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Brief Report

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Associations of intimate partner violence and maternal comorbidities: a cross-sectional analysis of the Pregnancy Risk Assessment Monitoring System

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Abstract

Context: Intimate partner violence (IPV) occurs when an intimate partner inflicts physical, sexual, and/or emotional assault with coercive control and is a traumatic experience with repercussions that can be exacerbated when a woman is pregnant. While screening for IPV during pregnancy is recommended to occur regardless of risk, less than 50% of pregnant women are screened.

Objectives: Identifying clinical factors commonly associated with IPV during pregnancy may improve screening rates, thus our primary objective was to examine associations between IPV and maternal comorbidities.

Methods: We conducted a cross-sectional analysis of the Pregnancy Risk Assessment Monitoring System (PRAMS) Phase 8 spanning 2016 through 2019. Bivariate and multivariable logistic regression was utilized to calculate adjusted odds ratios (AORs) to determine associations between IPV and diabetes, anxiety, hypertension, depression, asthma, polycystic ovary syndrome (PCOS), and thyroid disease.

Results: More than 40% of women experiencing IPV reported a history of depression or anxiety. The occurrence of IPV was higher among women with depression (AOR 3.48, CI 3.14–3.85), anxiety (AOR 2.98, CI 2.64–3.37), hypertension (AOR 1.21, CI 1.02–1.44), and asthma (AOR 1.37; CI 1.17–1.59) than women without those respective conditions, but not among diagnoses of diabetes, PCOS, or thyroid disorders.

Conclusions: Our findings show that pregnant individuals reporting having experienced IPV were more likely to report having certain comorbidities compared to those who did not report experiencing IPV. Given the low rates of screening, knowing clinically relevant associations may increase screening sensitivity among clinicians and, in turn, increase the likelihood that individuals experiencing IPV receive supportive care.

Keywords: comorbidities; intimate partner violence; maternal health; PRAMS.

Evidence suggests that more than 140,000 women who had given birth in the United States between 2009 and 2015 experienced intimate partner violence [1] (IPV), which is likely a low estimate due to the reluctance of some women to disclose IPV due to fear of further harm [2]. Indeed, the worldwide prevalence of IPV during pregnancy is difficult to capture and is not fully represented by the current body of literature [3]. IPV, which occurs when a partner inflicts physical, sexual, and/or emotional assault with coercive control [4], is a traumatic experience that can be exacerbated when a woman is pregnant and poses risks to both the mother and fetus [2]. Further, IPV may extend to reproductive and sexual coercion intended to maintain power and control with attempts to impregnate a partner against their will, control the outcome of a pregnancy, coerce a partner to have unprotected sex, and interfere with contraceptive methods [5].

Screening methods are useful for assessing the presence of IPV [6], especially because IPV does not always present

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with warning signs, and some women may attempt to conceal abusive relationships [6]. As such, the US Preventive Services Task Force recommends routine screening to support accurate detection of IPV and to improve outcomes for women experiencing IPV [7]. However, screenings for IPV are not always conducted. A 2019 study showed that among 24 states, fewer than 50% of women reported having been screened for IPV during pregnancy [8]. Provider knowledge deficits, lack of effective interventions, fear of offending patients, and lack of standardized screening frequency recommendations are all reasons for poor IPV screening rates [9]. Screening for IPV and promptly referring patients to appropriate support systems is crucial for supporting positive pregnancy outcomes and can be detrimental if lacking [10].

While sociodemographic factors have been shown to be risk factors for IPV during pregnancy [2, 11, 12], there is limited research regarding the associations of comorbid medical conditions with IPV during pregnancy. For example, maternal comorbidities such as diabetes mellitus, hypertension, and asthma may place additional stress on expecting families, leading to increased worry, reduced income due to medical expenses, a perceived imbalance of responsibilities, and relationship dissatisfaction [13]. These external stressors may share a bidirectional or unidirectional relationship with IPV [14, 15] and may also contribute to the association between IPV and depression [16, 17]. An underlying principle of osteopathic medicine is to understand the complexities of relationships between social and medical factors; however, the relationship between experiencing IPV and medical comorbidities has not been thoroughly explored. Additionally, although screening for IPV during pregnancy is recommended to occur regardless of risk, identifying clinical factors commonly associated with IPV during pregnancy may improve screening rates. Thus, our primary objective was to examine associations between IPV and maternal comorbidities, so we sought to analyze the Pregnancy Risk Assessment Monitoring System (PRAMS).

