Prevalence, Incidence, and Persistence of Postpartum Depression, Anxiety, and Comorbidity among Chinese Immigrant and Nonimmigrant Women: A Longitudinal Cohort Study

Prévalence, incidence, et persistance de la dépression du postpartum, de l'anxiété et de la comorbidité chez des femmes chinoises immigrantes et non immigrantes: une étude de cohorte longitudinale

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Abstract

Objective: Our objectives were to examine the prevalence and incidence of postpartum depressive, anxiety, and comorbid symptoms over the first postpartum year; the persistence of these symptoms; and the prevalence stratified by immigration status.

Method: We conducted a longitudinal cohort study in Ontario, Canada. Participants were 571 Chinese recent immigrant, nonrecent immigrant, and Canadian-born women with live births in 2011 to 2014. Participants were assessed at 4, 12, and 52 weeks postpartum for the presence of possible and high depressive symptomatology (Edinburgh Postnatal Depression Scale [EPDS] >9 and >12, respectively), anxiety symptomatology (State-Trait Anxiety Inventory [STAI] >40), and comorbid symptomatology (EPDS >9 and STAI >40). Prevalence and incidence with 95% confidence intervals were calculated.

Results: Prevalence rates were highest at 4 weeks and decreased across time, with possible depressive symptomatology most prevalent at most time points. Incidence rates at 12 and 52 weeks were generally similar. Of those with possible symptomatology at 4 weeks, 42.0% or less continued to have symptomatology at 12 weeks and 17.4% or less at 52 weeks. There were no differences in prevalence of any type of symptomatology between immigrant and Canadian-born Chinese women at 4 weeks, but at 12 and 52 weeks, most types of symptomatology were more common among recent and nonrecent immigrants.

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Conclusion: Our findings suggest that Chinese immigrant women are a high-risk group for postpartum depressive and anxiety symptomatology. Future research should identify cultural and psychosocial factors associated with immigration that could be addressed in the system of care for postpartum immigrant women.

Abrégé

Objectif : Nous avions comme objectifs d'examiner la prévalence et l'incidence des symptômes dépressifs du postpartum, anxieux, et comorbides durant la première année du postpartum, la persistance de ces symptômes; et la prévalence stratifiée selon le statut d'immigration.

Méthode : Nous avons mené une étude de cohorte longitudinale en Ontario, Canada. Les participantes étaient 571 femmes chinoises immigrantes récentes, immigrantes non récentes, et nées au Canada qui ont eu des naissances vivantes de 2011 à 2014. Les participantes ont été évaluées à 4, 12, et 52 semaines du postpartum pour la présence d'une symptomatologie dépressive possible et élevée (Edinburgh Postnatal Depression Scale [EPDS] > 9 et > 12, respectivement), d'une symptomatologie d'anxiété (State-Trait Anxiety Inventory [STAI] > 40), et d'une symptomatologie comorbide (EPDS > 9 et STAI > 40). La prévalence et l'incidence ont été calculées avec des intervalles de confiance à 95%.

Résultats : Les taux de prévalence étaient les plus élevés à 4 semaines et diminuaient avec le temps, et la symptomatologie dépressive possible était la plus prévalente à la plupart des points du suivi. Les taux d'incidence à 12 et 52 semaines étaient généralement semblables. Parmi celles qui avaient une symptomatologie possible à 4 semaines, 42,0% ou moins ont continué la symptomatologie à 12 semaines et 17,4% ou moins à 52 semaines. Il n'y avait pas de différences de prévalence de tout type de symptomatologie entre les femmes chinoises immigrantes et celles nées au Canada à 4 semaines, mais à 12 et 52 semaines, la plupart des types de symptomatologie étaient plus communs chez les immigrantes récentes et non récentes.

Conclusion : Nos résultats suggèrent que les femmes chinoises immigrantes forment un groupe à risque élevé de symptomatologie dépressive et d'anxiété. La future recherche devrait identifier les facteurs culturels et psychosociaux associés à l'immigration qui pourraient être pris en compte dans le système de soins du postpartum chez les femmes immigrantes.

