The prevalence of domestic violence and its correlation with family factors: A cross-sectional study among pregnant women in urban communities of Hengyang City, China

CURRENT STATUS: UNDER REVIEW

Baohua Zheng
Central South University Xiangya School of Public Health

Xidi Zhu
Central South University Xiangya School of Public Health

Zhao Hu
Central South University Xiangya School of Public Health

Wensu Zhou
Central South University Xiangya School of Public Health

Yunhan Yu
Central South University Xiangya School of Public Health

Shilin Yin
Central South University Xiangya School of Public Health

Huilan Xu
Central South University Xiangya School of Public Health

✉️ xhlxuhuilan@163.com
Corresponding Author
ORCiD: https://orcid.org/0000-0003-3397-5878

DOI: 10.21203/rs.2.20577/v1

SUBJECT AREAS
Health Policy  Infectious Diseases

KEYWORDS
Domestic violence, Women in the third trimester of pregnancy, Family factors, China
Abstract

Background

Domestic violence (DV) against pregnant women is a serious public health problem that affects the health of the women’s children. This study aimed to explore the prevalence and correlation between family factors and DV among women in late pregnancy.

Methods

A cross-sectional survey was conducted from July-October, 2019 among pregnant women in urban communities of Hengyang City, Hunan Province, China. A total of 813 participants were included by a multi-staged cluster random sampling method. DV was assessed by the Abuse Assessment Screen Questionnaire (AAS). A binary logistic regression model was used to evaluate the relationship between family factors and DV.

Results

Ultimately, 127 (15.62%) participants were identified as victims of DV. After adjustment, the potential risk factors of DV were strained relations with their mother-in-law and other family members (OR: 6.59; 95% CI: 3.28 to 13.24 and OR: 6.32; 95% CI: 3.28 to 12.16), medium household debt (OR: 2.17; 95% CI: 1.22 to 3.85), separation (OR: 1.94; 95% CI: 1.19 to 3.14), partner’s extramarital relations (OR: 4.94; 95% CI: 1.19 to 13.58), and middle and low family APGAR (OR: 2.25; 95% CI: 1.47 to 3.46 and OR: 5.36; 95% CI: 2.95 to 9.76).

Conclusions

In summary, the correlation between DV and family factors may help medical personnel intervene in cases of domestic violence against pregnant women in a reasonable and timely manner.

Background

Domestic violence (DV) refers to all forms of violence against family members by means of beating, binding, maiming, abuse, restriction of personal freedom, abandonment and sexual abuse[1, 2]. DV is not only a serious social problem but also a public health problem, and has been reported in both developed and developing countries[3, 4]. DV can lead to serious injury, disability, and even death. It can also indirectly cause depression, anxiety, sleep disorder, eating disorder, substance use, and lack
of fertility control and personal freedom[5, 6].

Pregnancy is considered as a special period that DV starts or exacerbates[7, 8]. Some researchers found that pregnant women were 2.7 to 3.9 times more likely to suffer from physical violence and twice as likely to suffer from sexual violence compared with unpregnant women[9]. Because of the increased vulnerability women experience during pregnancy, DV not only can harm their own body and psychology but can also seriously affect the health of their next generation[10].

In different countries, the prevalence of DV is significantly different. Worldwide, the prevalence of DV during pregnancy is approximately 0.9%-20%[11]. In Iran, the prevalence of DV against pregnant women is 28.2%[12]. A cross-sectional study on 2088 Sri Lankan pregnant women reported that the prevalence of DV was 15.9%[13]. In Changsha City, China, Zhang et al reported that 11.3% of women had experienced DV during pregnancy[1]. DV can include physical, mental and sexual violence. Physical violence was the second leading cause of trauma during pregnancy[14], and the prevalence varied from 0.9% to 21% worldwide[15-17]. A review including 18 studies from around the world from 1996 to 2009 reported that the prevalence of physical violence during pregnancy ranged from 0.9% to 30.0%, that of mental violence during pregnancy was 1.5% to 36% and that of sexual violence was 1.0% to 3.9%[18].

In previous studies, many social factors were associated with the occurrence of DV among pregnant women. First, social instability was the potential risk factor associated with violence. For instance, other studies showed that higher prevalence rates tend to be reported among low-income, separated and divorced pregnant women[19-21]. Additionally, violence during pregnancy has been associated with some pregnancy characteristics, such as multiple deliveries[22], lack of prenatal care[23] and unintended pregnancy[7, 19]. Moreover, there has been some indication that violence during pregnancy is associated with unhealthy lifestyle behaviours, such as drinking, smoking, unhealthy diet and substance abuse[24]. Some characteristics of intimate partners, such as alcohol misuse, jealousy, stress[24], and unemployment[25, 26] might be risk factors of DV during pregnancy. Based on the current literature, the relationship between family factors and DV among pregnant women has not received much attention. Few studies have explored the relationship between family
characteristics and DV from the various perspectives of family characteristics. Therefore, this study focuses on the correlation between family factors and the occurrence of DV among pregnant women from four aspects: family relationships, family structure, family-related stressors and family function, to facilitate DV intervention for pregnant women.

