

# Association Between Suicidal Behavior and Clinical Features of Premenstrual Syndrome and Menstrual History: A Cross Sectional Study

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## Abstract

**Background:** The link between suicidal behavior and premenstrual syndrome has been poorly studied. This study aimed to determine the association of suicide attempts, and suicidal ideation and signs and symptoms of premenstrual syndrome and menstrual history in women in Durango City, Mexico.

**Methods:** Using a cross-sectional study design, 437 women were interviewed to obtain clinical data about their premenstrual period, menstrual history and suicidal behavior. Logistic regression was used to assess the association between suicide behavior and clinical features of women. Odds ratio (OR) adjusted by age, presence of mental illness, and residence area, and 95% confidence interval (CI) were obtained.

**Results:** Of these women, 29 (6.6%) had a history of suicidal ideation, and 15 (3.4%) had a history of suicide attempts. Logistic regression showed that suicidal ideation was associated with the variables: presence of irregular periods (OR = 2.89; 95% CI: 1.10 - 7.55; P = 0.03), low back pain (OR = 4.57; 95% CI: 1.31 - 15.92; P = 0.01), desire to eat certain food or eat a lot (OR = 2.47; 95% CI: 1.10 - 5.57; P = 0.02), guilty feeling (OR = 2.43; 95% CI: 1.06 - 5.59; P = 0.03), and aggressiveness (OR = 3.19; 95% CI: 1.42 - 7.13; P = 0.005). Whereas logistic regression showed that a history of suicide attempts was associated with the variables: presence of irregular periods (OR = 9.57; 95% CI: 1.23 - 74.44; P = 0.03), and desire to eat certain food or eat a lot (OR = 3.08; 95% CI: 1.04 - 9.15; P = 0.04).

**Conclusions:** In this first study on the link of suicide behavior and clinical features of premenstrual syndrome, results suggest that suicidal ideation and suicide attempts are associated to specific signs or symptoms of premenstrual syndrome. Further research to confirm the findings of this study is needed. Results might help for an optimal planning of preventive measures against suicide.

**Keywords:** Suicide attempts; Suicidal ideation; Association; Pre-

menstrual syndrome; Cross-sectional study

## Introduction

Suicidality is a worldwide major societal and health care problem [1]. Three times more women than men commit parasuicide, while about three times more men than women commit suicide [2]. History of depression is associated with a 30-fold increase in suicide risk, and patients with history of attempted suicides have a greater risk of suicide [3]. The number of people attempting suicide is surprisingly high [4]. In a study of emergency department visits for attempted suicide and self-harm in the USA during the years 2006 - 2013, more than 3.5 million suicide attempt-related visits were reported, most visits were by females, and most patients had a current mental disorder [5]. Non-fatal suicidal behavior has been linked to aspects of the menstrual cycle in women. In a meta-analysis about possible associations between phases of the menstrual cycle and suicidal behavior, researchers found that this behavior was apparently more common in the late luteal and follicular phases and in those suffering from premenstrual syndrome [6]. Suicide attempts occurred more frequently during the menstrual phase among women admitted to a clinic of internal diseases and acute poisoning in Poland [7]. In a study of women in Spain, the highest incidence of suicide attempts occurred in women in the first week (or menstrual) followed by the fourth week (or premenstrual) of their menstrual cycle [8].

To the best of my knowledge, the association between suicide attempts and clinical characteristics of the premenstrual period has not been assessed. Premenstrual syndrome is common and is characterized by physical, mental and behavioral changes in women at reproductive age [9]. This syndrome has a negative impact on emotions in women and affects their normal life [10, 11]. It raises the question whether specific signs or symptoms of this repetitive premenstrual syndrome might be linked to suicide behavior in women. Identification of clinical characteristics associated with suicide behavior may help to identify women at risk for suicide attempts. The aim of the present study was to determine the association between suicide attempts and specific signs or symptoms of premenstrual syndrome and menstrual history in women in Durango City, Mexico.

