RESEARCH ARTICLE

Substance use during and after pregnancy among a national cohort of pregnant women in opioid maintenance treatment and their partners

INGUNN OLEA LUND¹, SVETLANA SKURTVEIT¹,², MONICA SARFI¹, BRITTELISE BAKSTAD³, GABRIELLE WELLE-STRAND¹, & EDLE RAVNDAL¹

¹SERAF – Norwegian Centre for Addiction Research, University of Oslo, Oslo, Norway, ²Department of Epidemiology, Norwegian Institute of Public Health, Oslo, Norway, and ³Norwegian Directorate of Health, Oslo, Norway

Abstract
Background: Most individuals in opioid maintenance treatment (OMT) have had serious polydrug problems in addition to opiate addiction. Prospective studies on substance use among pregnant women in OMT and their male partners on a national level have been scarce and therefore deserve attention.
Methods: The European Addiction Severity Index was used to map substance use history among a Norwegian national cohort (2005–2006) of pregnant OMT women (n = 37) and their partners (n = 23), as well as substance use during the last month of pregnancy and 1 year later.
Results: Lifetime substance use indicated an average of 8 years of heroin abuse before entering OMT. During the last month of pregnancy one woman and two partners reported using illegal substances, while 1 year later, one women and one partner reported having used illegal substances. The use of legal substances among the partners was significantly reduced from pregnancy to 1 year later (38–20%, p < 0.01), while the use of legal substances among the women increased from 8% to 19%.
Conclusion: The results suggest that a majority of OMT mothers in Norway and their partners are able to abstain from most illegal substances 1 year after pregnancy, but the tendency of problem drinking among the women is a concern.

Keywords: Prospective, opioid maintenance treatment, pregnancy, partners, substance abuse

Introduction
About one of three heroin addicts are women, and most of them are of childbearing age. Since 2004 about 30–45 children have been born to women in opioid maintenance treatment (OMT) in Norway each year. OMT programmes in Norway are expanding
and a growing number of pregnant women in OMT and their families will be requiring professional care and treatment in the future. There exists literature on substance use during pregnancy among women in OMT (Jones et al., 2001; Fischer et al., 2006; Jansson et al., 2007; Tuten et al., 2009), but few studies have evaluated OMT mothers’ substance use as well as medical and psychosocial problems over time. The women’s partners have received little attention and they are rarely included in studies. Therefore we know little about their substance use and related problems during the women’s pregnancy and some years later.

Women with a substance abuse history who have stable, drug-free relationships are more likely to abstain from using drugs later on (Sundfaer, 2001). However, the women’s partners often have a similar drug abuse history and similar psychosocial problems (Powis et al., 2000). Drug-using sexual partners have a major influence on women's drug use (Hser et al., 1987), and women with partners who use drugs are five times more likely to use drugs than is the case with women whose partners do not (Bresnahan et al., 1992). A majority of studies focus on the impact of maternal drug use on parenting. Whereas women usually stop using drugs while they are pregnant (Davis, 1990), this is not always the case for their partners. Since their partners’ substance abuse will have an influence on how the women cope (Powis et al., 1996) and how the family develops, it is important to include them in prospective studies.

Substance abuse is often accompanied by other related problems, for example, psychiatric, family/social, unemployment and legal problems (Gossop et al., 2005; Gossop et al., 2006; Velez et al., 2006; Fitzsimons et al., 2007; Tuten et al., 2009). Earlier studies indicate that substance abuse and related problem behaviour are reduced when individuals join OMT (Weissman et al., 1976; Chatham et al., 1999; Gossop et al., 2006; Maremmani et al., 2007). In the National Treatment Outcome Research Study, there was a marked reduction in frequency of use of heroin and other substances among OMT patients (Gossop et al., 2000). It has been reported, however, that although the use of illegal substances is reduced after individuals join OMT, this does not necessarily apply to problem drinking (Gossop et al., 2000). There was also a reduction in psychological problems from intake to OMT and 2 years after (Gossop et al., 2002; Gossop et al., 2003). The 5-year follow-up results from the Drug Abuse Treatment Outcomes Study showed a 50% reduction in illegal activities and reported an increase in full-time employment among OMT clients (Hubbard et al., 2003).

OMT in Norway has traditionally been a strict, high-threshold programme where social control is high (Waal, 2007). The child welfare authorities are informed at an early stage if pregnant women in OMT, or parents in OMT, show signs of not coping well. High level of urinary testing and high doses of methadone and buprenorphine are characteristics of the Norwegian OMT programme (Waal, 2007; Clausen et al., 2008). As pregnancy is considered a great motivation for abstaining from drugs (Sundfaer, 2001), it is reasonable to believe that pregnant women in OMT, and their partners, demonstrate even less substance use than OMT patients in general (Finnegan et al., 1981; Crandall et al., 2004).

