Heliyon 9 (2023) e20528

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

# Preconception care, prenatal care, and postpartum bonding in women with substance use

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ARTICLE INFO

*Keywords:*
Attachment
Mother-infant Interaction
Preconception care
Pregnancy
Substance use

ABSTRACT

*Background:* The status of care in the preconception and pregnancy periods in women who use substances can have an impact on maternal and neonatal health. This study aimed to assess the provision of preconception care, prenatal care, and postnatal mother-to-child bonding among pregnant women who use substances.

*Methods:* An ambidirectional cohort study was conducted, involving 69 pregnant women who reported substance use and had it confirmed using a ten-parameter panel kit (M10T) manufactured by Hannan Teb Pars Company. These women were selected from a referral maternity hospital between January and December 2020, using a convenience sampling method. Sociodemographic information, obstetric and medical history, and information about preconception and prenatal care were collected. All maternal and neonatal outcomes were recorded from the time of admission to the time of discharge for both the mothers and their neonates. Neonatal abstinence syndrome and mother-to-child bonding were assessed using modified Finnegan's neonatal abstinence tool and a postpartum bonding questionnaire, respectively. The data were analyzed using descriptive and inferential tests using SPSS software version 22.

*Result:* The mean age of the women was 32.8 ± 5.7 years. The mean duration of substance use was 5.1 ± 3.5 years. 48% of the pregnancies were reported as unwanted. A total of 94.2% and 50.7% of pregnant women did not receive preconception care and prenatal care, respectively. There was no association between pregnancy wantedness and receiving preconception care ($P = 0.287$), but a significant association was observed for prenatal care ($P < 0.001$). 31% of the mothers experienced a mother-to-child bonding disorder, with 75% of those who had unwanted pregnancies reporting such a disorder.

*Conclusion:* The findings of this study indicate that the majority of pregnant women who use substances did not receive preconception care, and prenatal care was inadequate with fewer visits than recommended. One-third of the pregnant women who use substances experienced a mother-to-child bonding disorder. It was also observed that women with unwanted pregnancies had poorer perinatal care and mother-to-child bonding.

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https://doi.org/10.1016/j.heliyon.2023.e20528
Received 3 January 2023; Received in revised form 29 July 2023; Accepted 28 September 2023
Available online 29 September 2023

## 1. Introduction

According to the World Drug Report, in 2021, nearly 270 million people aged 15–64 years, which accounts for 5.5% of the world population, had used drugs in the past year. From 2010 to 2019, the global number of people with substance use in the past year increased by 22%. In 2019, the use of drugs resulted in almost 500,000 deaths and 31 million disability-adjusted life years (DALYs), with accounting women for 30% of deaths and 33% of DALYs [1].

According to the World Health Organization (WHO) Atlas of Substance Abuse in the Eastern Mediterranean Region (EMRO) in 2017, the median annual prevalence of cannabis, opioids, cocaine, and amphetamine-type stimulant use among the population aged 15–64 years in this region was 3.5%, 0.16%, 0.1% and 0.2% respectively [2]. A meta-analysis in 2021 revealed that the prevalence of substance use in EMRO was 4% (95% CI: 3.1–5.2%) [3]. Afghanistan, Pakistan, and the Islamic Republic of Iran have some of the highest rates of opioid use in the world, with an annual prevalence of over 2% [2].

A national cohort study conducted in Iran in 2014 reported a prevalence of substance use among 130,570 Iranian adults aged 35 years and above be to 11.9%. Among them, 2.2% were women who drugs illicit used had more in once than their lifetime [4]. Another study involving 2065 adults aged 18 years and older in Iran that found 4% of women had a lifetime experience of substance use [5]. The majority of women who use substances fell within the age range of 26–30 years [6]. This age group is particularly vulnerable as they are of reproductive age, and those who use drugs are at a higher risk of complicated pregnancy.

According to a report by the American College of Obstetricians and Gynecologists (ACOG) in 2017, the use of opioids in pregnant women has increased in recent years [7]. The Pregnancy Risk Assessment Monitoring System (PRAMS) estimated that 6.6% of pregnant women reported using prescription opioids [8]. The Quebec Pregnancy Cohort study from 1998 to 2015 showed that 4.7% of pregnant women were exposed to opioids [9]. Limited data are available on the prevalence of substance use among pregnant women in Iran. A recent study of 2000 Iranian pregnant women showed that the lifetime prevalence of substance use was 15%, with 3.3% reporting use in the previous month. Additionally, 23% of urine samples screened for illicit drugs were positive [10].