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## Materials and Methods

### Study design and women examined

Using a cross-sectional study design, 437 adult women (mean age:  $35.26 \pm 3.45$  years) were examined. Women were invited to participate in the study when attending general consultations in two primary healthcare centers (Clinic of Family Medicine of the Institute of Security and Social Services of State Workers, and Healthcare Center "Dr. Carlos Santamaria" of the Secretary of Health) in Durango City, Mexico. Only women aged 30 - 40 years old who accepted to participate were included in the study. Pregnant women were not included in this study. Table 1 shows the general socio-demographic characteristics of the women studied.

### Clinical characteristics of participants

Signs and symptoms related to premenstrual syndrome, menstrual history, the presence of underlying diseases, and the history of suicide attempts and suicidal ideation in participants were obtained in a face-to-face interview with the aid of a questionnaire. The clinical characteristics included fatigue, confusion, low self-esteem, nervousness, headache, migraine, dizziness, difficulty concentrating, memory lapses, guilty feeling, mood changes, panic attacks, tension, judgement problems, irritability, lack of interest in daily activities, depression, increase of fears, lack of interest in social relations, sleep problems, out of control feeling or overwhelmed, reduced tolerance to noises and lights, aggressiveness, anxiety, bouts of rapid heartbeat, breast pain, respiratory problems, presence of herpes labialis, presence of acne, bruises, edema in ankles, hands or feet, weight gain, tingling extremities, muscle tension, decrease in muscle power, joint pain, low back pain, clumsiness, electric shock sensation, increased libido, decreased libido, dyspareunia, nausea, appetite disturbance, abdominal inflammation, abdominal bloating, desire to eat certain food or eat a lot, gas, abdominal pain, constipation, or diarrhea. Data of menstrual history included severity of menstruation, presence of irregular periods, and painful periods. Data about underlying diseases including vaginal infections, arterial hypertension, obesity, allergy, and thyroid disease were recorded.

### Statistical analysis

Data of participants were analyzed with the software SPSS 15.0 (SPSS Inc. Chicago, Illinois), and Epi Info 7. The following parameters were used to calculate the sample size: a 9.2% prevalence of suicide attempts in women [12], a 99.9% confidence level, a 5% of confidence limits, and a population size of 100,000. Thus, a sample size of 360 subjects was obtained. The Pearson's Chi-squared test or the two-tailed Fisher's exact test (when values were less than five) were used to assess the association between the presence of suicide attempts and the clinical characteristics of the women. All clinical characteris-

tics with a P value  $< 0.05$  obtained in the bivariate analysis were further analyzed by stepwise regression analysis with the backwards elimination method. Odds ratio (OR) adjusted for age, presence of mental illness, and residence area, and 95% CI were obtained. A P value less than 0.05 was considered statistically significant.

### Ethical aspects

The study protocol was approved by the Ethics Committee of the General Hospital of the Secretary of Health in Durango City, Mexico. All women gave their written informed consent. Participation was voluntary.

## Results

Of the 437 women studied, 29 (6.6%) had a history of suicidal ideation, and 15 (3.4%) had a history of suicide attempts. Bivariate analysis of history of suicidal ideation and premenstrual clinical data, menstrual history, and underlying diseases showed 16 variables with a P value  $< 0.05$ : presence of irregular periods, memory lapses, low self-esteem, depression, guilty feeling, increase of fears, anxiety, nervousness, aggressiveness, lack of interest in social relations, out of control feeling or overwhelmed, dizziness, joint pain, low back pain, muscle tension, and desire to eat certain food or eat a lot. The rest of clinical characteristics correlated with suicidal ideation showed P values higher than 0.05 by bivariate analysis. Results of a correlation of a selection (variables with P  $< 0.20$  obtained in the bivariate analysis) of clinical characteristics of women and a history of suicidal ideation is shown in Table 2. Further analysis by logistic regression of clinical characteristics with P value  $< 0.05$  obtained by bivariate analysis showed that suicidal ideation was associated with the variables: presence of irregular periods (OR = 2.89; 95% CI: 1.10 - 7.55; P = 0.03), low back pain (OR = 4.57; 95% CI: 1.31 - 15.92; P = 0.01), desire to eat certain food or eat a lot (OR = 2.47; 95% CI: 1.10 - 5.57; P = 0.02), guilty feeling (OR = 2.43; 95% CI: 1.06 - 5.59; P = 0.03), and aggressiveness (OR = 3.19; 95% CI: 1.42 - 7.13; P = 0.005).