Perinatal mental health problems such as depression and anxiety affect 1 in 6 women and are associated with considerable economic and personal burden.[1] Women with these conditions are at increased risk for chronic mental illnesses,[2] and their children are more likely to experience adverse developmental outcomes.[3] The aetiology of perinatal mental health problems is multifactorial, with studies consistently reporting the importance of psychosocial variables such as life stress and lack of social support.[4,5] While demographic factors are seldom strong predictors of perinatal mental health, growing research suggests *immigrant status* is an exception. A recent systematic review and meta-analysis showed that immigrant women are twice as likely to experience depressive symptomatology in the postpartum period as nonimmigrant women (pooled odds ratio [OR], 2.10; 95% confidence interval [CI], 1.62-2.73[5]; the prevalence of postpartum depressive symptomatology among immigrant women is 20%, a rate significantly higher than that of nonimmigrant women of 13%.[6]

There are multiple reasons why immigrant women may be at increased risk for perinatal mental health problems, including low social support, premigration trauma,[7] and challenges related to facing a new host society, such as adjusting to a new language, different norms for social interaction, unfamiliar laws, and lifestyle changes (e.g., rural to urban).[8] Acculturation refers to the process of adjusting to these changes. Depending on the reasons for migration, the disparity between cultures, the degree of identification with the new culture, and the receptiveness of the host society, acculturative stress has been associated with increased risk for depression.[9,10] Therefore, it is important to consider the timing of immigration by distinguishing recent from nonrecent immigrants, as this may affect the likelihood of acculturative stress. Within Canadian literature,[11-16] few studies have made this distinction. One study by Kingston et al.[17] using data from the Canadian Maternity Experiences Survey found that recent immigrants had a slightly higher rate of postpartum depressive symptoms (13.2%) than nonrecent immigrants (11.5%), who in turn had a higher rate than Canadian-born women (6.0%).

Likewise, it is important to consider the ethnicity of immigrants, since there may be heterogeneity in risk by ethnic group. Few Canadian studies have done this. One study using data from the Canadian Maternity Experiences Survey broadly revealed variation in the prevalence of postpartum depressive symptoms by region of birth: immigrants of non-European descent had double the prevalence of depressive symptoms compared to Canadian-born women, while those of European descent showed no elevated prevalence.[18] A study of Chinese/Vietnamese immigrants to Taiwan showed a high rate of depressive symptoms at 4 weeks postpartum of 24.1%.[19] To our knowledge, no Canadian studies have focused on the postpartum mental health of Chinese immigrant and Canadian-born women. China was

among the top 3 countries of origin for new immigrants to Canada (10.5% of newcomers in 2006-2011); the Chinese-Canadian population is one of the top 3 visible minority groups in Canada, and the Chinese language is the most often spoken mother tongue (38%) after the official languages of English and French.[20] A study of perinatal mental health among Chinese immigrant and Canadian-born women would generate data important for providing nuanced clinical recommendations.

The aim of this study was to examine the occurrence of postpartum depressive symptoms, anxiety symptoms, and the comorbid presentation of both symptoms in a cohort of Chinese Canadian women. Given the large number of Chinese Canadians and the lack of postpartum mental health research focusing on this group, we present the results for the overall cohort and stratified by immigrant status. Thus, our objectives were to examine 1) the prevalence and incidence of postpartum depressive, anxiety, and comorbid symptoms over the first postpartum year; 2) the persistence of these symptoms over the first postpartum year; and 3) the prevalence of these symptoms stratified by immigration status.

Methods

Study Design and Setting

A longitudinal, community-based cohort study was conducted in which Chinese Canadian women were followed for the first year postpartum. Women who were born in Canada or had immigrated to Canada were recruited from the Greater Toronto Area via referrals from public health home visitors and community-based health organisations, study flyers, and advertisements in Chinese newspapers. Following recruitment, a research assistant (matched on maternal language) telephoned potentially eligible women and provided a study explanation and ensured eligibility. Women who agreed to participate and provided informed consent completed a baseline telephone interview within 4 weeks postpartum and were contacted again at 12 and 52 weeks postpartum to complete follow-up interviews. Ethics approval was obtained from the University of Toronto.

Inclusion and Exclusion Criteria

To be eligible, a woman had to have had a live birth; be discharged from hospital; be less than 4 weeks postpartum; be fluent in spoken English, Cantonese, and/or Mandarin; and identify as a Chinese immigrant (e.g., from Mainland China, Hong Kong, Taiwan, etc.) or Canadian-born Chinese woman. Women were excluded if their infant was not discharged home at recruitment, they reported active thoughts of self-harm or suicide, they reported current use of antidepressants or antipsychotics at baseline, or they identified as a refugee.