Against this background, the aims of this study were (1) to describe the lifetime substance abuse history of a Norwegian cohort of women in OMT and their partners; (2) to examine substance use among women and their partners during the last month of pregnancy and 1 year later; and (3) to examine reported problems in areas associated with substance abuse: family/social relations, illegal activities, unemployment and physical and mental health within the same time period.
Materials and methods

Participants

The sample consists of a national cohort of pregnant women in OMT \( (n = 37) \) and their partners \( (n = 23) \). All pregnant women in OMT in Norway \( (n = 47) \) between January 2005 and January 2007 and their partners were invited to participate. Six women chose not to take part in this study. In two cases, this was due to reluctant partners, and in four cases, they did not want more involvement from researchers or health-care professionals in their lives than they already had. Forty-one women gave their informed consent to take part in this study. Of these, two dropped out because of miscarriages and one withdrew for other personal reasons. One interview form was lost after the interview was carried out, leaving a total of 37 women.

Twenty-four of the women participating in this study had partners and 13 were single. Twenty-three of the partners agreed to participate in this study. Seven of these partners had never used heroin and six had never used illegal drugs. At the time of the first interview, all the women and 12 of the partners were in OMT. Prior to the first interview the women had been in OMT on average of 2.7 years, and the partners on average of 2.5 years. Only two women got started in the OMT programme after conception (Bakstad et al., 2009). All participants signed an informed consent before joining this study. The Regional Ethics Committee approved the protocol for this study.

Thirty-five women and 19 partners participated in the follow-up interview 1 year later. Three women and four partners did not take part in the follow-up interview for a variety of reasons: One woman no longer wanted to participate in this study, another had a relapse, and she and her partner were in a situation where their child was being placed in foster home. It was not possible to contact one woman and her partner as they were splitting up at the time. One of the partners was in alcohol abuse treatment, and another had had a relapse and did not want to participate in the follow-up interview.

Methadone/buprenorphine dose

Twenty-five women received methadone and 12 received buprenorphine during pregnancy. The mean daily doses before delivery were 90 mg \((87–260 \text{ mg})\) for methadone and 13 mg \((2–24 \text{ mg})\) for buprenorphine among the same cohort of pregnant women in OMT (Bakstad et al., 2009).

Urine analyses

Urine analyses were obtained for 28 of 37 pregnant women during pregnancy from regional OMT centres and from general practitioners (Bakstad et al., 2009).

Instruments

The European Addiction Severity Index (EuropASI) is the revised version of the fifth edition of the Addiction Severity Index (McLellan et al., 1980). EuropASI is a semi-structured interview widely used for clinical and research purposes. It is designed to evaluate problem severity in seven areas that are often affected by drug and alcohol abuse. The areas covered are drug and alcohol use, family and social relationships, employment and support status, medical and psychiatric status and legal status. EuropASI
gives information about problem severity in the different areas during the month prior to the interview. The initial interview also includes information about substance abuse history and previous psychiatric problems. Concerning the validity and reliability of EuropASI, there have been some divergent opinions. Some studies have documented satisfactory validity and reliability (McLellan et al., 1980; Leonhard et al., 2000), while others have been rather critical (Makela, 2004). However, in spite of certain well-known weaknesses of the EuropASI as a research instrument, altogether we have judged the positive properties of the instrument as far outweighing the negative ones (McLellan et al., 1992).

Procedures

The first EuropASI data were collected through a personal interview during the final month of pregnancy. One year later the EuropASI follow-up interview was conducted by telephone. All three interviewers had been trained and certified in use of the EuropASI.

Data analysis

All data analyses were carried out using SPSS 16.0 for Windows. Crosstab analyses with Fischer’s exact test were used to examine whether there were significant changes in substance use from the first to the second interview. The variables for each substance were dichotomised into “use” and “no use”. The same procedure was conducted to see whether there were significant changes in somatic/medical, family/relatives, unemployment, psychiatric and legal problems from the last month of pregnancy to 1 year later. Descriptive information on reported problems with family and social relationships, unemployment, physical and mental health during the time periods is also presented.

Results

Background characteristics of the study population (past 3 years)

Table I shows the background characteristics of the pregnant women and their partners. The table includes information from the interview conducted during pregnancy, as well as information about 3 years prior to the interview and the substance abuse history. The women had been in OMT for an average of 2.7 years (range 1–6) and their partners 2.5 years (range 1–6) prior to the first interview. Eighteen of the women and nine partners had been in OMT less than 2 years.