Bivariate analysis of history of suicide attempts and premenstrual clinical data, menstrual history, and underlying diseases showed seven variables with a P value  $< 0.05$ : presence of irregular periods, severity of menstruation, depression, anxiety, dizziness, low back pain, and desire to eat certain food or eat a lot. The rest of clinical characteristics studied showed P values higher than 0.05 by bivariate analysis. A correlation of a selection (variables with P  $< 0.20$  obtained in the bivariate analysis) of clinical characteristics and a history of suicide attempts is shown in Table 3. Further analysis by logistic regression of clinical characteristics with P value  $< 0.05$  obtained by bivariate analysis showed that only the variables presence of irregular periods (OR = 9.57; 95% CI: 1.23 - 74.44; P = 0.03), and desire to eat certain food or eat a lot (OR = 3.08; 95% CI: 1.04 - 9.15; P = 0.04) were associated with a history of suicide attempts (Table 4).

**Table 1.** General Socio-Demographic Characteristics of the Women Studied

Characteristic	No.*	%
Birth place		
Durango state	403	92.2
Other Mexican states	34	7.8
Residence place		
Durango state	437	100
Residence area		
Urban	353	80.8
Suburban	56	12.8
Rural	27	6.2
Educational level		
No education	1	0.2
1 - 6 years	43	9.8
7 - 12 years	261	59.7
> 12 years	131	30
Occupation		
Housewife	228	52.2
Business	14	3.2
Employee	117	26.8
Student	2	0.5
Factory worker	1	0.2
Professional	69	15.8
None	1	0.2
Other	2	0.5
Socio-economic level		
Low	88	20.1
Medium	346	79.2

\*Sums may not add up to 437 because of few missing values.

## Discussion

Suicide behavior has been linked to premenstrual syndrome [6-8]. However, studies of this link have been focused on the presence of premenstrual syndrome in general, but an association between suicidal behavior and specific signs or symptoms of premenstrual syndrome has not been reported. Premenstrual syndrome has physical, emotional and behavioral signs and symptoms (<https://www.mayoclinic.org/diseases-conditions/premenstrual-syndrome/symptoms-causes/syc-20376780>). The present study thus aimed to assess the association between suicidal behavior and each of the physical, emotional and behavioral signs and symptoms of premenstrual syndrome. Certain clinical features of premenstrual syndrome may be more disturbing for women than others, and the presence of such specific clinical characteristics might lead to suicidal behavior. Therefore, investigation of this association is important to identify clinical features with high risk for suicide behavior,

and to take optimal actions to prevent suicide. Interestingly, in the present study several clinical features of premenstrual syndrome were found associated with suicidal ideation and suicide attempts in the women studied. Concerning suicidal ideation, it was associated with the presence of irregular periods, aggressiveness, low back pain, desire to eat certain food or eat a lot, and guilty feeling. The association between suicidal ideation and irregular periods found in this study agrees with the finding of a previous report. In a study about menstrual problems and suicidal behavior of Chinese adolescents, irregular menstrual cycle was significantly associated with increased risk of suicidal ideation [13]. Whereas the aggressiveness association with suicidal ideation found in the present study is in line with results of recent studies. In a school-based sample of rural Chinese adolescents, participants with high levels of total aggression had 4.31 times higher risk of suicidal ideation compared to subjects with low level of total aggression [14]. In a study of military service members in the USA, those reporting aggression were significantly more likely to report suicide ideation than those reporting no aggression [15]. On the other hand, the low back pain association with suicidal ideation found in the present study agrees with results of a previous study. Pain symptoms (low back pain, headache, joint pain, neck pain and sciatica) were strongly associated with suicidal ideation in elderly people in Taiwan [16]. The association of guilty feeling with suicide ideation found in the present study agrees with that of a previous study in China where researchers found that guilt was an independent factor for suicide ideation in patients with depression [17].