While most studies have focused on the maternal and neonatal outcomes in women who use substances, it is also important to consider the care provided during the preconception and pregnancy periods for these women. Despite the available evidence, no studies have specifically examined preconception and prenatal care. Therefore, this study aims to evaluate preconception care, prenatal care, and postpartum bonding among pregnant women who use substances.

## 2. Methods

### 2.1. Study design and participants

This ambidirectional cohort study was conducted from January to December 2020 in the Obstetrics Department of Hazrat Zeinab Hospital, which is a referral maternity hospital affiliated with Shiraz University of Medical Sciences in Iran. The convenience sampling method was used in this study.

The study included pregnant women who reported substance use, which was confirmed using a ten-parameter panel kit (M10T) manufactured by Hannan Teb Pars Company. This kit detected the presence of morphine, amphetamine, methamphetamine, methadone, cannabis, tramadol, buprenorphine, benzodiazepine, barbiturates, and tricyclic antidepressants in urine samples. The inclusion criteria for the study were Iranian nationality, a gestational age of 20 weeks or more, initiation of substance use before pregnancy or at any time during pregnancy, and the beginning of the first stage of labor. The exclusion criterion was withdrawal from the study after enrollment.

### 2.2. Measurements

The ambidirectional cohort study consisted of both retrospective and prospective phases. Eligible pregnant women who use substances were included in the study upon admission to the hospital for delivery. Sociodemographic and substance use characteristics, as well as obstetrics and medical history, were collected from the recruited women. Data on substance use before, during and after pregnancy were obtained through self-report using a researcher-made questionnaire. The retrospective phase involved gathering information about the preconception and prenatal care of these women from the health integrated system (SIB). The SIB was launched by the Ministry of Health and Medical Education in 2016 to record electronic health records of households in Iran [11]. Information on the provision of preconception care and prenatal care, including records in the SIB, was retrieved. The prospective phase began after the admission of women. Maternal and neonatal outcomes were prospectively assessed, followed, and recorded from the time of admission until discharge. Maternal information and outcomes included labor progress, delivery type, postpartum hemorrhage, maternal mortality and morbidity, and duration of hospitalization. Neonatal data and outcomes included weight, height, head circumference, Apgar scores at 1 and 5 min, neonatal intensive care unit admission, duration of hospitalization, perinatal mortality, neonatal abstinence syndrome (NAS), and feeding status. Additionally, mother-to-child bonding was assessed postpartum.

NAS was assessed using Modified Finnegan's Neonatal Abstinence Tool, which evaluates central nervous system, gastrointestinal, respiratory, metabolic, and vasomotor disturbances caused by neonatal abstinence syndrome [12]. The first evaluation of abstinence symptoms began immediately after the baby was born and continued every 3–4 h. If the evaluation score was less than 8, the non-pharmacological interventions were implemented, including reducing environmental stimuli such as light, sound, and touch, encouraging baby care, promoting skin-to-skin contact, and, if possible, rooming-in with the mother. Pharmacological and

non-pharmacological interventions were initiated if the evaluation score was 8 or higher. If no pharmacological intervention was required, the neonate was evaluated for four days. If pharmacological intervention was necessary, the evaluation continued for 48–72 h after discontinuation of the intervention to ensure that the symptoms of abstinence syndrome did not recur.

Mother-to-child bonding was assessed using a postpartum bonding questionnaire specifically designed to identify disorders of the mother-infant relationship. This self-rating questionnaire consists of 25 items, each graded on a 6-point Likert-type response scale ranging from always (zero) to never (5). The questionnaire evaluates four scales: impaired bonding (12 questions), rejection and pathological anger (7 questions), infant-focused anxiety (4 questions), and incipient abuse (2 questions). A higher score indicates a mother-infant relationship disorder. The cutoff scores for impaired bonding, rejection and pathological anger, anxiety about the infant, incipient abuse, and the full scale were 12,13,10,3, and 38, respectively [13,14]. Data on mother-to-child bonding were prospectively collected 48 h after giving birth.

### 2.3. Data analysis

The data were summarized using frequencies and percentages. Continuous variables are summarized as means and standard deviations. Categorical variables were compared using the $\chi 2$ test or Fisher's exact test. Data were analyzed using SPSS software version 22 (SPSS Inc., Chicago, IL, USA).

### 2.4. Ethical clearance

The present study protocol underwent review and received approval from the National Committee of Ethics in Biomedical Research of Shiraz University of Medical Sciences, Iran (ethical approval No. IR.SUMS.REC.1397.664). Informed consent was obtained from all the participants upon their admission to the hospital for delivery and their inclusion in the study.

