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Infertility, Gynecologic Disorders, and Chronic Disease: Pathways to Improved Care for South Asian Women

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ABSTRACT

This study explores the intersection of infertility, gynecologic disorders, and chronic diseases among South Asian American women living in the U.S., an under-researched population. Using data from 2,677 participants in a web-based survey, we examined the prevalence of infertility, gynecologic conditions (uterine fibroids, endometriosis, and polycystic ovary syndrome PCOS), and their associations with chronic health outcomes, including type 2 diabetes, obesity, hypertension, and gestational diabetes. Multivariate logistic regression models adjusted for age, education, and employment status were used to assess these relationships.

Key findings revealed that 36.9% of participants experienced infertility, and prevalence rates for uterine fibroids, endometriosis, and polycystic ovary syndrome were 15.5%, 13.2%, and 17.3%, respectively. These conditions were strongly associated with chronic diseases. Polycystic ovary syndrome exhibited the highest odds of type 2 diabetes (OR: 3.168, 95% CI: 2.231–4.499), while uterine fibroids were linked to hypertension (OR: 2.786, 95% CI: 2.134–3.639). Endometriosis was significantly associated with both type 2 diabetes (OR: 2.626, 95% CI: 1.818–3.795) and gestational diabetes (OR: 2.152, 95% CI: 1.586–2.916). Infertility itself was also linked to increased odds of obesity (OR: 1.925, 95% CI: 1.581–2.343) and hypertension (OR: 2.315, 95% CI: 1.843–2.909).

These findings highlight the interplay between reproductive health and metabolic risks in South Asian women living in the U.S., underscoring the need for culturally tailored, integrated care models. Addressing infertility and gynecologic disorders early may mitigate chronic disease risks, offering a life-course approach to improving health outcomes in this population.

Keywords: Infertility, Endometriosis, Polycystic Ovarian Syndrome, South Asian Reproductive Health, Diabetes.

Introduction

Infertility, defined as the inability to conceive after trying for 12 months, affects 15% of women of reproductive age in the U.S.[1] Infertility diagnosis goes beyond the pursuit of family building but one that is often tied to broader health challenges, particularly stemming from underlying gynecologic diagnosis. Conditions like polycystic ovary syndrome, endometriosis, and uterine fibroids are among the most common contributors to infertility in women of reproductive age[1]. These conditions disrupt normal ovulatory cycles, impact hormonal balances, and can result in physical damage to the reproductive organs, making conception difficult or impossible without medical intervention[2]. For instance, polycystic ovary syndrome, a hormonal disorder characterized by irregular periods and ovarian cysts, affects up to 4-7% of women and is the leading cause of anovulation, where the ovary fails to release an egg[3]. Women with polycystic ovarian syndrome have rates of infertility up to 70-80%[32]. Similarly, endometriosis, where the uterine lining grows outside the uterus, can lead to scarring, adhesions, and blocked fallopian tubes, severely hindering a woman's ability to conceive[3]. Endometriosis affects anywhere from 10-15% of all women of reproductive age[4,5]. Furthermore, the frequency of occurrence of infertility in patients with endometriosis is as high as 30-50%[31]. Finally, uterine fibroids are the most common type of tumor found in women and are frequently observed in patients experiencing infertility[6]. Fibroids are estimated to be the primary cause of infertility in approximately 2-3% of women, underscoring their impact on reproductive health[6].

The impact of infertility has increased risks of preterm delivery, low birth weight, and perinatal mortality[7], in addition to severe maternal morbidity, chronic disease, and other adverse health outcomes[8-11]. Furthermore, gynecologic conditions such as endometriosis and polycystic ovary syndrome have been found to be linked to elevated risk of chronic diseases due to mechanisms like hormonal disruptions, chronic inflammation, insulin resistance, obesity, mental health impacts and epigenetic changes[1,3,8-13]. Women with polycystic ovary syndrome, for example, are at an increased risk of developing insulin resistance, type 2 diabetes, cardiovascular disease, and metabolic syndrome due to hormonal imbalances that often accompany the condition[1,3]. Endometriosis, too, is associated with chronic pain and increased risk of ovarian cancer and may lead to long-term inflammatory responses[3]. Further, in a study conducted by Haan et al., women with fibroids were found to have remarkably high hypertension risk compared to their controls[12]. Finally, mental health challenges like depression also interact with physical health risks, and epigenetic changes may predispose individuals to chronic illnesses[12-13]. These interconnected factors highlight the long-term health risks for individuals with gynecological conditions and infertility[12-13].