With respect to suicide attempts, they were associated with the presence of irregular periods and desire to eat certain food or eat a lot. Suicidal ideation has been associated with irregular menstrual cycle [13], and non-suicidal self-injury [18]. However, to the best of my knowledge, the presence of irregular periods has not been associated with suicide attempts. On the other hand, the association between suicide attempts and desire to eat certain food or eat a lot found in the current study agrees with findings of other studies in which differences in eating habits between suicide attempters and non-attempters were found. In a cross-sectional assessment of diet quality in individuals with a lifetime history of attempted suicide, researchers found that fruits, vegetables and meat were significantly under-consumed in adults who had ever attempted suicide [19]. In a controlled study of eating disorders and food addiction in men with heroin use disorder in Turkey, food addiction was found associated with having a history of suicide attempts [20]. In a study of the association of eating habits and suicide attempts in psychiatric patients in Mexico, a history of suicide attempts was associated with consumption of pork and other types of meat [21]. Furthermore, in an American study of differences in dietary intakes of macronutrients between individuals who had ever made a suicide attempt and those who never had, researchers found that individuals with a history of suicide attempt had low intakes of polyunsaturated fat and fiber [22].

Adjustment of OR for age, presence of mental illness, and residence area was performed because these factors might influence the frequency of suicide behavior. For instance, in a review about suicide and deliberate self-harm in Pakistan, suicide behavior was more common in individuals younger than

**Table 2.** Results of Bivariate Analysis of a Selection of Clinical Characteristics and Suicidal Ideation

Characteristic	Women studied (No.)	History of suicidal ideation		P value
		No.	%	
Irregular periods				
Yes	243	23	9.5	0.008
No	194	6	3.1	
Memory impairment				
Yes	217	20	9.2	0.03
No	220	9	4.1	
Difficulty concentrating				
Yes	170	15	8.8	0.14
No	267	14	5.2	
Mood changes				
Yes	302	24	7.9	0.1
No	135	5	3.7	
Low self-esteem				
Yes	196	20	10.2	0.007
No	241	9	3.7	
Depression				
Yes	117	15	12.8	0.002
No	320	14	4.4	
Guilty feeling				
Yes	96	13	13.5	0.002
No	341	16	4.7	
Increase of fears				
Yes	88	11	12.5	0.01
No	349	18	5.2	
Panic attacks				
Yes	23	3	13	0.19
No	414	26	6.3	
Anxiety				
Yes	144	16	11.1	0.008
No	293	13	4.4	
Tension				
Yes	168	16	9.5	0.05
No	269	13	4.8	
Nervousness				
Yes	197	20	10.2	0.007
No	240	9	3.8	
Aggressiveness				
Yes	119	17	14.3	< 0.001
No	318	12	3.8	
Lack of interest in daily activities				
Yes	111	11	9.9	0.1
No	326	18	5.5	

**Table 2.** Results of Bivariate Analysis of a Selection of Clinical Characteristics and Suicidal Ideation - (*continued*)