Methods

Research design and sample

A cross-sectional survey was conducted from July-October, 2019 among pregnant women in urban communities of Hengyang City, Hunan Province, China. A multi-staged cluster random sampling method was used in this study. There are 5 districts in urban Hengyang. In the first stage, a street from each district was randomly selected: Zhengxiang Street, Qingshan Street, Baishazhou Street, Guangdonglu Street and Zhurong Street. In the second stage, proportional sampling was carried out at a proportion of 1/3 to randomly select 4 communities in Zhengxiang Street, 3 communities in Qingshan Street, 3 communities in Baishazhou Street, 2 communities in Guangdonglu Street, and 2 communities in Zhurong Street. In total, 14 communities were selected for this study. All pregnant women who were registered in community health service centres and who met the inclusion criteria were potential subjects in this study. The inclusion criteria for the study were as follows: 1. women in the third trimester of pregnancy; 2. pregnant women over 16 years old; and 3. pregnant women who had local household registration, or migrant people who had lived in urban areas of Hengyang city for more than 6 months. The exclusion criteria were: 1. pregnant women with cognitive disorders, severe mental illnesses or other serious diseases who cannot fill out the questionnaire by themselves; and 2. pregnant women who refused to participate in the study. There were 819 registered samples in the 14 selected communities, of which 6 were excluded because of refusals to respond and failure to contact; therefore, 816 pregnant women who met the requirements participated in the study. The response rate was 99.3% (813/819).

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Xiangya School of Public Health, Central South University (XYGW-2019-056).
Data collection and measurements

General characteristics

General characteristics were collected, including age (26, 27-32, ≥33), ethnicity (minority, Han ethnicity), marital status (stable, unstable), monthly per capita household income (≤3000, 3001-5000, 5001-8000, ≥8001), education level (senior school / technical school or less, college / university degree or above), occupation (employed, unemployed), partner’s education level (senior school / technical school or less, college / university degree or above), partner’s occupation (employed, unemployed), whether they had medical insurance, whether they had a smoking habit, whether they had a drinking habit, the partner’s smoking habit, the partner’s drinking habit, the mode of pregnancy (natural conception, artificial impregnation), history of delivery (≤1, ≥1), pregnancy intention (intended, unintended), whether they had experienced multiple abortions/sterility, whether they had received antenatal examinations, whether they had pregestational diseases (depression or diabetes), and whether they had pregnancy complications (gestational diabetes, pregnancy-induced hypertension, intrahepatic cholestasis of pregnancy, and others). Being married was defined as being in a stable marriage. Unstable marriages included unmarried, divorced, and widowed.

Family factors

Family factors consisted of four aspects: family relationships, family structure, family-related stressors and family function. Family relationships were evaluated on two dimensions: the relations with the mother-in-law (good, bad) and relations with other family members (good, bad). Family structure included the number of cohabitants (1-2, ≥3) and whether they lived with elders. In terms of family relation stressors, three family negative life events were listed: whether they had medium household debt, whether they were separated from their partner, and whether their partner had extramarital relations. The Family Adaptation Partnership Growth Affection and Resolve Index (APGAR) is a tool for evaluating family functions. The Family APGAR has five items, and each item was answered on a 3-point Likert scale from “often” (2 points) to “rarely” (0 points). The total score was 0-10 points. High family APGAR index scores ranging from 7 to 10 points indicated good family function, middle family APGAR index scores ranging from 4 to 6 points indicated moderate family dysfunction, and low family
APGAR index ranges from 0 to 3 points indicated severe family dysfunction. Family APGAR index has been widely used and has good reliability and validity[27, 28]. The Cronbach's α is 0.876.

**Assessment tools for DV**

The Abuse Assessment Screen Questionnaire (AAS) was compiled in 1995 by McFarlane and translated into Chinese by Leung of the University of Hong Kong and was used to assess DV during pregnancy. There are eight items in this scale assessing mental, physical and sexual violence as well as the psychological response to perpetrators in three periods: lifetime and 12 months prior to and during pregnancy. The response to each item was either Yes or No. If the interviewee answered “Yes” to one or more of Questions 5 to 7, she was identified as a victim of DV during pregnancy[29, 30]. The scale's Cronbach's α is 0.685. These scales are widely known as self-management tools for screening DV with good validity and reliability[25].