Outcome Measures

Telephone interviews were conducted by research assistants who spoke English, Cantonese, and/or Mandarin and examined a variety of outcomes, including mental health, acculturative stress, breastfeeding, infant sleep, maternal fatigue, social support, postpartum rituals, and health care utilisation. This article focuses on depressive and anxiety symptoms measured in the early (4 and 12 weeks) and late postpartum periods (52 weeks).

Depressive symptomatology was assessed using the 10-item Edinburgh Postnatal Depression Scale (EPDS).[21] Items are rated on a 4-point Likert scale ranging from 0 to 30, with higher scores indicating increased depressive symptomatology. A score >9 indicates possible depressive symptomatology and has been recommended for community-based screening to identify individuals who require further follow-up, while a score >12 indicates high depressive symptomatology.[21] Although some studies of other cultures (e.g., North American women) suggest a higher cut-off, previous studies in Mainland China and Hong Kong support the use of the lower cutoff of 9, in view of the tendency towards somatic rather than cognitive presentation of depression among Chinese women.[22,23] In our study, both 9 and 12 were used as cutoff scores. The EPDS had a Cronbach's alpha of 0.78 at the 4-week interview, 0.79 at 12 weeks, and 0.78 at 52 weeks.

Anxiety symptomatology was measured using the State-Trait Anxiety Inventory (STAI),[24] from which a 20-item self-report State subscale was used to assess relatively transient, situation-related anxiety. Items are rated on a 4-point Likert-type scale to produce a summative score ranging from 20 to 80, with higher scores indicating higher levels of anxiety symptomatology. The STAI has been used extensively in studies of anxiety in the perinatal period, with a recommended cutoff of >40.[25] The STAI has also been widely used in Chinese populations.[26,27] The STAI had a Cronbach's alpha of 0.92 at the 4-week telephone interview, 0.93 at 12 weeks, and 0.94 at 52 weeks.

Women who scored >9 on the EPDS and >40 on the STAI were considered to have comorbid depressive and anxiety symptomatology. We defined comorbidity using the lower cutoff on the EPDS with the rationale that those with anxiety symptomology who also screened positive for depressive symptomatology, even at the lower threshold, should be identified as a unique group in need of follow-up.

Immigrant status was categorised as follows: Chinese women who immigrated to Canada within the past 5 years were "recent immigrants"; those who immigrated to Canada more than 5 years from the assessment date were "nonrecent immigrants."[17] Women who were born in Canada but identified themselves as Chinese and those who immigrated to Canada before the age of 6 years were considered "Canadian born." The decision to include women born in Canada and those who immigrated to Canada before 6 years of age in this latter group was based on literature on generational cohorts

showing that individuals who immigrate at a young age behave more like native-born individuals than immigrants (e.g., because of receipt of formal schooling in the host society).[28]

Demographic measures were assessed at the 4-week interview to describe the sample. These included questions about home country (country of birth or ancestral country: Mainland China and Hong Kong or "other" [Taiwan, Vietnam, Macau, Malaysia, Singapore, Philippines, Thailand, Indonesia, or Cambodia]), age, number of children, marital status, education level, annual income, and income adequacy (4-point Likert scale rating ability to manage family income, from 1 = *difficult all the time* to 4 = *it is easy*).

Data Analysis

Prevalence and incidence with 95% CIs, using the continuity-corrected method for a binominal proportion,[29] were calculated at each observation time (4, 12, and 52 weeks postpartum). Point prevalence was calculated by dividing the number of cases at each time by the total number of participants with nonmissing outcome data at that time. Incidence was determined by dividing the number of new cases since the preceding observation time by the number "at risk" for the condition (i.e., those without the condition at the preceding time and with nonmissing outcome data at the evaluated time). Persistence over time was calculated as the proportion of participants who had the condition at the first 2 observation times or at all 3 observation times; the denominators for these calculations were all women with the outcome at the preceding time. Analyses were conducted for the overall sample and disaggregated by immigrant status; however, due to the small number of cases with incident and persistent symptomology, we were not able to stratify these latter analyses. To test differences among immigrant groups and adjust for age and income adequacy, we estimated prevalence rate ratios comparing each of recent and nonrecent immigrants to Canadian-born Chinese women using Poisson regression with robust standard errors.

Our a priori sample size calculation showed that a sample of 231 women per group (recent immigrant, nonrecent immigrant, and Canadian born) would provide 80% power with α = 0.05 to detect a difference between a proportion of 0.13 in one group (Canadian born)[6] versus a proportion of 0.23 in the other group.