## 3. Results

69 pregnant women who use substances, with a mean age of 32.8 ± 5.7 years, were included in the study. The mean age of their husbands was 33.7 ± 13 years. The mean duration of substance use was 5.1 ± 3.5 years, and only 4.3% of the women had started using substances for the first time during pregnancy. Nearly 93% of the participants were married, and 48% of the pregnancies were unwanted. Two women had positive laboratory findings for acquired immunodeficiency syndrome and three had positive findings for hepatitis C. Table 1 shows some of the participants' demographic and essential characteristics (Table 1).

Opium (33.33%) and methadone (31.88%) were the most commonly used substances during the preconception and pregnancy periods. The most common method of use was smoking during both periods (Table 2). 12 (17.39%), and 22 (31.88%) of women were under methadone maintenance therapy during the preconception and pregnancy period, respectively. All women were visited by a

**Table 1**
Essential characteristics of pregnant women with substance use (N = 69).

| Variable | | N(%) |
|---|---|---|
| **Marital status** | Married | 64 (92.75) |
| | Single | 5 (7.24) |
| **Education** | Illiterate | – |
| | Primary school | 28 (40.57) |
| | Secondary school | 20 (28.98) |
| | High school | 20 (28.98) |
| | University | 1 (1.44) |
| **Occupation** | Housewife | 58 (84.05) |
| | Employed | 11 (15.94) |
| **Spouse education** | Illiterate | – |
| | Primary school | 20 (31.25) |
| | Secondary school | 31(48.43) |
| | High school | 10 (15.62) |
| | University | 3 (4.68) |
| **Spouse occupation** | Government Job | 1 (1.56) |
| | Worker | – |
| | Unemployed | 1(1.56) |
| | Self-employed | 62 (96.87) |
| **Unwanted pregnancy** | Yes | 33(47.82) |
| | No | 36(52.17) |
| **Gravid** | Primigravid | 8 (11.59) |
| | 2–3 | 34 (49.27) |
| | ≥3 | 27 (39.13) |
| **History of abortion** | Yes | 17(24.63) |
| | No | 52 (75.37) |
| **History of stillbirth** | Yes | 6 (8.6) |
| | No | 63 (91.4) |

doctor who was an expert in substance use disorders during delivery. He assessed women according to the diagnostic and statistical manual of mental disorders, fifth edition substance use disorder criteria and offered treatment in needed cases in the postpartum period. 4 (5.79%) women were new cases who needed treatment. Methadone maintenance therapy for women who were under treatment during the pregnancy period continued postpartum.

Among the participants, 94.2% were not referred for preconception care. Of the pregnant women, 49.3% received prenatal care. Among those who received prenatal care, 58.8% started care in the first trimester, 35.2% in the second trimester, and 5.8% in the third trimester. The average number of prenatal care visits was $3.5 \pm 4.32$ times. There was no association between pregnancy wantedness and receiving preconception care ($P = 0.287$), but there was an association for prenatal care ($P < 0.001$). Women who had wanted pregnancies received a greater amount of prenatal care compared to those who had unwanted pregnancies.

None of the patients experienced bleeding in the second trimester, and only four cases (5.8%) had moderate bleeding in the third trimester. Six patients (8.7%) were diagnosed with gestational diabetes, and four patients (5.8%) developed preeclampsia; however, no cases of eclampsia were observed. There were no cases of abortions. One stillbirth occurred at 33 weeks gestation for unknown reasons. A total of 53.6% of women underwent cesarean delivery. Postpartum hemorrhage occurred in 5.8% of patients, with severity classified as severe in 2.9% of cases. Preterm delivery and preterm rupture of membrane (PROM) was observed in 40.6% of patients, with a mean gestational age of $34.7 \pm 8.88$ weeks at PROM. Meconium excretion was observed in 8.7% of cases. There were no cases of placental abruption, wound infection, placental or membrane infections, or maternal death. Mothers were hospitalized for an average of $3.5 \pm 3.3$ days after delivery.

Of the infants, 47.8% were boys and 50.7% were girls. The mean neonatal weight, height, and head circumference were $2608.6 \pm 665.7$g, $47.5 \pm 4.32$ cm, and $32.84 \pm 2.44$ cm, respectively. A total of 44.7% of neonates had low birth weight. The mean Apgar scores at the first and fifth minute were $7.9 \pm 1.7$ and $9 \pm 1.3$, respectively. The NAS was examined using the Modified Finnegan Neonatal Abstinence Tool at different times, and the mean score was $8.3 \pm 4.9$. 58% of neonates exhibited drug withdrawal syndrome, and 95% were treated with morphine, 2.5% with phenobarbital, and 2.5% with a combination of these two drugs. Only one neonate experienced seizures, which occurred 48 h after birth. Almost all neonates (98.6%) were admitted to the neonatal intensive care unit on the first day after birth.