**Statistical analysis**

*EpiData 3.1* and *SPSS 19.0* software were used for data entry and statistical analysis. Categorical variables are expressed as n (%), the χ² test was applied for comparisons of characteristics between pregnant women who had experienced DV and those who had not (no DV group), and the variable of p≤0.05 was used as the adjustment variable. The crude odds ratio (COR) was reported by univariate binary logistic regression models. For instance, the multivariate binary logistic regression models were conducted to estimate the effect of family factors on DV, and adjusted odds ratio (AOR) and 95% confidence interval (95% CI) were reported. The statistical significance level was accepted as p≤0.05. All statistical tests were 2-sided.

**Results**

The mean age of the 813 participants was 28.98±4.52 years. Most of them were of Han ethnicity (n=798[98.2%]), had stable marital status (n=728, 89.5%) and were employed (n=599, 73.7%). More than half of them had college / university degree or above education level (n=472, 58.1%). A total of 9% had a monthly household income of ≤3000, 36.9% of 3001-5000, 33.5% of 5001-8000, and 20.7% of >8001. The majority had medical insurance (n=592,72.8%). Three (0.4%) and 80 (9.8%) had smoking and drinking habits, respectively. Regarding their partner, 487 (59.9%) had college /
university degree or above education level, and 799 (98.3%) were employed. A total of 288 (35.4%) and 314 (38.6%) had smoking and drinking habits, respectively. (Table 2)

During pregnancy, 127 (15.62%) participants suffered from DV in at least one form. Mental violence was the most serious (n=90, 11.07%), followed by physical and sexual violence, which only occurred in 8 (0.98%) and 7 (0.86%), respectively. A total of 25 (3.08%) participants reported that they had experienced two types of violence (physical and mental violence), and 44 (5.41%) participants reported that they were afraid of the person who hurt them. (Table 1)

**Table 1** General characteristics of the participants. (DV vs No DV).
| Variables                                      | DV (n=127) | No DV (n=686) | Total (n=813) | $\chi^2$ value | p value |
|-----------------------------------------------|------------|---------------|---------------|---------------|---------|
| **Age**                                       |            |               |               | 0.189         | 0.910   |
| 26                                            | 35 (27.6)  | 202 (29.4)    | 237 (29.2)    |               |         |
| 27-32                                         | 67 (52.8)  | 354 (51.6)    | 421 (51.8)    |               |         |
| 33                                            | 25 (19.7)  | 130 (19.0)    | 155 (19.1)    |               |         |
| **Ethnicity**                                 |            |               |               | 0.690         | 0.406   |
| Minority                                      | 4 (3.1)    | 11 (1.6)      | 15 (1.8)      |               |         |
| The Han ethnicity                             | 123 (96.9)| 675 (98.4)    | 798 (98.2)    |               |         |
| **Marital status**                            |            |               |               | 0.739         | 0.390   |
| Stable                                        |            |               |               |               |         |
| Unstable                                      | 111 (87.4)| 617 (89.9)    | 728 (89.5)    |               |         |
| **Education**                                 |            |               |               | 1.064         | 0.302   |
| Senior school / technical school or less      | 48 (37.8)  | 293 (42.7)    | 341 (41.9)    |               |         |
| College / university degree or above          | 79 (62.2)  | 393 (57.3)    | 472 (58.1)    |               |         |
| **Occupation**                                |            |               |               | 0.944         | 0.331   |
| Employed                                      | 98 (77.2)  | 501 (73)      | 599 (73.7)    |               |         |
| Unemployed                                    | 29 (22.8)  | 185 (27)      | 214 (26.3)    |               |         |
| **Education (partner)**                      |            |               |               | 1.064         | 0.302   |
| Senior school / technical school or less      | 48 (37.8)  | 293 (42.7)    | 341 (41.9)    |               |         |
| College / university degree or above          | 79 (62.2)  | 393 (57.3)    | 472 (58.1)    |               |         |
| **Monthly per capita household income**       |            |               |               | 4.025         | 0.259   |
| ≤3000                                         | 12 (9.4)   | 61 (8.9)      | 73 (9.0)      |               |         |
| 3001-5000                                     | 44 (34.6)  | 256 (37.3)    | 300 (36.9)    |               |         |
| 5001-8000                                     | 51 (40.2)  | 221 (32.2)    | 272 (33.5)    |               |         |
| 8001-1000                                     | 20 (15.7)  | 148 (21.6)    | 168 (20.7)    |               |         |
| **Medical insurance**                         |            |               |               | 4.275         | 0.039   |
| Yes                                           | 102 (80.3)| 490 (71.4)    | 592 (72.8)    |               |         |
| No                                            | 25 (19.7)  | 196 (28.6)    | 221 (27.2)    |               |         |
| **History of smoking**                        |            |               |               | 0.002         | 0.960   |
| Yes                                           | 1 (0.8)    | 2 (0.3)       | 3 (0.4)       |               |         |
| No                                            | 126 (99.2)| 684 (99.7)    | 810 (99.6)    |               |         |
| **History of drinking**                       |            |               |               | 9.499         | 0.002   |
| Yes                                           | 22 (17.3)  | 58 (8.5)      | 80 (9.8)      |               |         |
| No                                            | 105 (82.7)| 628 (91.5)    | 733 (90.2)    |               |         |
| **History of smoking (partner)**              |            |               |               | 0.042         | 0.838   |
| Yes                                           | 46 (36.2)  | 242 (35.3)    | 288 (35.4)    |               |         |
| No                                            | 81 (63.8)  | 444 (64.7)    | 525 (64.6)    |               |         |
| **History of drinking (partner)**             |            |               |               | 1.393         | 0.238   |
| Yes                                           | 55 (43.3)  | 259 (37.8)    | 314 (38.6)    |               |         |
| No                                            | 72 (56.7)  | 427 (62.2)    | 499 (61.4)    |               |         |
| **Mode of pregnancy**                         |            |               |               | 1.113         | 0.291   |
| Natural conception                            | 124 (97.6)| 656 (95.6)    | 780 (95.9)    |               |         |
| Artificial impregnation                       | 3 (2.4)    | 30 (4.4)      | 33 (4.1)      |               |         |
| **History of delivery**                       |            |               |               | 0.388         | 0.533   |
| ≤1                                            | 66 (89.2)  | 347 (86.5)    | 413 (86.9)    |               |         |
| 1                                             | 8 (10.8)   | 54 (13.5)     | 62 (13.1)     |               |         |
| **Pregnancy intention**                       |            |               |               | 0.958         | 0.328   |
| Intended                                      | 70 (55.1)  | 410 (59.8)    | 480 (59.0)    |               |         |
| Unintended                                    | 57 (44.9)  | 276 (40.2)    | 333 (41.0)    |               |         |
| **Multiple abortions/sterility**              |            |               |               | 11.476        | 0.001   |
| Yes                                           | 16 (12.6)  | 33 (4.8)      | 49 (6.0)      |               |         |
| No                                            | 111 (87.4)| 653 (95.2)    | 764 (94.0)    |               |         |
| **Regular antenatal examination**             |            |               |               | 1.836         | 0.175   |
| Yes                                           | 120 (94.5)| 623 (90.8)    | 743 (91.4)    |               |         |
| No                                            | 7 (5.5)    | 63 (9.2)      | 70 (8.6)      |               |         |
| **Pregestational diseases**                   |            |               |               | 0.676         | 0.411   |
| Yes                                           | 3 (2.4)    | 7 (1.0)       | 10 (1.2)      |               |         |
| No                                            | 124 (97.6)| 679 (90.0)    | 803 (98.8)    |               |         |
| **Pregnancy complications**                   |            |               |               | 3.264         | 0.071   |
| Yes                                           | 19 (15.0)  | 66 (9.6)      | 85 (10.5)     |               |         |
| No                                            | 108 (85.0)| 620 (90.4)    | 728 (89.5)    |               |         |

