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Multifactorial Study of Suicidal Deaths in Women of Reproductive Age Group and Their Relationship with Menstrual Cycle- A Histopathological Based Autopsy Study

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ABSTRACT

Background: The aim of this study is to find out the association of suicidal deaths among women of reproductive age groups with various sociodemographic factors like age, marital status, locality, occupation and to evaluate the relationship of female suicide with different phases of the menstrual cycle through histological study of the uterus and ovary.

Material and Methods: This descriptive, observational, and cross-sectional study was conducted at the department of FMT in collaboration with the department of Pathology, MJNMC&H, Cooch Behar, West Bengal during a period of one year on 116 women in the reproductive age group of 15–45 years.

Results: To study the menstrual phases, the whole uterus and both ovaries were collected at autopsy and fixed in formalin solution and sent to the pathology department for histological examination. Most of the victims were in the age group of 15–25 years (51.8%) and were married Hindus from a rural locality. Hanging was the most common method adopted for suicide (72.4%) with family problems being the most common precipitating cause (34.5%). 67.2% women committed suicide during the secretory phase followed by 25% in the proliferative phase. Limitations: though some socio-demographic factors were included in this study as parameters, a few were absent, like per capita income, type of family, seasonal variations, etc. Here lie the limitations of this study.

Conclusion: Further research to confirm the findings of this study is needed. Results might help in the optimal planning of preventive measures against suicide.

Keywords: Suicide; Reproductive age group females; Menstrual cycle; Proliferative phase; Secretory phase; Histopathology.

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INTRODUCTION

Suicide or deliberate self-killing, is defined as choosing death in the conflict between life and death. Worldwide nearly 800,000 people die by suicide every year, yet suicides are very much preventable.[1] In the Indian context, the NCRB data suggests that overall, a total of 1,64,033 suicides were reported in the country during 2021, which showed a 7.2% increase in comparison to 2020. Our state of West Bengal accounted for 13,500 of these suicides in the year 2021. [2]

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Each suicide is a personal tragedy that prematurely takes the life of an individual and has a continuing ripple effect, dramatically affecting the lives of families, friends and communities. Suicide is a multi-factorial phenomenon where there is a complex interaction between the individual's internal and external environment. So, factors like age, education, marital status, poverty, family conflicts, etc. play a vital role in addition to a person's physical, mental and emotional factors. India is a vast country with varied religions and faiths, multifaceted social customs and with rural and urban populations with regional and zonal thinking.

Statistics reveal that women consistently make more frequent suicidal attempts to end their own lives than men. [3] In the present scenario, suicidal attempts among young and middle-aged females (reproductive age groups) have alarmingly increased, which may be due to many factors like mental depression, financial problems, familial or social disharmony or some sort of provocation, either alone or in combination with more than one such factor. The reproductive life cycle of a woman is designated and influenced by the periodicity of the menstrual cycle and its associated hormonal alterations, mainly controlled by the hypothalamic-pituitary-ovarian axis. The hormonal changes during a menstrual cycle occur both in the proliferative phase (1st day of menstruation to ovulation) and the secretory phase (after ovulation to the start of the next menstruation). And at times of such significant hormonal changes, women are explicitly vulnerable to mental health issues, including anxiety and depression. Incidentally, these psychological changes often spread their ugly wings, with suicide being the fatal outcome.

There is an abundance of studies on the relationship between suicide and menstruation cycle phases based on cases of suicidal attempts and suicidal deaths. These studies have shown different methodologies and mixed results. Some of them have concluded that there is no relationship between phases of the menstrual cycle and suicidal behavior. Now, whether the menstrual cycle is truly associated with suicide attempts and the specific phase of menstruation that makes women more susceptible to them are still under controversy.

This study aims to find out the association between female suicide and various sociodemographic factors like age, marital status, education and also to establish any association between female suicide and different phases of the menstrual cycle through histological study of the uterus and ovary. There has been no such study undertaken in the Cooch Behar district of West Bengal. Hence, it is imperative that we further understand the reasons underlying suicides in women and their association with phases of the menstrual cycle so as to formulate means that may help in intervention at the correct time and, in turn, provide much-needed support to vulnerable groups with women-targeted suicide prevention programs.