Substance abuse history

The women and their partners alike reported having used heroin on average for 8 years prior to OMT (Table II). In addition, they reported a long history of abuse of cannabis, amphetamines and other opiates, while medications such as benzodiazepines were common among both genders. Thirty-five women reported several years of polydrug abuse (mean 10 years, range 1–25) and 36 reported having injected drugs. Sixteen partners reported polydrug use (mean 13 years, range 2–25) and 15 had injected drugs. Twenty-six of the women (73%) and eight (40%) of the partners had one or more overdoses earlier in life. Seven of the partners (30%) had never used heroin.
Table I. Background characteristics of pregnant women in opioid maintenance treatment (OMT) in 2005–2006 in Norway and their partners

|                      | Women  | Partners |
|----------------------|--------|----------|
| n                    | 37     | 23       |
| Mean age (minimum–maximum)* | 32 (23–44) | 36 (26–50) |
| In opioid maintenance treatment, n (%)* | 36 (97) | 12 (52) |
| Employment (past 3 years), n (%) |        |          |
| Full- or part-time work | 11 (31) | 11 (48) |
| Student               | 1 (3)   | 0        |
| Home with children    | 2 (5)   | 0        |
| Retired/disability    | 5 (14)  | 0        |
| Vocational training   | 1 (3)   | 0        |
| Unemployed            | 14 (39) | 11 (48) |
| In a controlled environment | 2 (5) | 1 (4) |
| Housing conditions (past 3 years), n (%) |        |          |
| Living with partner and children | 6 (16) | 5 (21) |
| Living with partner only | 12 (33) | 9 (39) |
| Living with children only | 3 (8) | –        |
| Living alone          | 10 (27) | 6 (26) |
| Living with parents or friends | 1 (3) | 1 (9) |
| Inpatient treatment   | 3 (8)   | 2 (9)    |
| No stable living arrangements | 2 (5) | 0        |
| Family and social relations, n (%)* |        |          |
| Children (1–3 children) | 18 (49) | 13 (56) |
| Daily care of own children | 10 (57) | 5 (39) |
| In detention/jail earlier in life, n (%) | 21 (57) | 15 (71) |
| Hepatitis B or/and C, n (%)* | 32 (87) | 17 (74) |

Note: *At the time of the first interview.

Table II. Substance abuse history (number of years) among pregnant women (n = 37) in opioid maintenance treatment (OMT) in Norway and their partners (n = 23)

|                      | Heroin  | Other opiates | Amphetamine | Cocaine | Cannabis | Pharmaceutical drugs (benzo-diazepine and other sedatives) | Alcohol problems |
|----------------------|---------|---------------|-------------|---------|----------|------------------------------------------------------------|------------------|
| Women                | 36, 8 (2–16) | 24, 5 (1–20) | 25, 6 (1–19) | 5, 3 (1–6) | 29, 10 (1–25) | 32, 8 (1–25) | 13, 4 (1–9) |
| Partners             | 16, 8 (1–19) | 13, 6 (1–22) | 13, 6 (1–12) | 5, 1 (1–2) | 17, 13 (1–28) | 14, 8 (1–22) | 13, 7 (1–20) |

Notes: The values are represented as n, mean (range). Number of years = to count as 1 year, the respondent would have to report using the substance for at least 3 days or 2 days in a row in the same week for at least 6 months of a full year. Use would compromise normal activities such as school, work, family life and/or recreational activities. Alcohol problems are defined by EuropASI as five or more drinks per day at least three times per week or alcohol consumption 2 days in a row at a level that causes psychological/somatic symptoms to appear or compromises normal activities.

Substance abuse in pregnancy and 1 year after

Only one woman reported using illegal substances (heroin and amphetamine) during the last 30 days (final month) of pregnancy. Another woman reported using illegal substances (cannabis) during the 30 days before the second interview. Two partners reported using illegal substances (other opiates and cannabis) during the last 30 days in the final month.
of pregnancy. One of these partners also reported using illegal drugs (cannabis) during the last 30 days prior to the follow-up interview.

None of the women reported binge drinking of alcohol in the final month of pregnancy, but five of them did after 1 year (Table III). Among the partners, the trend was the opposite. Seven partners reported binge drinking at the first interview and only three at the second interview 1 year later. There was a significant reduction in the use of legal substances from the first to the second interview among the partners ($p = 0.01$).