Characteristic	Women studied (No.)	History of suicidal ideation		P value
		No.	%	
Lack of interest in social relations				
Yes	63	9	14.3	0.02
No	374	20	5.3	
Out of control feeling or overwhelmed				
Yes	63	10	15.9	0.004
No	374	19	5.1	
Dizziness				
Yes	159	17	10.7	0.01
No	278	12	4.3	
Joint pain				
Yes	194	19	9.8	0.01
No	243	10	4.1	
Low back pain				
Yes	282	26	9.2	0.003
No	155	3	1.9	
Muscle tension				
Yes	168	18	10.7	0.007
No	269	11	4.1	
Bruises				
Yes	59	7	11.9	0.09
No	378	22	5.8	
Increased libido				
Yes	29	4	13.8	0.11
No	408	25	6.1	
Appetite disturbance				
Yes	140	13	9.3	0.12
No	297	16	5.4	
Desire to eat certain food or eat a lot				
Yes	127	16	12.6	0.001
No	310	13	4.2	
Respiratory problems				
Yes	44	5	11.4	0.19
No	393	24	6.1	

30 years of age [23]. In some mental disorders (postpartum depression or psychosis, bipolar disorder), it has been reported a higher risk of suicide behavior [24]. In a study in two provinces in Iran, the rate of suicidal behavior involving burns among the rural population was higher than that in the urban population [25].

The limitations of the present study include a small number of women with suicide attempts, and few health institutions participated. Further research with a larger sample size of

women with suicide behavior, and participation of more health institutions is needed.

### Conclusions

In this first study on the link of suicide behavior and clinical features of premenstrual syndrome, results suggest that suicidal ideation and suicide attempts are associated to specific signs

**Table 3.** Results of Bivariate Analysis of a Selection of Clinical Characteristics and Suicide Attempts

Characteristic	Women studied (No.)	History of suicide attempts		P value
		No.	%	
Irregular periods				
Yes	243	14	5.8	0.003
No	194	1	0.5	
Severity of menstruation				
Mild	78	1	1.3	0.04
Moderate	264	7	2.7	
Severe	95	7	7.7	
Mood changes				
Yes	302	13	4.3	0.16
No	135	2	1.5	
Low self-esteem				
Yes	196	10	5.1	0.08
No	241	5	2.1	
Depression				
Yes	117	8	6.8	0.03
No	320	7	2.2	
Guilty feeling				
Yes	96	6	6.2	0.1
No	341	9	2.6	
Anxiety				
Yes	144	9	6.2	0.04
No	293	6	2	
Aggressiveness				
Yes	119	7	5.9	0.13
No	318	8	2.5	
Dizziness				
Yes	159	10	6.3	0.01
No	278	5	1.8	
Low back pain				
Yes	282	14	5	0.01
No	155	1	0.6	
Clumsiness				
Yes	56	4	7.1	0.11
No	381	11	2.9	
Painful periods				
No	178	5	2.8	0.16
Yes, but mild	85	3	3.5	
Yes, moderate pain	112	2	1.8	
Yes, severe pain	62	5	8.1	
Increased libido				
Yes	29	3	10.3	0.07
No	408	12	2.9	

**Table 3.** Results of Bivariate Analysis of a Selection of Clinical Characteristics and Suicide Attempts - (continued)

Characteristic	Women studied (No.)	History of suicide attempts		P value
		No.	%	
Digestive problems				
Yes	274	12	4.4	0.15
No	163	3	1.8	
Appetite disturbance				
Yes	140	8	5.7	0.09
No	297	7	2.4	
Desire to eat certain food or eat a lot				
Yes	127	9	7.1	0.01
No	310	6	1.9	
Respiratory problems				
Yes	44	3	6.8	0.18
No	393	12	3.1	

**Table 4.** Results of the Regression Analysis of Selected Characteristics of the Women Studied and Their Association With Suicide Attempts

Characteristic	Odds ratio	95% Confidence interval	P value
Irregular periods	9.57	1.23 - 74.44	0.03
Low back pain	0.16	0.02 - 1.24	0.08
Desire to eat certain food or eat a lot	3.08	1.04 - 9.15	0.04
Severity of menstruation	0.48	0.20 - 1.12	0.09

or symptoms of premenstrual syndrome. However, further research to confirm the findings of this study is needed. Results might help for an optimal planning of preventive measures against suicide.

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