM and/or GDM compared to women who are not born VLBW or LBW.

Methods

Survey Design

52-question, **quantitative web-based cross-sectional anonymous survey** on Qualtrics. This study received IRB approval from The George Washington University (IRB Number: NCR234807).

Eligibility Criteria

18+ South Asian women living in the US

Data Collection Process

Distributed to organizations' listservs, social media networks, and personal media outlets during March 2023

15-20 minutes to complete

Incentive: Raffle entry for $50 Amazon gift card*

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After data cleaning: 2634 responses total

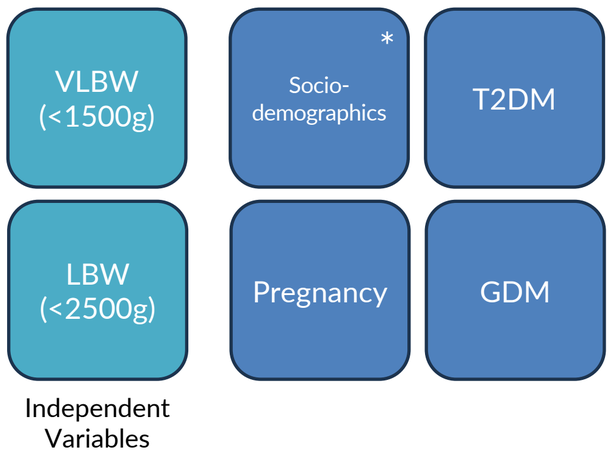
Instruments and Measures

This study was part of a larger study on SA women's health.

Questions were adapted from:

- Centers for Disease Control and Prevention (CDC) National Health and Nutrition Examination Survey (NHANES)
- Adverse Childhood Experiences (ACE) Study
- Natividad Diabetes Questionnaire[9-12]

Domains Assessed



*Socio-demographics assessed included the eligibility criteria of self-identifying as South Asian, age, South Asian ancestry, born in the US, lived in the US, marital status, educational level, employment status, and family's combined household income.

Results

Figure 1: Total Participants (N = 2634)

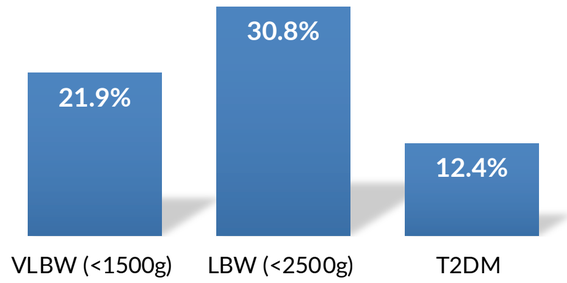
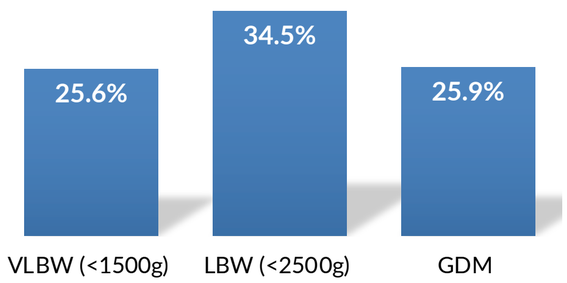


Figure 2: GDM Subsample (N = 1910)



Bivariate analysis was conducted among those women who had LBW and VLBW with T2DM and secondly with GDM; the results were significant for both bivariate analyses (p<0.001).

Table 1: T2DM Logistical Analysis		
***=p<0.001, 95% CI	Model 1	Model 2
VLBW <1500g	6.538 (4.862-8.973)***	
LBW <2500g		4.251 (3.202-5.644)***

T2DM Logistical Analysis: When logistical regression analysis was run, Model 1 found that women who were born with a VLBW (p-value: <0.001) have 6.538 higher odds of developing T2DM compared to women who are not born with a VLBW after controlling for covariates. Model 2 found that women who were born with a LBW have 4.251 higher odds of developing T2DM compared to women who are not born LBW after controlling for covariates.

GDM Logistical Analysis: Model 1 found that women who were born with a VLBW (p-value: <0.001) have 2.588 higher odds of developing GDM compared to women who are not born with a VLBW after controlling for covariates. Model 2 found that women who were born with a LBW (<2500g) have 2.500 higher odds of developing GDM compared to women who are not born LBW after controlling for covariates.

Table 2: GDM Logistical Analysis		
***=p<0.001, 95% CI	Model 1	Model 2
VLBW <1500g	2.588 (1.977-3.386)***	
LBW <2500g		2.500 (1.953-3.201)***

Conclusion

Overall, the logistic regression results indicate that being born VLBW and LBW is associated with higher odds of developing diabetes (T2DM and GDM).[7] This information suggests that among SAs, being born VLBW or LBW may serve as a risk factor for developing T2DM. These findings support the proposed theory that intrauterine undernutrition can lead to impairments in pancreatic development, β-cell dysfunction, which could be exacerbated by insulin resistance.[13] Additional research posits that being born VLBW is associated with increased mortality, adverse neurodevelopmental outcomes, and a greater socioeconomic disadvantage in adulthood; **hence, a call to action is necessary to develop prenatal interventions with a South Asian audience in mind to counter poor birth weight outcomes from the start.**[14-15]

Limitations

The limitations to this study include the following:

Recall bias
SA American women may not remember or know if they were born LBW or VLBW

Sensitive topics the survey addressed
Women may not want to reveal their health history

Cross-sectional study design limitation
Causal inferences cannot be made between birth weight and T2DM/GDM

Alternative etiologies of diabetes
Poor nutrition, genetic history, and other variables are unaccounted for in this study

Acknowledgements and References

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References: Please find the list of references within this link and/or the QR code: https://rb.gy/lcqmlk