Prevalence of reported psychosocial problems during the final month of pregnancy and 1 year later

There was a significant decrease ($p < 0.05$) in somatic/medical problems reported among the women from the final month of pregnancy to 1 year later, while the trend among the partners was the opposite (Table IV). There was some increase in reported problems with family among women and partners alike. The same number of women reported psychiatric problems during pregnancy and 1 year later. Among the partners there was a decrease in psychiatric problems from 26% during pregnancy to 16% 1 year later. No criminal activities or prostitution were reported during the final month of pregnancy or 1 year later.

Table III. Substance use among pregnant women in OMT and their partners during the final month (30 days) of pregnancy and 1 year after

| Substances        | Pregnancy: women ($n = 37$), partners ($n = 23$). 1 year later: | Women, $n$ (%) | Partners, $n$ (%) | $P$-value |
|-------------------|---------------------------------------------------------------|----------------|------------------|-----------|
|                   | women ($n = 35$), partners ($n = 19$).                      |                |                  |           |
| Heroin            | Pregnancy                                                   | 1 (3)          | 0                |           |
|                   | 1 year later                                                | 0              | 0                |           |
| Other opiates     | Pregnancy                                                   | 0              | 1 (4)            |           |
|                   | 1 year later                                                | 0              | 0                |           |
| Cocaine           | Pregnancy                                                   | 0              | 0                |           |
|                   | 1 year later                                                | 0              | 0                |           |
| Amphetamines      | Pregnancy                                                   | 1 (3)          | 0                |           |
|                   | 1 year later                                                | 0              | 0                |           |
| Cannabis          | Pregnancy                                                   | 0              | 1 (4)            |           |
|                   | 1 year later                                                | 1 (3)          | 1 (5)            |           |
| Illegal substances sum | Pregnancy                              | 1 (3)          | 2 (8)            | NS        |
|                   | 1 year later                                                | 1 (3)          | 1 (5)            | NS        |
| Benzodiazepines   | Pregnancy                                                   | 3 (8)          | 3 (13)           |           |
|                   | 1 year later                                                | 2 (6)          | 1 (5)            |           |
| Alcohol problems  | Pregnancy                                                   | 0              | 7 (30)           |           |
|                   | 1 year later                                                | 5 (15)         | 3 (16)           |           |
| Legal substances sum | Pregnancy                              | 3 (8)          | 9 (38)           | $p = 0.08$|
|                   | 1 year later                                                | 7 (19)         | 4 (20)           | $p = 0.01$|

Note: NS, not significant.
Table IV. Reported problems (number of days) in areas affected by substance abuse during the 30 days prior to the interview in the last month of pregnancy and 1 year later

| Problem area        | Pregnancy: women (n = 37), partners (n = 23). 1 year later: women (n = 35), partners (n = 19) | Women, n (%) | Partners, n (%) |
|---------------------|-------------------------------------------------------------------------------------------------|--------------|-----------------|
| Somatic/medical     | Pregnancy                                                                                       | 15 (41)*     | 5 (22)          |
|                     | 1 year later                                                                                   | 12 (34)*     | 7 (37)          |
| Family/relatives    | Pregnancy                                                                                       | 3 (8)        | 1 (4)           |
|                     | 1 year later                                                                                   | 7 (20)       | 2 (10)          |
| Others              | Pregnancy                                                                                       | 4 (11)       | 1 (4)           |
|                     | 1 year later                                                                                   | 3 (9)        | 3 (16)          |
| Unemployment        | Pregnancy                                                                                       | 1 (3)        | 3 (13)          |
|                     | 1 year later                                                                                   | 1 (3)        | 2 (10)          |
| Psychiatric         | Pregnancy                                                                                       | 9 (24)       | 6 (26)          |
|                     | 1 year later                                                                                   | 9 (26)       | 3 (16)          |
| Legal               | Pregnancy                                                                                       | 0            | 0               |
|                     | 1 year later                                                                                   | 0            | 0               |

Note: *p < 0.05.

Discussion

There are two main findings in this study. Firstly, illegal substance use remained stable and low from the last month of pregnancy to 1 year later. Secondly, problems in areas often related to substance abuse also remained low and stable from pregnancy to 1 year later.

The results from this study add to the existing research on substance abuse among parents in OMT with detailed information on substance use during pregnancy and after the children were born. Previous research has examined substance abuse among OMT mothers (Fitzsimons et al., 2007; Jansson et al., 2007; Jones et al., 2008), but to our knowledge this is the first study that provides detailed information of substance use among the women’s partners over time. Substance use history indicates that the women and most of their partners had serious drug abuse problems in the past. Women and partners alike had used heroin for about 8 years on a daily or almost daily basis prior to joining OMT. In line with findings from previous studies (Melberg et al., 2003; Jansson et al., 2007), most of the women, and the partners with a substance abuse history, in this study had been injecting drug users and polydrug users earlier in life.