A total of 94.2% of the infants were fed formula. Two infants (2.9%) experienced hypoglycemia, which occurred 1 h after birth. In total, 4.3% of infants were born with congenital anomalies. There was one case of neonatal death due to sepsis observed in this study, occurring 6 days after birth. Nine infants (13%) were delivered to welfare organizations. The neonates were hospitalized for an average of $16.2 \pm 15.1$ days. The mean total score of the postpartum bonding questionnaire was $106.1 \pm 10.3$. The highest disorder in mother-to-child bonding was related to impaired bonding (100%), while the lowest was detected in rejection and pathological anger (13.8) (Table 3). In terms of the total score, 75% of mothers who had an unwanted pregnancy experienced mother-to-child bonding disorder. There was an association between unintended pregnancy and mother-to-child bonding disorder ($P = 0.011$).

## 4. Discussion

Nearly 95% of the women who use substances did not receive preconception care in the year before pregnancy. Substance use during pregnancy has been associated with adverse maternal and neonatal outcomes [15]. Preconception care provides biomedical, behavioural, and social health interventions to optimize maternal and infant health outcomes and reduce risks before conception [16]. Preconception care is essential for women who use substances because they are exposed to risky behaviours, and this care can improve both maternal and fetal outcomes by identifying risks and necessary interventions and treatments. However, there is a lack of information regarding the prevalence of preconception care among women who use substances. Studies have shown that the number of mothers without substance use who received preconception care in the last 12 months before their pregnancies was unsatisfactory. Some studies have shown that the prevalence of mothers who utilized preconception care varied from 6.4% to 22.3% among different regions of Southern Ethiopia [17–19]. Recent studies in Iran showed that the prevalence of preconception care ranged from 19.6% to 47.7% [20,21].

There are several challenges and barriers to receiving preconception care, including lack of awareness, not perceiving oneself at risk, insufficient support from husbands and relatives for preconception care, unplanned pregnancy, and the perception that time spent

**Table 2**
Frequency of substance use and method of use in preconception and pregnancy period.

| Substance | Preconception period N (%) | Pregnancy period N (%) |
|---|---|---|
| Heroin | 9 (13.04) | 7 (10.14) |
| Methamphetamine | 5 (7.24) | 5 (7.24) |
| Opium | 23 (33.33) | 17 (24.63) |
| Crack | 5 (7.24) | 3 (4.34) |
| Methadone | 12 (17.39) | 22 (31.88) |
| Multiple substances | 15 (21.73) | 15 (21.73) |
| **Method of use** | | |
| Smoking | 33 (47.82) | 22 (31.88) |
| Inhaling | 22 (31.88) | 20 (28.98) |
| Orally | 14 (20.28) | 27 (39.13) |

**Table 3**
Frequency of mother-to-child bonding disorders by the postpartum bonding questionnaire score in mothers with substance use.

| Postpartum bonding domains | | | | | |
|---|---|---|---|---|---|
| | Impaired bonding | Rejection and pathological anger | Infant-focused anxiety | Incipient abuse | Total score |
| Cut off point | >12 | >13 | >10 | >3 | >38 |
| N(%) | 58(100) | 8(13.8) | 9(15.5) | 38(65.5) | 18(31) |

on preconception care is wasteful [17–21]. Women who use substances perceived these barriers more than women without substance use. This issue is supported by a national study conducted in the United States (US) on the assessment of preconception health services, which found that the prevalence of preconception service delivery among women with substance use disorders was only 6% [22]. However in the current study, nearly half of the pregnancies were unplanned, which may have affected the rate of receiving preconception care among these women. Nevertheless, no association was observed between the intention to become pregnant and undergoing preconception care in this study, likely due to the fact that almost all women did not receive preconception care.

Half of the pregnant women in this study received prenatal care, with three-fifths of them starting care in the first trimester. Pregnant women who use substances are more likely to receive late, limited, and no prenatal care [23,24]. Data from the PRAMS in nine states in the US from 2016 to 2019 showed that pregnant women who use substances did not receive adequate prenatal care and often initiated prenatal care later than pregnant women without substance use. The average timing of the first prenatal visit was reported to be 2.6 months of gestation [24].

Although more than half of the pregnant women in the current study did not receive prenatal care, a comparison between prenatal care and preconception care revealed that pregnant women received prenatal care more frequently than preconception care. Additionally, women who wanted their pregnancies received more prenatal care. This could be attributed to the fact that concern for the baby's health can motivate pregnant women who use substances to seek prenatal care [25].