Methods

Pregnancy Risk Assessment Monitoring System

To investigate the prevalence of IPV and co-occurrence of comorbidities among pregnant women, we conducted a cross-sectional study of the PRAMS (https://www.cdc.gov/prams/index.htm) to perform secondary analyses of this data. Initiated in 1987, PRAMS is an ongoing population-based system to track and reduce infant morbidity and mortality, tracking maternal behavior and health outcomes during prenatal, perinatal, and postnatal periods. PRAMS is a combined effort of state, territorial, and local health departments utilizing a combination of birth records and monthly surveys from a sample of all women who have recently given birth within participating sites. Further, nonresponse, noncoverage, and sampling variations are considered to provide appropriate analysis weighting to create population estimates [18]. This investigation was conducted utilizing Phase 8 of PRAMS spanning 2016 through 2019—which collected data from 47 states (AK, AL, AR, AZ, CO, CT, DE, FL, GA, HI, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV, and WY), Puerto Rico, and New York City—covering 83% of births in the United States [18]. This study was submitted for ethics review and was determined not to meet the criteria for human subjects research. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines [19].

Demographic and behavioral variables

Demographic variables included maternal age and maternal and paternal education. Race/ethnicity was coded into the following groups: American Indian/Alaskan Native, Black, Asian, White, Hispanic, and Other (including Native Hawaiian). Income was collected in different margins between states; thus, income was recorded into the categories less than $20,000, $20,001 to $40,000, $40,001 to $75,000, $75,001 to $120,000, and above $120,001. Further, we considered smoking and alcohol consumption during pregnancy (binary; yes or no) to be demographic variables in the context of the study, because previous studies have noted significant associations with IPV [9, 20].

IPV and comorbidities variables

IPV was determined through the PRAMS question that asked: “In the 12 months before you got pregnant with your new baby [or during your most recent pregnancy], did any of the following people push, hit, slap, kick, choke, or physically hurt you in any other way?” We included responses listing “My husband or partner” or “My ex-husband or ex-partner” as the abuser as affirmative for IPV. For comorbidities, participants from 41 states were asked to report if “during the 3 months before you got pregnant with your new baby, did you have diabetes, high blood pressure, or depression.” Twenty-one states also asked if they had been diagnosed with asthma, polycystic ovary syndrome (PCOS), anxiety, or thyroid disease. Respondents answered these items as either “yes” or “no.”

Statistical analysis

First, we report the descriptive statistics of demographic items: sample size (n) answering survey items including missing data, estimated population size (n), and the percent and 95% confidence intervals (CIs). Next, we reported the sample, population estimate, and percent of individuals experiencing IPV. We investigated missing data to assess missingness and after inspection assumed data to be missing at random. We parsed the data into two groups, the first of which included 41 states with all comorbidity questions and a subgroup of the 21 states with the additional variables. To account for missing data, we utilized multiple imputation with chained equations (MICE) and utilized a combination of binary logistic, ordered logistic, and multinomial logistic regressions to create 10 imputations within a state group.

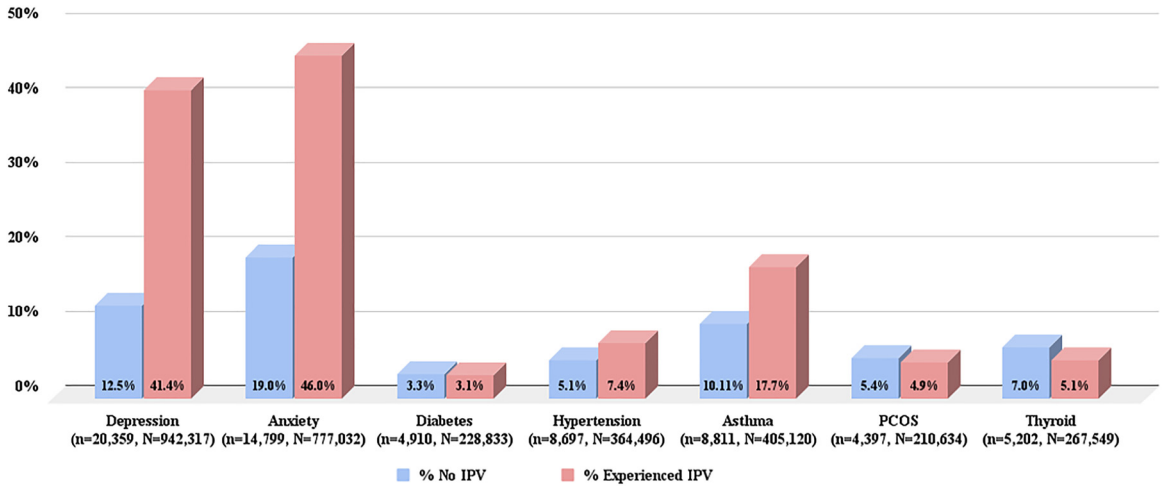

Figure 1: Prevalence of intimate partner violence (IPV) among women with chronic disease diagnoses.