Results

Sample Characteristics

Women were recruited between January 2011 and March 2014. Table 1 describes study sample characteristics at 4 weeks, stratified by immigration status. The sample included 571 Chinese women, of whom 39.2% (*n* = 224) were recent immigrants and 43.3% (*n* = 247) were nonrecent immigrants; the remainder were Canadian born or moved to Canada before 6 years of age (17.5%; *n* = 100). Recent and nonrecent immigrants reported their home country to be primarily Mainland China (93.8% and 72.1%, respectively), while most Canadian-born women reported their home country to be Hong Kong (63.0%). Mean (standard deviation [SD]) age was 31.6 (4.4) years, and most were primiparous (70.1%), were married/common-law (97.4%), and had greater than high school education (90.9%). There were smaller proportions of recent and nonrecent immigrants with an annual household income ≥$80,000 (12.5% and 47.0%, respectively) compared to Canadian-born women (84.5%). Mean income adequacy was lower in both immigrant groups than among Canadian-born women. Most participants (71.0%; *n* = 367) provided data at all observation times, with 21.1% (*n* = 109) lost to follow-up by 52 weeks; 7.9% (*n* = 41) had missing data at 2 or more observation times. No significant differences between those with complete and missing data were found with respect to immigrant status, home country, number of children, household income, or presence of depressive or anxiety symptomatology at 4 weeks postpartum.

Overall Prevalence and Incidence

Table 2 provides prevalence and incidence of symptomology for Chinese women at 4, 12, and 52 weeks. Prevalence rates were highest at 4 weeks and declined over time. Possible depressive symptomology was most prevalent and occurred in a quarter of women at 4 weeks (24.4%; 95% CI, 21.1%-28.2%) and decreased to 17.9% (95% CI, 14.6%-21.8%) at 52 weeks. High depressive symptomology occurred in 7.6% (95% CI, 5.6%-10.2%) at 4 weeks and decreased slightly to 5.3% (95% CI, 3.5%-7.8%) at 52 weeks. Anxiety symptomology occurred in just over 1 in 5 women (21.9%; 95% CI, 18.6%-25.6%) at 4 weeks and decreased to 18.4% (95% CI, 15.0%-22.4%) at 52 weeks. Comorbid symptomology was present in 14.4% at 4 weeks (95% CI, 11.6%-17.6%) and declined to 10.8% (95% CI, 8.2%-14.1%) at 52 weeks.

Incidence rates at 12 and 52 weeks were generally similar. The highest incidence rate observed, at 14.0% (95% CI, 10.7%-18.1%), was for possible depressive symptomology at 12 weeks, which dropped slightly to 10.7% (95% CI, 7.2%-15.4%) at 52 weeks. Incident high depressive symptomatology was 4.9% (95% CI, 3.2%-7.5%) at 12 weeks and 3.2% (95% CI, 1.7%-5.9%) at 52 weeks. Incident anxiety symptomology was 9.8% (95% CI, 7.1%-13.4%) at 12 weeks and 8.9% (95% CI, 5.9%-13.1%) at 52 weeks. Finally, incident comorbid symptomology was 6.8% at each of 12 weeks (95% CI, 4.7%-9.9%) and 52 weeks (95% CI, 4.4%-10.4%).

Overall Persistence

Table 3 describes persistence of symptomology among Chinese women at all observation times. Of those with possible depressive symptomatology at 4 weeks, 40.0% (95% CI, 31.7%-48.9%) continued to have symptoms at 12 weeks and 15.8% (95% CI, 10.0%-24.2%) at 52 weeks. For high depressive symptomatology, 28.2% (95% CI, 16.5%-43.8%)

Table 1. Baseline Characteristics of the Study Sample.