The American Academy of Pediatrics and the ACOG, in the 8th edition of the guidelines for prenatal care in 2017, recommended a specific frequency of prenatal visits for women with uncomplicated pregnancies. This includes visits every four weeks until 28 weeks, every two weeks until 36 weeks, and weekly until delivery. However, women with risk factors such as substance use may require more frequent visits based on the severity of the risks [26]. In the current study, the frequency of prenatal visits was found to be less than the recommended schedule, with an average of three times during pregnancy. This is consistent with previous studies that have shown pregnant women who use substances avoid prenatal care due to various reasons. These reasons include fear of being identified as substance users, concerns about losing custody of their infants, lack of trust in healthcare providers to protect them from legal authorities, fear of judgment from healthcare providers, transportation and financial difficulties, limited availability of care, and poor quality of care [24,25].

In this study, it was found that nearly one-third of pregnant women who use substances had impaired overall mother-to-child bonding, with the impaired bonding domain being the most common. This finding is consistent with a systematic review that identified mothers with opioid use disorders as being more irritable, ambivalent, and less sensitive to their infant's cues. These mothers also exhibit less adaptability in their parenting behaviours and are at a high risk of abusing their infants [27]. Similar issues were observed in the mothers in the current study, with two-thirds of them perceiving themselves as a threat to their children. Another review showed that infants of mothers with substance use experience significant separation from their mothers during the first year of life [28]. In this study, 13% of the neonates were delivered to child welfare services. Maternal-to-child bonding disorders were observed in three-fourths of mothers who had an unwanted pregnancy. These findings align with a study by Karina et al., which found that a higher level of unintendedness was associated with lower postnatal bonding.

The study conducted by Shreffler et al. on pregnant women without substance use found that a higher level of unintendedness in pregnancy was associated with lower postnatal mother-infant bonding [29]. This issue was also observed in pregnant women who use substances, with three-fourths of them experiencing maternal-to-child bonding disorders after delivery.

### *4.1. The strength and limitation of the study*

One of the strengths of this study is its focus on preconception care in women who use substances, which is an area that lacks sufficient information. Additionally, the study assessed preconception care, prenatal care, maternal and neonatal outcomes, and postnatal mother-to-child bonding in these women in an ambidirectional cohort study, providing valuable insights into an understudied population. However, there are potential limitations to consider. Firstly, due to the nature of the study, it was not possible to design a national cohort study on pregnant women who use substances, and the samples were limited to one referral center in the fifth most populous city in Iran. Therefore, the findings may not be generalizable to the entire population. Additionally, the study did not allow for further analysis of the association between preconception care and prenatal care on maternal and fetal outcomes, as well as postpartum bonding. Another limitation is that women were included in this study based on self-disclosure, followed by confirmation using the drug test kit. This method of data collection may lead to an underreporting of the problem and provide an unrealistic estimate of the subject.

## 5. Conclusions

The results of the study indicate that the majority of pregnant women who use substances did not receive preconception care. Prenatal care was more common than preconception care, but the frequency of prenatal visits was less than the recommended schedule. One-third of pregnant women who use substances experienced impaired postnatal mother-to-child bonding. Improving preconception care, prenatal care, and screening of postnatal mother-to-child bonding is crucial within the healthcare system. These elements play a vital role in the early identification of maternal and child complications, improving perinatal outcomes, and reducing adverse short and long-term outcomes for both mothers and infants, especially in high-risk women.

## Funding statement

This study was funded by the Research Deputy of Shiraz University of Medical Sciences (Project Number 14383).

## Data availability statement

Data included in article/supp. material/referenced in article.

## Declaration of interest's statement

The authors declare no conflict of interest.

## Additional information

No additional information is available for this paper.

## Author contribution statement

Parvin Ghaemmaghami: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Fatemeh Sarbakhsh: Performed the experiments; Wrote the paper.

Roksana Janghorban: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Reza Bahrami: Conceived and designed the experiments; Wrote the paper.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgements

This study was financially supported by Shiraz University of Medical Sciences, Shiraz, Iran. The authors would be grateful to pregnant women who use substances for their participation and midwives of Hazrat Zeinab Hospital, Shiraz University of Medical Sciences, Iran for their cooperation in this study.

## Abbreviations

| | |
|---|---|
| ACOG | American College of Obstetricians and Gynecologists |
| DALYs | disability-adjusted life years |
| EMR | Eastern Mediterranean Region |
| NAS | neonatal abstinence syndrome |
| PROM | preterm rupture of membrane |
| SIB | health integrated system |
| US | United States |
| WHO | World Health Organization |

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2023.e20528.

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