SOUTH ASIANS: INFERTILITY AND CHRONIC HEALTH ISSUES

As the U.S. becomes increasingly diverse, it is important to understand how infertility impacts different populations, especially minority groups like South Asian women. South Asian women in the U.S., a growing demographic, face unique reproductive health challenges. Although research on this group is limited, existing evidence suggests that they may be at higher risk for certain gynecologic conditions that contribute to infertility, such as polycystic ovary syndrome, endometriosis, and uterine fibroids. Cultural factors, stigma around infertility, and limited access to reproductive health services further complicate their ability to seek and receive appropriate care. Moreover, traditional gender roles and expectations can place additional pressure on South Asian women to conceive, making infertility an even more complex and sensitive issue within these communities[15].

The U.S. is home to approximately 5.4 million South Asians[16]. The South Asian American population, comprising individuals with origins in Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka, exhibits higher risks of gynecologic

disorders, such as endometriosis, uterine fibroids, and polycystic ovary syndrome , which often contribute to infertility[17-18]. Data specifically addressing the prevalence of these conditions among South Asian women living in the U.S. is limited. However, some studies illustrate the significance of this issue in the U.S. and globally. In a study conducted by Velarde, Buca, and Habana in 2023, authors noted that Filipinos, Indians, Japanese, and Koreans are among the top Asian ethnicities who are more likely to have endometriosis than Caucasian women[18-19]. Further, Shan et al., in a study conducted in 2016 in the U.S., noted a difference in the prevalence of polycystic ovary syndrome between South Asian and Caucasian women, finding that 20.5% of South Asian women had polycystic ovarian syndrome compared to 11.8% of Caucasian women[20]. South Asian women in the UK exhibit particularly high rates of polycystic ovary syndrome, with a prevalence of 52% compared to 22% in Caucasian women[21].

In addition to an increased risk of gynecologic conditions, South Asians are at a higher risk of developing type 2 diabetes mellitus and cardiovascular disease compared to other racial and ethnic groups[8-11]. This elevated risk is mainly due to metabolic factors, including abdominal obesity and a higher concentration of visceral fat, intermuscular fat, and intrahepatic fat[9]. In 2016, the prevalence of diabetes among South Asians was reported at 23%, significantly higher than East Asians (14%) and non-Hispanic (12%)[20]. Additionally, South Asian American women face a fourfold increased risk of gestational diabetes compared to other ethnicities[25]. This community also suffers from disproportionately high cardiometabolic risks and mortality from atherosclerotic cardiovascular disease relative to non-Hispanic White adults and other Asian subgroups[22]. Specifically, the Mediators of Atherosclerosis in South Asians Living in America study (also referred to as the MASALA study) found that hypertension affects 43% of South Asian American men and 35% of women aged 40-85[22-25]. In comparison, the prevalence of hypertension across the general U.S. population is 49.64%[26].

The long-term health challenges posed by these gynecological conditions are often compounded by infertility, adding significant emotional and physical burdens on women. Infertility not only impacts reproductive health but also contributes to a broader spectrum of psychological distress and chronic health issues. It is crucial for healthcare systems to recognize the interrelated nature of infertility, gynecological conditions, and chronic disease in order to design effective medical and public health interventions for women's well-being. This study aims to explore the intersection of infertility, gynecologic disorders and chronic health outcomes, specifically focusing on South Asian women living in the U.S. By addressing this underexplored area, the research seeks to fill a critical gap in the literature by providing a descriptive landscape of infertility and gynecologic conditions in this population, and its relationship to chronic disease, and inform targeted interventions to reduce the burden of diabetes and cardiovascular disease in this growing population.

Methods

STUDY DESIGN AND PARTICIPANTS

This study utilized a purposeful sample of 2677 of self-identified South Asian American women living in the U.S. Data were collected through a self-administered, anonymous web-based survey developed using the Qualtrics platform. Convenience sampling was used to recruit a diverse participant pool, with a survey link distributed electronically via South Asian American national listservs, organizations, and social media platforms. Once the initial convenience sample was established, participants were encouraged to forward the survey to eligible friends, colleagues, and social networks. The survey took approximately 15-20 minutes, and participants could anonymously enter a drawing for a $50 Amazon gift card upon completion. All procedures for this study, including the protection of human subjects, were reviewed and approved by the GW Institutional Review Board (IRB) at the GW Office of Human Research (IRB #: NCR234807).