	Whole Sample (n = 571)	Recent Immigrant[a] (n = 224)	Nonrecent Immigrant[b] (n = 247)	Canadian Born[c] (n = 100)
Home country[d,e]				
Mainland China	399 (69.9)	210 (93.8)	178 (72.1)	11 (11.0)
Hong Kong	126 (22.1)	3 (1.3)	60 (24.3)	63 (63.0)
Other[f]	27 (5.3)	13 (4.9)	9 (3.6)	26 (26.0)
Age in years, mean (SD)[e]	31.6 (4.4)	30.7 (4.5)	32.4 (4.4)	31.8 (4.2)
Number of children				
1	396 (70.1)	148 (67.3)	170 (69.1)	78 (78.8)
2	148 (26.2)	62 (28.2)	66 (26.8)	20 (20.2)
3 or more	19 (3.4)	10 (4.5)	10 (4.1)	1 (1.0)
Missing	6 (1.0)	4 (1.8)	1 (0.0)	1 (0.0)
Marital status[e]				
Married/common-law	556 (97.4)	212 (94.6)	244 (98.8)	100 (100.0)
Single	15 (2.6)	12 (5.4)	3 (1.2)	0 (0.0)
Education level[e]				
≤ High school	51 (9.1)	33 (14.3)	17 (6.9)	3 (3.0)
Postsecondary	518 (90.9)	191 (85.7)	230 (93.1)	97 (97.0)
Annual income (Canadian dollars)[e]				
0-19,999	87 (16.1)	67 (32.2)	20 (8.5)	0 (0.0)
20,000-39,999	92 (17.4)	64 (30.8)	29 (12.4)	1 (1.0)
40,000-59,000	79 (14.7)	31 (14.9)	42 (17.9)	6 (6.2)
60,000-79,999	61 (11.3)	20 (9.6)	33 (14.1)	8 (8.2)
≥80,000	218 (40.4)	26 (12.5)	110 (47.0)	82 (84.5)
Missing	32 (5.6)	16 (7.1)	14 (5.7)	3 (3.0)
Income adequacy, mean (SD)[e]	2.9 (0.7)	2.7 (0.7)	3.0 (0.7)	3.3 (0.7)
Delivery type				
Vaginal	445 (78.1)	169 (75.8)	199 (80.6)	77 (77.0)
Caesarean section	126 (21.9)	54 (24.2)	48 (19.4)	23 (23.0)
Exclusive breastfeeding (yes)[e]	284 (49.7)	93 (43.1)	113 (46.7)	78 (78.0)

Values are presented as number (%) unless otherwise indicated.
[a]Mean time since immigration = 2.5 years (range = 0-5).
[b]Mean time since immigration = 12.4 years (range = 6-32).
[c]For those not born in Canada (n = 22), mean time since immigration = 28.6 years (range = 21-37).
[d]Home country refers to country of birth or ancestral country for immigrants and ancestral country for Canadian-born women.
[e]Groups differ significantly at $P < 0.05$.
[f]Other includes Taiwan, Vietnam, Macau, Malaysia, Singapore, Philippines, Thailand, India, Indonesia, Cambodia, Brazil, Mauritius, and Trinidad and Tobago.

continued to have symptoms at 12 weeks and 6.1% (95% CI, 1.7%-19.6%) at 52 weeks. Of those with anxiety symptomatology at 4 weeks, 42.0% (95% CI, 33.2%-51.2%) had symptoms at 12 weeks and 17.4% (95% CI, 11.0%-26.4%) at 52 weeks. The persistence of comorbid symptomatology was 30.0% (95% CI, 20.5%-41.5%) at 12 weeks and 8.9% (95% CI, 3.9%-19.3%) at 52 weeks.

Immigration Status

Table 4 describes prevalence at 4, 12, and 52 weeks, stratified by immigration status. At 4 weeks, there were no differences in adjusted prevalence ratios (APR) between immigrant and Canadian-born women. At 12 weeks, however, rates of both possible depressive symptomology and anxiety symptomology were significantly higher among recent (APR possible depressive symptomology, 2.9; 95% CI, 1.3-6.5; APR anxiety symptomology, 3.5; 95% CI, 1.3-9.5) and nonrecent (APR possible depressive symptomology, 2.8 [95% CI, 1.2-6.4]; APR anxiety symptomology,

4.1 [95% CI, 1.5-10.9]) immigrants compared to Canadian-born women. There were no differences for high depressive symptomatology or comorbid symptomatology at 12 weeks. At 52 weeks, the prevalence of all types of symptomology, except high depressive symptomology, was higher among recent and nonrecent immigrants compared to Canadian-born women. Particularly large differences between recent and nonrecent immigrants and Canadian-born women were observed for possible depressive symptomology and comorbid symptomatology at 52 weeks.

Discussion

In this longitudinal cohort study, we examined the prevalence, incidence, and persistence of postpartum depressive, anxiety, and comorbid symptomatology over the first year postpartum among recent immigrant, nonrecent immigrant, and Canadian-born Chinese women. The rate of possible depressive symptomatology was high at 4 weeks, at 24.4%. This is higher than the overall Canadian prevalence

Table 2. Postpartum Depressive Symptomatology, Anxiety Symptomatology, and Comorbid Symptomatology at Baseline (4 Weeks), 12 Weeks, and 52 Weeks Postpartum among Chinese Canadian Women.