Abbreviations: DV, domestic violence.
Characters in bold mean statistical significance P0.05.

Table 2 Bivariate logistic regression analysis of family factors associated with DV among pregnant women.

| Variables                          | DV (n=127) | No DV (n=686) | COR (95% CI) | AOR* (95% CI) |
|-----------------------------------|------------|---------------|--------------|---------------|
| **Family relationships**          |            |               |              |               |
| Relationship with mother-in-law   |            |               |              |               |
| Good                             | 106 (83.5) | 668 (97.4)    | 1.00         | 6.59 (3.79, 14.25) |
| Bad                              | 21 (16.5)  | 18 (2.6)      | 7.35 (3.42, 15.86) | 13.24 (6.59, 26.7) |
| Relationship with other families  |            |               |              |               |
| Good                             | 104 (81.9) | 666 (97.1)    | 1.00         | 6.32 (3.28, 12.16) |
| Bad                              | 23 (18.1)  | 20 (2.9)      | 7.36 (3.91, 13.88) | 12.16 (6.32, 23.34) |
| **Family structure**              |            |               |              |               |
| Number of cohabitation (include oneself) | 26 (20.5) | 147 (21.4)    | 1.00         | 1.00 |
| 1-2                               | 101 (79.5) | 539 (78.6)    | 1.06 (0.66, 1.69) | 1.16 (0.72, 1.87) |
| 3                                 | 101 (79.5) | 539 (78.6)    | 1.06 (0.66, 1.69) | 1.16 (0.72, 1.87) |
| Live with eldership               |            |               |              |               |
| Yes                               | 88 (69.3)  | 447 (65.2)    | 1.21 (0.80, 1.82) | 1.18 (0.78, 1.79) |
| No                                | 39 (30.7)  | 239 (34.8)    | 1.00         | 1.00 |
| **Family related stressors**      |            |               |              |               |
| Medium Household debt             |            |               |              |               |
| Yes                               | 20 (15.7)  | 52 (7.6)      | 2.28 (1.31, 3.97) | 2.17 (1.22, 3.85) |
| No                                | 107 (84.3) | 624 (92.4)    | 1.00         | 1.00 |
| Separation                        |            |               |              |               |
| Yes                               | 29 (22.8)  | 90 (13.1)     | 1.96 (1.23, 3.14) | 1.94 (1.19, 3.14) |
| No                                | 98 (77.2)  | 596 (85.9)    | 1.00         | 1.00 |
| Partner’s extramarital relations  |            |               |              |               |
| Yes                               | 9 (7.1)    | 8 (1.2)       | 6.46 (2.45, 17.09) | 4.9 (1.80, 13.58) |
| No                                | 118 (92.9) | 678 (98.8)    | 1.00         | 1.00 |
| **Family function**               |            |               |              |               |
| Family APGAR index                |            |               |              |               |
| Low level                         | 25 (19.7)  | 41 (6)        | 5.38 (3.02, 9.58) | 5.36 (2.95, 9.76) |
| Middle level                      | 52 (40.9)  | 204 (29.7)    | 9.58 (3.22, 27.72) | 2.25 (1.47, 3.46) |
| High level                        | 50 (39.4)  | 441 (64.3)    | 2.25 (1.47, 3.46) | 1.00 |