INSTRUMENT AND MEASURES

This study was part of a larger study on South Asian women's health in which data was collected from a 52-question survey. Questions were adapted from the Centers for Disease Control and Prevention (CDC) National Health and Nutrition Examination Survey (NHANES), Adverse Childhood Experiences (ACE) Study, and the Natividad Diabetes Questionnaire.[27-30] The specific domains looked at for this study include socio-demographics, infertility, diagnosis of polycystic ovarian syndrome, uterine fibroids, endometriosis, and infertility.

The socio-demographics assessed included the eligibility criteria of self-identifying as South Asian, age, South Asian ancestry, birth in the US, living in the US, marital status, educational level, employment status, and the family's combined household income.

Data was collected on infertility and three gynecological disorders: endometriosis, uterine fibroids, and polycystic ovary syndrome. With respect to infertility, participants were asked "have you ever had trouble becoming pregnant after attempting for 12 months or longer?" and prompted to answer either yes or no. For questions related to gynecological disorders, participants were asked, "*Have you ever been diagnosed with any of the following*?" and prompted to answer either yes or no. Participants were also asked about specific health conditions, including type 2 diabetes mellitus, gestational diabetes mellitus, obesity, and hypertension. Participants were asked, "*Have you ever been diagnosed with any of the following*?" and prompted to answer either yes or no.

STATISTICAL ANALYSIS

Quantitative data analysis was conducted using SPSS 28. Frequencies and percentages were calculated for all categorical variables. Multivariate logistic regression models were constructed to examine the dependent variables (type 2 diabetes mellitus, gestational diabetes mellitus, obesity, and hypertension) in relation to the independent variables (infertility, endometriosis, polycystic ovary syndrome, and uterine fibroids). These models were adjusted for age, employment, education, and income to enhance the robustness and relevance of the analysis. Bivariate analysis found significant differences by age, employment, education, and income on the specific health measures. Therefore, multivariate analyses included these measures as covariates.

Results

Table 1 presents the sample characteristics of the overall sample for this present study. As shown in Table 1, most participants were under 39 (91.4%), and approximately a quarter of participants had ancestry from India (24.2%). Nearly 83% (82.5%) of participants were born in the US, with an even split among women who have lived in the US for less than 5 years (20.3%), 6-10 years (29.7%), 11-20 years (27.6%), and 21+ years (22.4%). Most of the participants identified as being married (56.3%). Their education background consists of less than high school (3.4%), high school/GED (15.3%), technical/trade school (21.2%), and higher education (60.1%). Most participants worked full-time (75.6%) and had a combined family income of $50,000-74,999 (30.1%).

Table 1. Characteristics of Study Population

Characteristic	Total Sample Population N = 2667 n (%)
Age	
18-29	1344 (50.4)
30-39	1093 (41.0)
40-49	184 (6.9)
50+	46 (1.7)
South Asian ancestry	
Bangladesh	523 (19.6)

Characteristic	Total Sample Population N = 2667 n (%)
Bhutan	382 (14.3)
India	734 (27.5)
Maldives	557 (20.9)
Nepal	371 (13.9)
Pakistan	327 (12.3)
Sri Lanka	149 (5.6)
Other	12 (0.4)
Born in the US	
Yes	2190 (82.1)
Lived in the US	
Less than 5 years	94 (20.2)
6-10 years	139 (29.8)
11-20 years	128 (27.5)
21+ years	104 (22.5)
Marital status	
Single	381 (14.4)
In a relationship/Dating	534 (20.2)
Married/Domestic partnership	1484 (56.1)
Separated (includes widowed, divorced, and separated)	244 (9.2)
Educational level	
Less than high school	90 (3.4)
High school diploma/GED	411 (15.5)
Technical/trade school	563 (21.3)
Associate's Degree	516 (19.3)
Bachelor's Degree	712 (26.7)
Master's Degree	249 (9.3)
Doctorate Degree/Professional Degree (i.e., PhD, EdD, MD, JD)	105 (3.9)
Employment Status	
Full-time (35 hours or more)	1955 (75.3)
Part-time (1-34 hours)	556 (21.4)
Not employed	86 (3.3)
Combined family income (including domestic partnerships)	
Under $25,000	131 (5.0)
$25,000-$49,999	577 (21.9)
$50,000-$74,999	796 (30.2)
$75,000-$99,999	711 (27.0)
$100,000-$199,999	282 (10.7)
$200,000+	137 (5.2)

Table 2 outlines the key health factors examined in this study. Of the participants, 36.9% reported difficulty becoming pregnant after attempting for 12 months or longer. Regarding gynecologic conditions, 15.5% of participants were diagnosed with uterine fibroids, 13.2% had endometriosis, and 17.3% were diagnosed with polycystic ovarian syndrome. Additionally, several chronic disease diagnoses were reported, with 16.4% of participants diagnosed with cardiovascular disease, 29.5% with obesity, 21.0% with hypertension, and 21.4% with type 2 diabetes. Among all the participants, 73.2% (n=1,910) had ever been pregnant, and of those women, 25.9% were diagnosed with gestational diabetes during pregnancy.