	Prevalence		Incidence	
	Cases/Observations, *n*	%, 95% CI	Cases/At Risk, *n*	%, 95% CI
Possible depressive symptomatology[a]				
Baseline	138/565	24.4 (21.1-28.2)	NA	NA
12 weeks	99/488	20.3 (16.9-24.2)	51/364	14.0 (10.7-18.1)
52 weeks	82/457	17.9 (14.6-21.8)	26/244	10.7 (7.2-15.4)
High depressive symptomatology[b]				
Baseline	43/565	7.6 (5.6-10.2)	NA	NA
12 weeks	33/488	6.8 (4.8-9.5)	22/445	4.9 (3.2-7.5)
52 weeks	24/457	5.3 (3.5-7.8)	11/339	3.2 (1.7-5.9)
Anxiety symptomatology[c]				
Baseline	125/570	21.9 (18.6-25.6)	NA	NA
12 weeks	84/488	17.2 (14.0-20.9)	37/376	9.8 (7.1-13.4)
52 weeks	84/456	18.4 (15.0-22.4)	24/269	8.9 (5.9-13.1)
Comorbid depressive and anxiety symptomatology[d]				
Baseline	81/564	14.4 (11.6-17.6)	NA	NA
12 weeks	49/483	10.1 (7.7-13.3)	28/409	6.8 (4.7-9.9)
52 weeks	49/454	10.8 (8.2-14.1)	21/309	6.8 (4.4-10.4)

CI, confidence interval; NA, not applicable.
[a]More than 9 on the Edinburgh Postnatal Depression Scale (EPDS).
[b]More than 12 on the EPDS.
[c]More than 40 on the State-Trait Anxiety Inventory (STAI).
[d]More than 9 on the EPDS and >40 on the STAI.

Table 3. Persistence of Depressive Symptomatology, Anxiety Symptomatology, and Comorbid Symptomatology among Chinese Canadian Women.

	Baseline and 12 Weeks	Baseline and 12 and 52 Weeks
Possible depressive symptomatology[a]		
Cases/observations, *n*	48/120	16/101
% (95% CI)	40.0 (31.7-48.9)	15.8 (10.0-24.2)
High depressive symptomatology[b]		
Cases/observations, *n*	11/39	2/33
% (95% CI)	28.2 (16.5-43.8)	6.1 (1.7-19.6)
Anxiety symptomatology[c]		
Cases/observations, *n*	47/112	16/92
% (95% CI)	42.0 (33.2-51.2)	17.4 (11.0-26.4)
Comorbid depressive and anxiety symptomatology[d]		
Cases/observations, *n*	21/70	5/56
% (95% CI)	30.0 (20.5-41.5)	8.9 (3.9-19.3)

Only those with complete data in consecutive waves were included in the analysis for each outcome. CI, confidence interval.
[a]More than 9 on the Edinburgh Postnatal Depression Scale (EPDS).
[b]More than 12 on the EPDS.
[c]More than 40 on the State-Trait Anxiety Inventory (STAI).
[d]More than 9 on the EPDS and >40 on the STAI.

of possible depressive symptomatology of 17.2% reported by the Canadian Maternity Experiences Survey.[16] Rates of possible depressive symptomatology among immigrant women (i.e., 23.4% and 28.5% in recent and nonrecent immigrants) at 4 weeks postpartum were similar to the rate of 24.1% at 4 weeks among Chinese/Vietnamese immigrants to Taiwan reported by Chen et al.[19] Also similar to previous research,[17] rates of possible depressive symptomatology among immigrant women were higher than those of

Canadian-born women at 12 and 52 weeks postpartum. Many factors may explain these results, including underdiagnosis and undertreatment in a population where there may be barriers to care. These findings suggest that research is needed to elucidate psychosocial, cultural, and systemic factors that may result in a longer period of vulnerability for this population, who may need ongoing monitoring and support for the entire postpartum year. While rates of high depressive symptomatology were lower,

Table 4. Crude Prevalence and Adjusted Prevalence Rates of Postpartum Depressive Symptomatology, Anxiety Symptomatology, and Comorbid Symptomatology by Immigrant Status among Chinese Canadian Women.