METHODOLOGY

This descriptive, observational, and cross-sectional study was conducted at the department of FMT in collaboration with the department of Pathology, MJNMC&H, Cooch Behar, West Bengal. All suicidal deaths of females in the menstruating age group (15–45 years) were studied during a period of one year (September 2022–August 2023). This study excluded unknown and decomposed cases, females who were pregnant and had pathological conditions of the uterus and ovaries. Details about the deceased regarding age, religion, marital status, address, approximate time of suicide and menstrual history where available were collected from police requisitions and inquests and also from the deceased's available close relatives. To study menstrual phases, the whole uterus and both ovaries were collected and fixed in 10%

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formalin solution for 24 hours, and sent to the pathology department for histological examination. As the cases were sent by the police, considering them being medicolegal, consent was not required. The tissue sections were processed, and the slides were stained with hematoxylin and eosin for microscopic examination. The phases of the menstrual cycle were identified from histological appearance of endometrium and ovaries. Endometrial findings were categorized into three groups: i) Proliferative ii) Secretory iii) Menstrual phase. The data collected during this study was tabulated in a pre-determined proforma. It was further entered in MS Excel Sheet and analyzed by SPSS statistical software, along with its representation in the form of diagrams and charts.

RESULTS

The histological slide of uterine endometrium and suicidal death in relation to different socio-demographic and other parameters was studied in 116 cases that fulfilled the inclusion and exclusion criteria. The relationship between age, marital status, method of suicide and reason for committing suicide in different phases of the menstrual cycle was also studied.

Out of the 116 cases of suicidal deaths in women of reproductive age group, maximum cases were reported in 15 – 25 years (51.8%) of age and minimum in the age group of 36 – 45 years (12.9%). [Table 1] Most of the victims were Hindus (77.6%), followed by Muslims 26 (22.4%). [Figure 1] In Table 2, it was observed that more than half of the women to have committed suicide were housewives (54.3%), which was followed by those who were either self-employed (12.9%) or daily wage earners (11.2%).

Most of the victims were from rural localities (95 cases). While 82.8% of cases occurred indoors, only 17.2% cases occurred in the open areas. The study was conducted among both married, unmarried and widowed or divorced females. The prevalence of suicide was higher in married females (69.8%) than in unmarried ones (28.5%). [Table 3]

Hanging was the most common method adopted for suicide with 84 cases. The other notable methods being self-ingestion of poison (22 cases) and self-immolation (7 cases). [Figure 2]

[Table 4] suggests that 40 subjects (34.5%) committed suicide due to some family problems, as per the inquest reports from the investigating officers and the history taken from the relatives. Mental illness is the second most common cause (19%), followed by health issues like chronic illness, abdominal pain, irregular periods, etc. Fascinatingly, financial problems were revealed to be a less pressing concern as the reason for committing suicide.

Suicidal deaths were more common during secretory phase 78 cases (67.2%), followed by proliferative phase 29 cases (25%), and menstrual phase 9 cases (7.8%). [Figure 3]

Table 1: Age distribution of female suicide victims

Age (years)	No Of Cases	Percentage
15 - 25 y	60	51.8
26 - 35 y	41	35.3
36 - 45 y	15	12.9

Table 2: Occupation wise distribution of female suicide victims.

Occupation	No Of Cases	Percentage
Housewife	63	54.3
Daily wages	13	11.2
Students	7	6
Unemployed	5	4.3

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Self employed	15	12.9
Salaried person	10	8.7
Others	3	2.6

Table 3: Distribution of female suicide victims as per their locality, place of occurrence and marital status.

Locality	**No Of Cases**	**Percentage**
Urban	21	18.1
Rural	95	81.9
Place of occurrence	**No Of Cases**	**Percentage**
Indoor	96	82.8
Outdoor	20	17.2
Marital status	**No Of Cases**	**Percentage**
Married	81	69.8
Unmarried	33	28.5
Divorced /Widow	2	1.7

Table 4.: Distribution of female suicide victims as per their reasons for committing suicide.

Reason for committing suicide	**No Of Cases**	**Percentage**
Health issues	15	13
Financial burden	8	6.9
Mental illness	22	19
Family problems	40	34.5
Others	25	21.4
Not known	6	5.2

Table 5: Relation between age of female suicide victims and phase of menstrual cycle.

Age (years)	**Proliferative phase**	**Secretory phase**	**Menstrual phase**
15 - 25 y	14 (48.3%)	43 (55.1%)	3 (33.3%)
26 - 35 y	10 (34.5%)	26 (33.3%)	5 (55.6%)
36 - 45 y	5 (17.2%)	9 (11.5%)	1 (11.1%)
Total	29	78	9

Table 6: Relation between marital status and phase of menstrual cycle.

Histological findings	**Married**	**Unmarried**	**Divorced/Widow**
Proliferative phase	22 (27.2%)	7 (21.2%)	0
Secretory phase	54 (66.7%)	24 (72.7%)	0
Menstrual phase	5 (6.1%)	2 (6.1%)	2 (100%)
Total	81	33	2

Table 7: Relation between methods of suicide and phase of menstrual cycle.