Table 2. Health Factors in South Asian American Women

Health Factors in South Asian American Women	Total Sample Population N = 2634 n (%)
Have you ever had trouble becoming pregnant after attempting for 12 months or longer?	984 (36.9)
Have you ever been diagnosed with any of the following?	
Uterine Fibroids	414 (15.5)
Endometriosis	352 (13.2)
Polycystic Ovarian Syndrome	461 (17.3)
Cardiovascular Disease	420 (16.4)
Obesity	759 (29.5)
Hypertension	541 (21.0)
Type 2 Diabetes	315 (12.4)
Pregnancy	1910 (73.2)
Gestational Diabetes*	481 (25.9)

*This question was only asked to those participants who answered 'yes' to pregnancy.

Table 3 presents odds ratios from four logistic regression models for (1) Type 2 diabetes, (2) Obesity, (3) High blood pressure, and (4) Gestational diabetes. The analysis shows that uterine fibroids were significantly associated with all four outcomes, with the highest odds observed for type 2 diabetes (OR: 3.019; 95% CI 2.128-4.823) and high blood pressure (OR: 2.786; 95% CI: 2134-3.639). Similarly, endometriosis was strongly linked to type 2 diabetes (OR: 2.626; 95% CI: 1.818-3.795), gestational diabetes (OR: 2.152; 95% CI: 1.586-2.916), and other outcomes. Women with polycystic ovarian syndrome had the highest odds of developing type 2 diabetes (OR: 3.168, 95% CI: 2.231–4.499), with significant associations also seen for obesity, high blood pressure, and gestational diabetes. Additionally, women who experienced difficulty conceiving after 12 months or longer were at significantly increased risk for all four conditions, with notably increased odds with high blood pressure (OR: 2.315, 95% CI: 1.843–2.909) and obesity (OR: 1.925, 95% CI: 1.581–2.343). These models were adjusted for age, education, employment, and income, and all associations were statistically significant at $p < 0.001$.

Table 3. Multivariate Logistic Analysis for various forms of Gynecologic Disorders and Infertility

	Type 2 Diabetes OR (CI) – model 1	Obesity OR (CI) – model 2	High Blood Pressure OR (CI) – model 3	Gestational Diabetes OR (CI) – model 4
Uterine Fibroids	3.019 (2.128-4.283)***	1.629 (1.264-2.100)***	2.786 (2.134-3.639)***	1.665 (1.244-2.229)***
Endometriosis	2.626 (1.818-3.795)***	1.515 (1.154-1.987)**	1.884 (1.409-2.519)***	2.152 (1.586-2.919)***
Polycystic ovary syndrome	3.168 (2.231-4.499)***	1.704 (1.342-2.165)***	2.297 (1.773-2.997)***	2.141 (1.606-2.853)***
Trouble becoming pregnant after 12 months or longer?	2.076 (1.430-3.014)***	1.925 (1.581-2.343)***	2.315 (1.843-2.909)***	2.054 (1.599-2.638)***

*Adjusted for age, education, employment, and income Statistical Significance: *p<0.05, **p<0.01, ***p<0.001*

Discussion

The results of this study provide significant insights into the health challenges faced by South Asian women living in the U.S., particularly concerning reproductive health and chronic disease prevalence. Notably, nearly one-third of participants (36.9%) reported difficulties in conceiving after attempting for 12 months or longer. This statistic signals a need for increased attention to fertility issues within this population. This aligns with existing research indicating that South Asian women have a higher prevalence of gynecologic conditions, including polycystic ovary syndrome, endometriosis, and uterine fibroids, all of which are strongly associated with infertility[7]. This study also highlights the higher rates of these conditions among South Asian

women living in the U.S., with polycystic ovary syndrome affecting 17.3%, endometriosis 13.2%, and fibroids 15.5% of participants, reinforcing the existing literature on the elevated reproductive health risks within this population.

The association between gynecologic disorders and metabolic conditions, such as type 2 diabetes, obesity, and hypertension, is particularly compelling. The logistic regression models demonstrate a significant correlation between gynecologic conditions and chronic conditions, as seen in Table 3. These findings emphasize the interplay between reproductive health and broader metabolic risk factors, particularly in South Asian women living in the U.S. This study supports previous research suggesting that reproductive disorders like polycystic ovary syndrome, which is also linked to metabolic syndrome, may play a key role in the development of chronic diseases. Women with polycystic ovary syndrome exhibited the highest odds of developing type 2 diabetes (OR 3.168), underscoring the need for early screening and intervention to manage metabolic complications in this population.