Abbreviations: DV, domestic violence; COR, crude odds ratio; AOR, adjusted odds ratio.

Characters in bold indicate statistical significance, p0.05.

*Adjusted for medical insurance, drinking habit, multiple abortions/sterility.

**Family factors influencing DV**

According to the χ2 test results, three variables showed statistically significant differences between the DV group and the no DV group (p ≤0.05): whether they had medical insurance, whether they had a drinking habit and whether they had experienced multiple abortions/sterility (Table 1). These three variables were adjusted as confounding variables. After adjustment, the multivariate binary logistic regression analysis showed that the independent risk factors for DV were strained relations with their
mother-in-law (OR: 6.59; 95% CI: 3.28 to 13.24), strained relations with other family members (OR: 6.32; 95% CI: 3.28 to 12.16), medium household debt (OR: 2.17; 95% CI: 1.22 to 3.85), separation (OR: 1.94; 95% CI: 1.19 to 3.14), partner’s extramarital relations (OR: 4.94; 95% CI: 1.19 to 13.58), and middle and low family APGAR index (OR: 2.25; 95% CI: 1.47 to 3.46, OR: 5.36; 95% CI: 2.95 to 9.76). (Table 2)

There were no significant differences in the number of cohabitants or living with elders between the DV group and the no DV group (p>0.05). (Table 2)

Discussion

In this study, 127 (15.62%) participants were identified as victims of DV: 11.07% (n=90) of participants had experienced mental violence, 0.98% (n=8) physical violence, and 0.86% (n=7) sexual violence; 25 (3.08%) participants reported that they had experienced two forms of violence.

The total positive rate of this study was similar to that of another study (the positive rate was 11.3%) carried out in Changsha City, Hunan Provinces, China[1]. However, the positive rate was lower than those in some foreign countries. In a Portuguese study, 43.4% reported a history of DV during pregnancy[31]. A hospital-based cross-sectional study carried out in Northwest Ethiopia reported that 58.7% were victims of DV during pregnancy[22]. The likely reasons for the lower positive rate in this study were the different cultural backgrounds and regions that led to different understandings of DV and the fact that some women who are suffering from violence do not regard these behaviours as DV.

In Eastern culture, women were more likely to be silent to maintain the stability of the family and to avoid more serious violence, which might have led to a decline in the positive reporting rate. Furthermore, the outcome assessment tool might the possible reason for the differences in the prevalence of DV. The study conducted in Changsha used the Abuse Assessment Screen (AAS), whereas the studies in Portugal and Ethiopia used the WHO tool to assess the outcome variable. In terms of the types of DV, mental violence was the most serious, which was similar to findings in Guatemala and Iran[32, 33]. Most of the perpetrators are their intimate partner (current husbands, ex-husbands and ex-boyfriends), which was consistent with the study by Mtonga in Zambia[34]. The findings showed that strained relations with family members, especially the mother-in-law, was
significantly related to the occurrence of DV during pregnancy (p<0.05). In the group with strained relations, the risk of DV was 6 times higher than that in the reference group (OR: 6.32; 95% CI: 3.28 to 12.16). In contrast, it is worth paying special attention that the risk of DV was higher in the group with a strained relationship with their mother-in-law (OR: 6.59; 95% CI: 3.28 to 13.24); these findings were almost consistent with those reported by Chen in Hong Kong, China[35]. In China, discord between family members, especially contradictions between mother-in-law and daughter-in-law, are important factors of family conflict. Due to the differences in fertility and health concepts between women and their mothers-in-law, contradictions occur frequently, especially during pregnancy. Driven by Chinese filial culture, the partner is extremely susceptible to the influence of their mothers' attitudes, which might lead to hostility, cold violence, language violence, and even physical violence. In this study, all three negative life events listed by family-related stressors were associated with the occurrence of DV (p<0.05). The risk in participants who had medium household debt was 2 times as much as that in the reference group (OR: 2.17; 95% CI: 1.22 to 3.85). Thus, pregnant women with medium household debt were more likely to suffer from DV. This was consistent with results from the research by Tsui in Hong Kong[36]. During pregnancy, with the increasing household expenses accompanied by the loss of working ability of the pregnant woman, the woman has to bear the brunt of her partner’s temper and pressure.