There were few reports of illegal substance abuse among the women, and their partners, during the last month of pregnancy and 1 year after birth compared with other studies on pregnant women in OMT/mothers in OMT (Finnegan et al., 1981; Crandall et al., 2004; Fitzsimons et al., 2007). Becoming a parent is perceived as a meaningful activity, and because the women and their partners have chosen to become parents, they are likely to be highly motivated to abstain from drugs in order to keep custody of their children (Sundfaer, 2001).

On the other hand, some findings of this study give reason to concern. The most disturbing finding was an increase in alcohol use among the women from the final month of pregnancy to 1 year later. None of the women reported drinking during the last month of pregnancy. However, the tendency towards problem drinking among the women may be an indicator that they are struggling. It is quite possible that the women showed the
same pattern of problem drinking prior to pregnancy. That is, however, not examined in this study. It may be that they use alcohol as comfort/escape and it should therefore be taken seriously. It has been suggested that continued problem drinking and reduced use of illicit drugs may indicate a substitution of one substance for another (Gossop et al., 2000). It is possible that they use alcohol instead because it is not illegal. Because of the strict drug policy in Norway, the women may be afraid to mention that they are struggling out of fear of losing custody of their children. They may thus fail to report the problems they are experiencing.

To our knowledge this is the first prospective study that provides information about substance use among the partners of pregnant women in OMT. The trend among the partners shows the opposite pattern of substance use compared with the women. They reported using significantly less legal substances prior to the second interview. One possible explanation is that they are preoccupied by their parenting responsibilities and spend more of their spare time with their child and partner instead of drinking alcohol. On the other hand, the restrictive policy in Norway (Waal, 2007) and the close follow-up on the part of child welfare for parents in OMT might also have influenced the partners to drink less. With a low level of substance use, it might be that the partners would be able to provide support for the women instead of compromising their treatment outcome (Bresnahan et al., 1992; Ravndal & Vaglum, 1994; Tuten & Jones, 2003).

The results from this study support previous studies (Gossop et al., 1998; Chatham et al., 1999; Flynn et al., 2003; Gossop et al., 2003; Hubbard et al., 2003) that found a reduction in substance abuse to be associated with a reduction of problems in other areas. The absence of criminal involvement among this cohort is striking. This reduces the risk of the parents being incarcerated and all the ensuing disruptions in family functioning that would entail. One area gives reason to concern though. The women manifested considerable psychiatric problems both during pregnancy and after their children were born (24%). The prevalence of psychiatric problems was still much lower than in other studies (56–73%) of pregnant women in substance abuse treatment (Regan et al., 1982; Burns et al., 1985; Haller et al., 1993; Fitzsimons et al., 2007). This may be related to the fact that the women in our study had been in OMT for an average of about 2 years. As psychiatric problems are a strong indicator of treatment outcome (Haller et al., 2002) as well as parenting abilities (Finnegan et al., 1981), this finding still gives reason to worry.

Several limitations of this study should be noted. Because of a small sample, there is a risk of type 2 errors. One should therefore be careful about concluding that there is no change in problems associated with substance use during pregnancy and 1 year later among this cohort. Bakstad et al. reported findings from urine tests performed on the women (n = 28) in this cohort. In all but one case, there was agreement between the self-reported use and the urine analyses (Bakstad et al., 2009). The results underpin the impression that we received honest responses in the interview situation. The instruments used to analyse the urine samples do not pick up on use of alcohol, however. Therefore use of alcohol might be more often under-reported than use of illegal substances. Also, urine tests were not collected while the follow-up interviews were conducted. Thus, self-reported use of illegal substances may be under-reported and the results should be interpreted carefully.

Some of the strengths of this study include that all pregnant women in OMT in Norway over a 2-year period were invited to participate in this study, resulting in a unique national cohort of OMT mothers. The second strength is the inclusion of the pregnant women’s partners. The third strength is the prospective design with the follow-up of this cohort of OMT mothers and their partners over time.
In conclusion, the main finding of this study suggests that most of the pregnant women getting OMT in Norway, and their partners, are able to abstain from using illegal substances. Research should further examine whether the low use of substances among this cohort remains low and stable over time. Even though this study shows promising results, the increase in problem drinking among the women is a concern. The women and their partners should be offered close follow-up and help to deal with their own issues in addition to help in developing good caregiver strategies (Stewart et al., 2007). If problems are not dealt with properly, the risk of relapse is great (Tuten & Jones, 2003; Waal, 2007).

Declaration of interest
The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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