Bivariate and multivariable logistic regression were utilized to calculate odds ratios (ORs) and adjusted odds ratios (AORs), respectively, to determine associations between IPV and diabetes, hypertension, depression, asthma, PCOS, anxiety, and thyroid disease. AORs were calculated utilizing maternal age, maternal and paternal education, income, and smoking and alcohol use during pregnancy as control variables. Alpha was set at 0.05 for all analyses. Statistical analyses were conducted utilizing STATA 16.1 (StataCorp, LLC., College Station, TX).

Results

Of the 140,817 participants (n=7,003,967), 5,482 reported IPV, representing 240,547 (3.4%) women from the states and territories included in PRAMS—covering 83% of births in the United States [18]—from 2016 through 2019. The percentages of missing data for demographic variables are available in the supplement. Our sample was primarily aged 25 to 29 (29.3%; CI, 28.9–29.6), white (70.3%; CI, 69.9–70.6), and low-income (<20,000$/year; 25.2%; CI: 24.8–25.6; Supplementary 1). Missing data for comorbidities ranged from less than 2% for diabetes, depression, and hypertension, asthma was 4.5%, thyroid was 7.6%, anxiety was 7.8%, and PCOS was 14.4%, all of which had no discernible pattern and were assumed to be missing at random. Among women experiencing IPV, 41.4% (CI, 39.1–43.6) reported a history of depression, 3.1% (CI, 2.5–3.8) had diabetes, 7.4% (CI, 6.4–8.6) reported hypertension, 17.7% (CI, 15.7–19.9) had asthma, 4.9% (CI, 3.8–6.1) reported PCOS, and 46.0% (CI, 43.3–48.8) reported anxiety (Figure 1).

Associations of IPV and comorbidities

Multivariable logistic regression showed that women who had been diagnosed with depression (AOR 3.48; CI, 3.14–3.85; Table 1) and anxiety (AOR 2.98; CI, 2.64–3.37) were more likely to have reported IPV, when controlling for maternal age, maternal and paternal education, income, smoking, and alcohol use (Table 1). We also found significant associations between IPV and hypertension (AOR, 1.21; CI, 1.02–1.44) and asthma (AOR 1.37; CI, 1.17–1.59). There was not a statistically significant association observed between reported IPV and thyroid disorders, diabetes, and PCOS.

Discussion

Principal findings

Our findings suggest that more than 3% of women within the 47 states assessed by PRAMS—more than 240,000 individuals—reported experiencing IPV from 2016 through 2019, which is much greater in magnitude than the number reported from 2009 through 2015 [1]. More than 40% of these women reported a history of depression or anxiety—an association that has also been noted in a systematic review by Paulson [21]. Further, nearly 1 in 6 reported asthma and 1 in 13 reported hypertension, demonstrating an increased odds of IPV co-occurring among women with these conditions. Previous research has noted an association between asthma exacerbations and IPV utilizing data from the Behavioral Risk Factor Surveillance System (BRFSS) [22], as well as an increased risk of hypertension following sexual violence among women in the Nurses Health Study II [23]. No significant association was observed between IPV and a diagnosis of diabetes, thyroid conditions, or PCOS. Our study supports IPV being associated with specific medical conditions that may be useful for screening in addition to the high

Table 1: Associations of intimate partner violence (IPV) and medical comorbidities.

Comorbidity	Bivariate models		Adjusted model	
	OR (95% CI)	p-Value	AOR (95% CI)[a]	p-Value
Depression[b]				
No	1 (Ref.)		1 (Ref.)	
Yes	5.02 (4.56–5.53)	**<0.001**	3.48 (3.14–3.85)	**<0.001**
Anxiety[c]				
No	1 (Ref.)		1 (Ref.)	
Yes	3.82 (3.41–4.29)	**<0.001**	2.98 (2.64–3.37)	**<0.001**
Diabetes[b]				
No	1 (Ref.)		1 (Ref.)	
Yes	0.96 (0.77–1.21)	0.756	0.90 (0.71–1.14)	0.375
Hypertension[b]				
No	1 (Ref.)		1 (Ref.)	
Yes	1.49 (1.26–1.76)	**<0.001**	1.21 (1.02–1.44)	**0.029**
Asthma[c]				
No	1 (Ref.)		1 (Ref.)	
Yes	1.95 (1.68–2.25)	**<0.001**	1.37 (1.17–1.59)	**<0.001**
PCOS[c]				
No	1 (Ref.)		1 (Ref.)	
Yes	0.88 (0.69–1.11)	0.276	1.07 (0.84–1.37)	0.581
Thyroid[c]				
No	1 (Ref.)		1 (Ref.)	
Yes	0.75 (0.58–0.96)	**0.025**	0.95 (0.74–1.24)	0.730