Separation is an independent risk factor for DV, which is in agreement with conclusions from a previous study carried out in six provinces in China[37]. A study by Bacchus in London showed that women with a history of DV were more likely to be separated or in a non-cohabiting relationship in the year prior to and/or during pregnancy[38]. Hillard et al expressed that assaulted women were more likely to separate from their partner[39]. The risk was 2 times as much as that in the reference group in this study (OR: 1.94; 95% CI: 1.19 to 3.14). Because of the separation, there was a lack of adequate communication, which might lead to the emergence and aggravation of contradictions and violence. In another words, the pregnant women who suffered from the DV were more likely to live separately from her partner to avoid the occurrence of violence.

Partner’s extramarital relations was a related factor in DV, with a risk that was 4 times higher than
that in the reference group (OR: 4.94; 95% CI: 1.19 to 13.58). The finding was similar to the study by Cao and colleagues in Hunan province[40]. The male partner's extramarital relations often occurred during the woman's pregnancy. During pregnancy, women pay more attention to their own physiological changes and the foetal growth, and they sometimes ignore the emotional and sexual needs of their male partners, which can cause family conflicts and violence to some extent.

Family dysfunction was a related factor with DV; this finding was similar to the study by Tuesca in Colombia[41]. The lower the family APGAR index indicates the more serious the family dysfunction. The risk to participants with low and middle family APGAR indexes was 5 and 2 times as much as that of pregnant women with a high family APGAR index (OR: 5.36; 95% CI: 2.95 to 9.76; OR: 2.25; 95% CI: 1.47 to 3.46), respectively. Family dysfunction reflected that pregnant women could not acquire enough care, love and help from their families and even that the family might be the source of bodily injury and mental pressure.

In this study, the selection of the objects is representative. The principle of randomization was followed, and women in the third trimester of pregnancy were selected as the subjects of the survey. Women in the third trimester of pregnancy have experienced nearly the entire pregnancy process and can report fully on their experiences of abuse throughout pregnancy with less recall bias. Equally important, pregnant women have different mental activities and physiological characteristics at different stages of pregnancy. Compared with all periods of pregnant women, the choice of women in the third trimester can reduce the influence of confounding factors such as gestational age. This study provides a comprehensive discussion of the relationship between family factors and pregnant women's DV from various dimensions, which has certain innovative value in the prevention of DV. The present study also had certain limitations. This study was cross-sectional; thus, there were limitations in identifying causal relationships. Second, because of the self-reported design, we cannot deny the reporting bias. Last, there are some limitations to the AAS scale: AAS cannot distinguish the severity of DV and injured body parts, which may reduce the investigative effect of the scale, so that some risk characteristics cannot be identified. However, this study promoted an understanding of the relationship between family factors and DV and further confirmed the importance of family factors.
Conclusions
In this study, 15.62% of participants were identified as victims of DV. A total of 11.07% of participants had experienced mental violence; 0.98%, physical violence; and 0.86%, sexual violence; 25 (3.08%) participants reported that they had experienced two types of violence. There were strong correlations between DV and family relationships, family function and family-related stressors.
Finally, maternal and child health personnel should pay more attention to pregnant women with these potential family risk characteristics and be able to recognize the signs of DV in the course of an antenatal examination so that relevant departments can take appropriate measures to decrease damage and even avoid the occurrence of DV. These findings have positive significance for the screening and prevention of DV in pregnant women.

Abbreviations
DV: Domestic violence; AOR: Adjusted

Declarations

Acknowledgements
We are grateful to all teachers and students who generously shared their time and experience for this study.

Funding
None.

Availability of data and materials
Data is currently not available online. But can be made available to any interested person(s) contacting the corresponding author via email.

Authors’ contributions
Conceptualization, XD Zhu and BH Zheng; Methodology, BH Zheng and WS Zhou; Investigation, BH Zheng, Z Hu, WS Zhou, YH Yu and SL Yin.; Resources, XD Zhu; Data Curation, BH Zheng and YH Yu; Writing – Original Draft Preparation, BH Zheng; Writing – Review & Editing, HL Xu.