Immigration Status	Baseline (4 Weeks)				12 Weeks				52 Weeks			
	Cases/ Observations	Prevalence, % (95% CI)	Adjusted Prevalence Ratio (95% CI)[a]	P Value	Cases/ Observations	Prevalence, % (95% CI)	Adjusted Prevalence Ratio (95% CI)[a]	P Value	Cases/ Observations	Prevalence, % (95% CI)	Adjusted Prevalence Ratio (95% CI)[a]	P Value
Possible depressive symptomatology[b]												
Recent	52/222	23.4 (18.1-29.7)	1.2 (0.7-2.0)	0.51	51/195	26.2 (20.5-32.7)	2.9 (1.3-6.5)	0.01	36/178	20.2 (15.0-26.7)	7.2 (1.8-28.9)	0.01
Nonrecent	70/246	28.5 (23.0-34.6)	1.6 (1.0-2.7)	0.05	42/203	20.7 (15.6-26.8)	2.8 (1.2-6.4)	0.01	44/196	22.5 (17.2-28.8)	8.4 (2.1-33.9)	0.003
Canadian born	16/97	16.5 (10.0-25.7)	Reference		6/90	6.7 (3.1-13.8)	Reference		2/83	2.4 (1.0-8.4)	Reference	
High depressive symptomatology[c]												
Recent	14/222	6.3 (3.6-10.6)	1.4 (0.4-4.6)	0.62	15/195	7.7 (4.7-12.3)	5.1 (0.6-40.4)	0.12	10/178	5.6 (3.1-10.0)	4.0 (0.5-31.9)	0.19
Nonrecent	26/246	10.6 (7.2-15.3)	3.0 (0.9-9.5)	0.06	17/203	8.4 (5.3-13.0)	6.3 (0.9-46.5)	0.07	13/196	6.6 (3.9-11.0)	5.1 (0.7-39.0)	0.11
Canadian born	3/97	3.1 (0.1-9.4)	Reference		1/90	1.1 (0.0-6.0)	Reference		1/83	1.2 (0.00-6.5)	Reference	
Anxiety symptomatology[d]												
Recent	53/224	23.7 (18.4-29.9)	1.2 (0.8-2.0)	0.523	38/192	19.8 (14.8-26.0)	3.5 (1.3-9.5)	0.01	35/178	19.7 (14.5-26.1)	2.6 (1.1-6.5)	0.04
Nonrecent	57/246	23.2 (18.2-29.1)	1.4 (0.8-2.4)	0.217	42/206	20.4 (15.4-26.4)	4.1 (1.5-10.9)	0.01	44/196	22.5 (17.2-28.8)	3.2 (1.3-7.8)	0.01
Canadian born	15/100	15.0 (8.9-23.9)	Reference		4/90	4.4 (1.7-10.9)	Reference		5/82	6.1 (2.6-13.5)	Reference	
Comorbid depressive and anxiety symptomatology[e]												
Recent	30/222	13.5 (9.4-18.9)	0.9 (0.5 -1.7)	0.707	27/191	14.1 (10.0-19.8)	3.1 (1.0-9.8)	0.06	20/177	11.3 (7.4-16.8)	7.5 (1.0-55.0)	0.05
Nonrecent	40/245	16.3 (12.1-21.7)	1.25 (0.7-2.3)	0.488	19/202	9.4 (6.1-14.2)	2.4 (0.8-7.9)	0.14	28/195	14.4 (10.1-20.0)	10.3 (1.4-74.4)	0.02
Canadian born	11/97	11.3 (6.1-19.8)	Reference		3/90	3.3 (1.1-9.3)	Reference		1/82	1.2 (0.0-6.6)	Reference	

CI, confidence interval.

[a] P value assessing differences in prevalence proportions comparing each immigrant group to Canadian-born women.

[b] More than 9 on the Edinburgh Postnatal Depression Scale (EPDS).

[c] More than 12 on the EPDS.

[d] More than 40 on the State-Trait Anxiety Inventory (STAI).

[e] More than 9 on the EPDS and >40 on the STAI.

measurement of possible depressive symptomatology is appropriate for identifying at-risk groups, especially those of Chinese descent, who may have the tendency towards somatic rather than cognitive presentation and may be missed using a higher cutoff.[22,23]

This is one of the few studies to examine postpartum anxiety symptomatology, which has been associated with negative parenting styles[30-32] that are associated with increased risk for child behaviour problems.[33,34] In our study, the prevalence of anxiety symptomatology among Chinese Canadian women of 21.9% at 4 weeks decreasing to 17.2% at 12 weeks is comparable to a population-based study in Vancouver, Canada, which found the prevalence among Canadian-born women of different ethnicities at 1, 4, and 8 weeks postpartum to be 22.6%, 17.2%, and 14.8%, respectively.[35] The observed prevalence and incidence of anxiety symptomatology was higher among immigrant than Canadian-born Chinese women, consistent with a systematic review that suggested that immigrant women experience higher levels of postpartum anxiety than their nonimmigrant peers.[5] Screening rates for anxiety are generally low.[36] Our findings emphasise the need for early identification and treatment of these symptoms, particularly among immigrant women.