Endometriosis was another condition significantly associated with both gestational diabetes and type 2 diabetes. Women diagnosed with endometriosis were more than twice (OR 2.626) as likely to develop type 2 diabetes and 2.152 times more likely to develop gestational diabetes. Those associations suggest that the inflammatory processes and hormonal imbalances characteristic of endometriosis may contribute to long-term metabolic dysregulation. Additionally, the prevalence of gestational diabetes among women who had been pregnant was notably high (25.9%), particularly given the increased odds of gestational diabetes in women with gynecologic disorders. These findings reflect the broader cardiometabolic risks that South Asian women face during and after pregnancy, further emphasizing the need for targeted healthcare interventions in this population.

This study also draws attention to the role of infertility and its relationship with chronic diseases. Women who have experienced infertility (defined as difficulty conceiving for 12 months or longer) had a 1.925 increased odds of developing obesity; 2.315 increased odds of developing hypertension; and 2.076 odds of developing type 2 diabetes, highlighting the long-term implications of fertility issues. These results suggest that infertility may serve as an early indicator of cardiometabolic risk, particularly in populations with known vulnerabilities, such as South Asian American women. These findings suggest that addressing reproductive health early in life may help mitigate the risk of developing chronic diseases later on, supporting a life-course perspective on health.

These results carry significant clinical and public health implications. First, integrated care models that address both reproductive and metabolic health are crucial for improving outcomes for South Asian women. For instance, women diagnosed with polycystic ovary syndrome should receive counseling on diet, physical activity, and weight management, in addition to reproductive health management, thereby reducing the risk of developing diabetes and cardiovascular diseases. Furthermore, healthcare providers must be trained on cultural sensitivity and awareness to effectively address the unique challenges and needs of South Asian women. Public health interventions should focus on South Asian women, disaggregated from all Asian American women or all women. Culturally tailored interventions promoting lifestyle interventions that include diet and exercise tailored to reduce the risk of metabolic syndrome, especially in women with polycystic ovarian syndrome or other hormone-related disorders. Social support networks for South Asian women dealing with infertility and other gynecologic conditions provide psychosocial support and reduce the stigma associated with these conditions.

Finally, there is a need for longitudinal research to track the health outcomes of South Asian women with gynecologic disorders over time to understand better causal relationships and the long-term impact of these conditions on metabolic health. These studies should also focus on the biological

mechanisms that link gynecologic disorders to chronic diseases in South Asian women. This could include studies on inflammatory markers, hormonal profiles, and genetic predispositions.

Despite the strengths of this study, including a large sample size and a focus on an understudied population, several limitations should be acknowledged. First, the study is a cross-sectional design, which limits our ability to draw causal inferences between gynecologic conditions and the development of chronic health conditions such as diabetes, cardiovascular disease, and obesity. Longitudinal studies are needed to confirm these associations and to explore the potential mechanisms linking gynecologic conditions to chronic health. Additionally, the reliance on self-reported gynecologic conditions can lead to inaccuracies, as participants might misunderstand medical terminology, underreport symptoms, or choose not to disclose specific health issues due to social stigma or privacy, particularly with sensitive topics like reproductive health issues. Future studies should aim to use more objective measures of gynecologic conditions, such as medical records, to minimize this bias.

Conclusion

In conclusion, this study provides critical evidence on the intersection between infertility, gynecologic disorders, and chronic diseases in South Asian women living in the U.S, emphasizing the compounded health burdens these women face. By highlighting the associations between reproductive health conditions - such as polycystic ovary syndrome, uterine fibroids, and endometriosis - chronic diseases like type 2 diabetes, hypertension, and obesity, this research underscores the need for healthcare systems to adopt a culturally sensitive integrated approach to care. The findings highlight infertility as both a significant health issue and a potential early marker for cardiometabolic risk in this population. Future research should further investigate the biological mechanisms underlying these associations and explore culturally tailored interventions aimed at improving reproductive and metabolic health outcomes for South Asian women living in the U.S. Addressing these interrelated health conditions holistically will be essential in reducing the long-term burden of chronic diseases and improving the overall health outcomes in this growing and high-risk population.

Conflict of Interest:

None

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Informed Consent Requirement:

Informed consent was obtained from all participants involved in this research.

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