Competing interests
The authors declare that they have no competing interests.

Consent for publication
Not applicable.

**Ethics approval and consent to participate**

The study has been approved by the Ethics Committee of Xiangya School of Public Health, Central South University (XYGW-2019-056). Written informed consent was obtained from all participants before administering any study procedures.

**Author details**

1. Department of Social Medicine and Health Management, Xiangya School of Public Health, Central South University, Changsha, China.

**References**

1. Zhang Y, Zou S.H., Cao Y.P., Zhang Y.L.: Relationship between domestic violence and postnatal depression among pregnant Chinese women. International Journal of Gynecology & Obstetrics 2012, 116(1):0-30.

2. Sarkar NN: The impact of intimate partner violence on women’s reproductive health and pregnancy outcome. Journal of Obstetrics & Gynaecology 2008, 28(3):266-271.

3. Garcia-Moreno C, Pallitto C, Devries K, Stockl H, Watts C, Abrahams N: Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence. Geneva: World Health Organization 2013.

4. Mavrikiou PM, Apostolidou M, Parlalis SK: Risk factors for the prevalence of domestic violence against women in Cyprus. The Social Science Journal 2014, 51(2):295-301.

5. Jasinski JL: Pregnancy and Domestic Violence: A Review of the Literature. Trauma, Violence, & Abuse 2004, 5(1):47-64.

6. Laude M, Fuchs SC, Stallings RY, Patricia P, Christine K, Josephine R, Campbell DW, Jacquelyn C, Sara T: Abuse During and Before Pregnancy: Prevalence and Cultural Correlates. Violence Vict 2000, 15(3).
7. Goodwin MM, Gazmararian JA, Johnson CH, Gilbert BC, Saltzman LE: Pregnancy Intendedness and Physical Abuse Around the Time of Pregnancy: Findings from the Pregnancy Risk Assessment Monitoring System, 1996-1997 Maternal and Child Health Journal 2000, 4(2):85-92.

8. Gelles RJ: Violence and Pregnancy: Are Pregnant Women at Greater Risk of Abuse? Journal of Marriage and Family 1988, 50(3):841-847.

9. Brownridge DA, Taillieu TL, Tyler KA, Tiwari A, Ko Ling Chan, Santos SC: Pregnancy and Intimate Partner Violence: Risk Factors, Severity, and Health Effects. Violence Against Women 2011, 17(7):858-881.

10. Jahanfar S, Malekzadegan Z: The Prevalence of Domestic Violence Among Pregnant Women Who Were Attended in Iran University of Medical Science Hospitals. Journal of Family Violence 2007, 22(8):643-648.

11. Johnson JK, Haider F, Ellis K, Hay DM, Lindow SW: The prevalence of domestic violence in pregnant women. BJOG 2003, 110(3):272-275.

12. Abadi MNL, Ghazinour M, Nojomi M, Richter Jr: The Buffering Effect of Social Support between Domestic Violence and Self-Esteem in Pregnant Women in Tehran, Iran. Journal of Family Violence 2012, 27(3):225-231.

13. Muzrif MM, Perera D, Wijewardena K, Schei B, Swahnberg KJBO: Domestic violence: a cross-sectional study among pregnant women in different regions of Sri Lanka. BMJ Open 2018, 8(2):e017745-017752.

14. Connolly AM, Katz V, Bash K, McMahon M, Hansen W: Trauma and Pregnancy. American Journal of Perinatology 1997, 14(06):331-336.

15. Newberger EH, Barkan SE, Lieberman ES, Mccormick MC, Schechter SJ: Abuse of Pregnant Women and Adverse Birth OutcomeCurrent Knowledge and Implications for Practice. JAMA 1992, 267(17):2370-2372.
16. Petersen R, Gazmararian JA, Spitz AM, Rowley DL, Marks JS: Violence and Adverse Pregnancy Outcomes: A Review of the Literature and Directions for Future Research. American Journal of Preventive Medicine 1997, 13(5):366-373.

17. Gazmararian, A. J: Prevalence of Violence Against Pregnant Women. JAMA 1996, 275(24):1915-1920.

18. Taillieu TL, Brownridge DA: Violence against pregnant women: Prevalence, patterns, risk factors, theories, and directions for future research. Aggression & Violent Behavior 2010, 15(1):0-35.

19. Saltzman LE, Johnson CH, Gilbert BC, Goodwin MM: Physical Abuse Around the Time of Pregnancy: An Examination of Prevalence and Risk Factors in 16 States. Maternal & Child Health Journal 2003, 7(1):31-43.

20. Covington DL, Hage M, Hall T, M. M: Preterm Delivery and the Severity of Violence During Pregnancy. Journal of Reproductive Medicine 2001, 46(12):1031-1039.