AOR, adjusted odds ratio; PCOS, polycystic ovary syndrome; OR, odds ratio. [a]AORs control for maternal age, maternal race and education, paternal education, income, and maternal smoking and alcohol use during pregnancy. [b]Data available for 41 states (AK, AL, AR, CO, CT, DE, GA, HI, IA, IL, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM,NY, OK, OR, PA, RI, SD, TX, UT, VA, VT, WA, WI, WV, and WY), Puerto Rico, and New York City. [c]Data available for 21 states (AK, CT, DE, HI, IA, KS, MD, ME, MI, MN, MO, MS, MT, NJ, NY, OK, PA, UT, WA, WI, and WV), Puerto Rico, and New York City. Bold values are statistically significant ($p < .05$).

correlations of IPV with depression and anxiety, which highlight the need for continued advocacy of mental health services for pregnant women.

Our findings are moderately consistent with the literature about IPV. For instance, a meta-analysis conducted in 2013 found that women experiencing IPV were more likely to report psychological and physical symptoms of illness, including depression, anxiety, respiratory conditions, cardiovascular disorders, and diabetes [24]. Although research suggests that both diabetes and PCOS are risk factors for the development of depression [25–27], we found no significant associations between the diagnosis of the conditions and IPV. Further, we found that anxiety, independent of depression, showed an increased likelihood of co-occurrence with IPV.

Clinical implications and recommendations

Although many major medical associations, including the AMA [28] and ACOG [29], recommend routine screening for IPV among women, screening does not occur often, with one study showing that only 14% of women who presented for orthopedic fractures for an IPV-related injury were asked about IPV [30]. While widespread adoption and implementation of IPV screening are recommended, even expanding current screening capacity to include these conditions may help identify IPV and improve quality of life. In a 2009 study by MacMillan et al. [31], screening alone was shown to reduce recurrence of IPV and associated mental health symptoms, while improving quality of life scores. Women were also more likely to access additional services during follow-up appointments.

Healthcare providers need to have opportunities to learn how to screen, counsel, treat, and follow up with women experiencing abuse [32] to be able to provide holistic care in accordance with osteopathic principles. While knowing how to treat the presenting patient is innate, assessing if sentinel trauma—mental or physical—is the result of underlying abuse that could worsen if not addressed. Documentation of these injuries from physicians is critical to provide clinical evidence if criminal charges are filed [33]. Advocating for sexual equality in clinical practice and training, promotion of community-based and educational growth about IPV, and recognition of risk factors such as low SES and alcohol consumption can all improve timely identification and/or prevention of IPV [34]. Further, women experiencing diagnoses such as comorbid depression and anxiety may be less likely to discuss IPV due to the perceived negative ramifications of combating both illnesses simultaneously—worsening feelings of fear and shame regarding ongoing IPV—and therefore screening is essential. For mental health professionals, knowing associations between IPV and comorbidities may also improve their ability to detect IPV when seeing individuals for depression and anxiety. Further, this could help differentiate symptoms that sequelae of traumatic experiences such as IPV, improve therapy sessions and treatment, and potentially improve overall treatment plans as a foundational tenet of osteopathic care.

Strengths and limitations

The PRAMS core questionnaire surveys individuals regarding physical forms of IPV, which limits the scope of IPV in our study, because IPV may also include verbal, sexual, psychological, financial, or coercive abuse. Our sample was robust and included individuals from diverse demographic backgrounds, which bolsters the applicability of our findings. Additionally, PRAMS covers nearly all states in the United States and is estimated to account for 83% of births in the United States [18]. Given the previously discussed issues of IPV reporting, prevalence of IPV within our study may be underrepresented. As this is a cross-sectional study, it is correlational, and temporal sequence cannot be inferred. Thus, we cannot determine causality, and the results should be interpreted as such. Further, the chronic conditions and diseases included in this study were limited to those collected from PRAMS, and additional health issues associated with IPV, such as arthritis [35], may warrant additional investigation. Future research may also examine the multifactorial properties of IPV in conjunction with behavioral, clinical, and demographic features, as well as quality improvement procedures to increase screening.

Conclusions

Our findings show that 1 in 29 pregnant women within the 47 states in the United States assessed by PRAMS experienced IPV, which may be underreported. Women experiencing IPV were more likely to have a diagnosis of depression, anxiety, hypertension, or asthma compared to those not experiencing IPV. All pregnant women should be screened for IPV; however, if for some reason they are not, given the association between IPV and depression, anxiety, hypertension and asthma, the provider should screen for IPV in these high-risk populations. Further, the association between IPV and medical conditions likely represents a complex interaction that warrants additional investigation. Thus, researchers investigating domestic violence and IPV may seek to perform future studies to further elucidate the likely complex relationships between IPV and comorbid medical conditions.

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