Comorbid depressive and anxiety symptomatology is rarely assessed in perinatal populations despite poorer clinical outcomes.[37-39] We found the prevalence of comorbid symptomatology among Chinese Canadian women to be 14.4% at 4 weeks, decreasing to and remaining at ∼10% across the first year postpartum. Our findings are comparable to another Canadian study,[40] which found the prevalence of comorbidity among 522 women at 1, 4, and 8 weeks postpartum to be 15.9%, 12.3%, and 10.8%, respectively. This study found that immigration within the past 5 years predicted higher odds of comorbidity (adjusted OR [AOR], 8.03; 95% CI, 3.43-18.77), consistent with our finding that immigrant Chinese women had increased risk of comorbid symptomatology compared to Canadian-born Chinese women. Half of the women with depressive symptomatology had comorbid anxiety symptomatology, suggesting that anxiety should be screened in women with depression and vice versa. Research is needed to elucidate their relationship to one another: depression causing anxiety versus anxiety causing depression versus both symptoms as manifestation of a mood disorder, especially in different cultural contexts with varying idioms of distress.

One of the most salient findings was that Chinese immigrant women had more postpartum depressive and anxiety symptomatology than Canadian-born Chinese women, whose rates were closer to Canadian-born women in other studies.[16] The 'healthy immigrant effect', whereby immigrants are healthier than their native-born peers,[41] was not found in our study. This is consistent with research suggesting immigrant women are more susceptible to postpartum mental health problems compared to other women because of the interplay of the stresses of motherhood and stresses experienced before, during, and after migration.[18] In our sample, immigrant women had comparatively lower income levels; to effectively prevent and treat mental health problems in immigrant women, interventions may benefit from targeting the broader determinants of health, including food insecurity, unstable housing, and other issues that may be more common among immigrant women.[42] Less recent immigrants, presumably with greater acculturation and adaptation to Western culture, including the health care system, did not have an advantage compared to recent immigrants. In fact, recent immigrants appeared to be closer to Canadian-born women at 4 weeks, with nonrecent immigrants faring worse. Further studies are needed to determine what might account for this. As there are Chinese cultural practices in the first 4 weeks postpartum, one possible explanation is that recent immigrants are more able to uphold these traditions, which include a certain amount of prescribed psychosocial support.

Limitations

This study is the first to provide a detailed longitudinal view of mental health in immigrant women in a specific ethnic population in the year following childbirth. However, several limitations should be addressed. Despite wide use of the EPDS and STAI,[22,23,25,43] they are self-report scales and may over- or underestimate depression and anxiety compared to clinical diagnoses; in practice, these screening tools should be followed by formal clinical assessment. Several factors may limit the generalisability of our sample, including use of snowball sampling, which resulted in a sample with high proportions of women who were married and had some postsecondary education; inclusion of only Chinese women, whose experiences may not be representative of other ethnicities; exclusion of refugees, who may have an even higher burden of mental health problems;[44] inclusion of a higher proportion of women from Hong Kong in the Canadian-born group, who may have had more cultural influences from the West; and a sample size insufficient to disaggregate groups according to the many ethnicities within China. Due to use of snowball sampling, we could not calculate a response rate or compare responders to nonresponders. However, there were no differences between women followed for the entire study period and those lost to followup. It would have been informative to include a control group of non-Chinese Canadian-born women to provide a baseline with which to compare rates. Our purpose was to describe prevalence and incidence, so we provide estimates only minimally adjusted for maternal age and income adequacy; future studies should examine further adjusted risks.

Conclusions

Understanding the burden and trajectory of maternal mental health problems makes it possible to identify critical times where intervention may be most beneficial. Ours is the first

study to examine postpartum mental health among Chinese recent and nonrecent immigrant women compared to Canadian-born women of the same ethnicity. Our findings suggest that Chinese immigrant women are a high-risk group for postpartum depressive and anxiety symptomatology, underscoring the need to investigate the usefulness of culturally appropriate screening and support for immigrant postpartum women. Furthermore, our study highlights the importance of studying comorbid presentation of depressive and anxiety symptomatology specifically, which has implications for screening and treatment.[45]

Declaration of Conflicting Interests

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