21. Dunn LL, Oths KS: Prenatal Predictors of Intimate Partner Abuse. Journal of Obstetric, Gynecologic, & Neonatal Nursing 2004, 33(1):54-63.

22. Fekadu E, Getachew Y, Alemu GK, Awoke AT, Tameru M, Tinsae G, Fetene TD: Prevalence of domestic violence and associated factors among pregnant women attending antenatal care service at University of Gondar Referral Hospital, Northwest Ethiopia. BMC Women's Health 2018, 18(1):138-145.

23. Heaman MI, Gupton AL, Moffatt ME: Prevalence and Predictors of Inadequate Prenatal Care: A Comparison of Aboriginal and Non-Aboriginal Women in Manitoba. Journal of Obstetrics & Gynaecology Canada 2005, 27(3):237-246.

24. Hellmuth JC, Gordon KC, Stuart GL, Moore TM: Risk factors for intimate partner violence during pregnancy and postpartum. Archives of Womens Mental Health 2013, 16(1):19-27.
25. Leung WC, Leung TW, Lam YY, Ho PC: The prevalence of domestic violence against pregnant women in a Chinese community. Int J Gynaecol Obstet 1999, 66(1):23-30.

26. Martin SL, Curtis S: Gender-based violence and HIV/AIDS: Recognising links and acting on evidence. Lancet 2004, 363(9419):1410-1411.

27. Smilkstein G, Ashworth C, Dan M: Validity and Reliability of the Family APGAR as a Test of Family Function. The Journal of family practice 1982, 15(2):303-311.

28. Liu Y, Duan XL, Li Z: Influence of Social Support and Family Function on the Approach of Delivery. Journal of Modern Clinical Medicine 2012, 5:358-361.

29. Rabin RF, Jennings JM, Campbell JC, Bair-Merritt MH: Intimate Partner Violence Screening Tools: A Systematic Review. 2009, 36(5):0-4450000.

30. Reichenheim ME, Moraes CL: Comparison between the abuse assessment screen and the revised conflict tactics scales for measuring physical violence during pregnancy. Journal of Epidemiology & Community Health 2004, 58(6):523-527.

31. Almeida FSJ, Coutinho EC, Duarte JC, Chaves CMB, Nelas PAB, Amaral OP, Parreira VC: Domestic violence in pregnancy: prevalence and characteristics of the pregnant woman. Journal of Clinical Nursing 2017, 26:2417-2425.

32. Mohamadian F, Hashemian A, Bagheri M, Direkvand-Moghadam AJKJoFM: Prevalence and Risk Factors of Domestic Violence against Iranian Women: A Cross-Sectional Study. Korean Journal of Family Medicine 2016, 37(4):253-258.

33. Johri M, Morales RE, Boivin JF, Samayoa BE, Hoch JS, Grazioso CF, Barrios Matta IJ, Sommen C, Baide Diaz EL, Fong HR: Increased risk of miscarriage among women experiencing physical or sexual intimate partner violence during pregnancy in Guatemala City, Guatemala: cross-sectional study. Bmc Pregnancy & Childbirth 2011, 11:49-60.

34. Mtonga MDM: The prevalence and factors contributing to domestic violence among
pregnant women attending antenatal clinics in Lusaka urban clinics in Zambia. Injury Prevention 2010, 16(1):A19-A20.

35. Chan KL, Brownridge DA, Tiwari A, Fong DYT, Leung WC: Understanding Violence Against Chinese Women in Hong Kong: An Analysis of Risk Factors With a Special Emphasis on the Role of In-Law Conflict. Violence Against Women 2008, 14(11):1295-1312.

36. Tsui KL, Chan AY, So FL, Kam CW: Risk factors for injury to married women from domestic violence in Hong Kong. Hong Kong medical journal 2006, 12(4):289-293.

37. Guo SF, Wang LH, Wu JL, Qu CY, Yan RY: Effect of domestic violence on obstetric outcome during pregnancy. Chin J Perinat Med 2004, 38:265-268.

38. Bacchus L, Mezey G, Bewley S: Domestic violence: prevalence in pregnant women and associations with physical and psychological health. European Journal of Obstetrics & Gynecology and Reproductive Biology 2004, 113(1):0-11.

39. Hillard PJA: Physical abuse in pregnancy. Obstetrics and Gynecology 1985, 66(2):185-190.

40. Cao YP, Zhang YL, Wang GQ, Yang SC, Zhang Y, Huang GP: An analysis of risk factors in household with a history of domestic violence. Chinese Journal of Behavioral Medical Science 2008, 17:34-36.

41. Tuesca R, Borda M: Violencia física marital en Barranquilla (Colombia): prevalencia y factores de riesgo. Gaceta Sanitaria 2003, 17(4):302-308.