Histological findings	**Hanging**	**Poisoning**	**Burns**	**Others**
Proliferative phase	17 (20.2%)	9 (40.9%)	2 (28.6%)	1 (33.3%)
Secretory phase	64 (76.2%)	10 (45.5%)	3 (42.8%)	1 (33.3%)
Menstrual phase	3 (3.6%)	3 (13.6%)	2 (28.6%)	1 (33.3%)
Total	84	22	7	3

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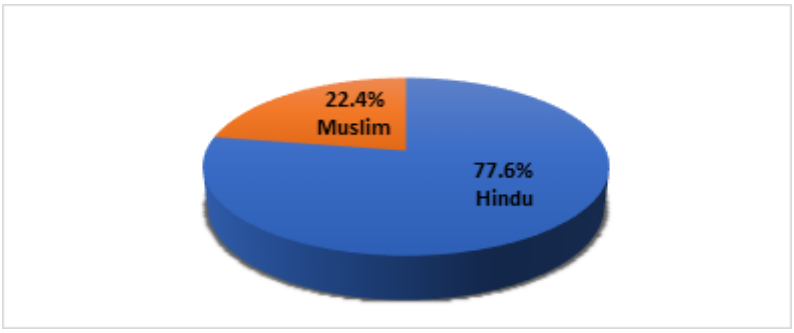

Figure 1: Religion wise distribution of victims

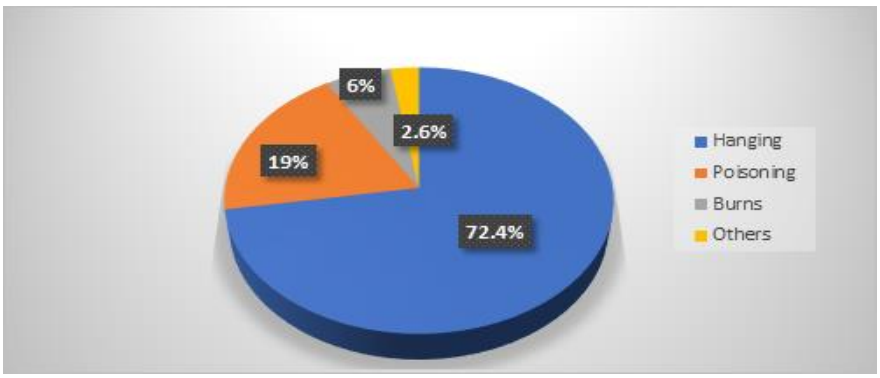

Figure 2: Methods of suicide in victims

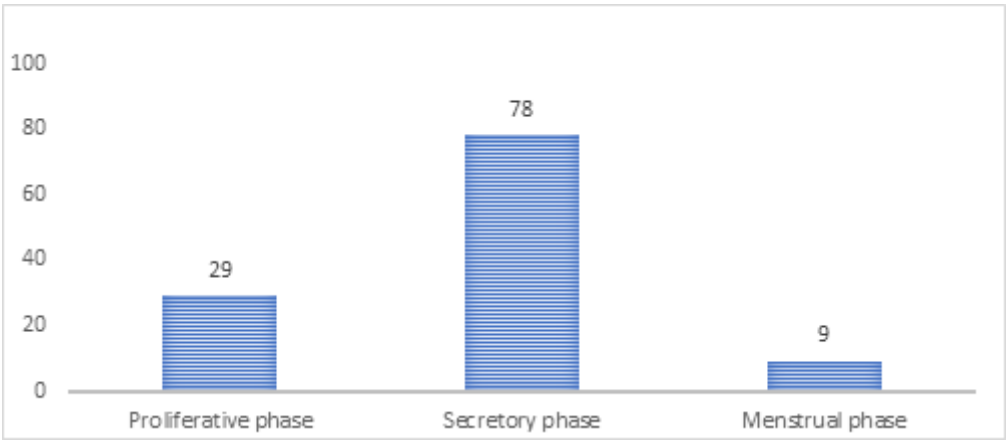

Figure 3: Distribution of victims according to phases of menstrutaion

Among women who have committed suicide in the secretory phase, most were aged between 15-25 years (55.1%) followed by those aged 26-35 years (33.3%). Similar observations were noted in women in the proliferative phase as well. While menstruating women who committed suicide were mostly in the age group of 26-35 years (55.6%), followed by those in the early age groups of 15 – 25 years (33.3%). [Table 5]

Among 78 married women who committed suicide, 54 cases (66.7%) were in the secretory phase of the menstrual cycle, while 27.2% `were in the proliferative phase. Among unmarried women, 24 cases (72.7%) were in the secretory phase, while 7 (21.2%) were in the proliferative phase. Of the two divorced/widows both were found to be menstruating. [Table 6]

As per [Table 7], out of 84 women who chose hanging as the method of committing suicide, 76.2% were in the secretory phase and 20.2% in the proliferative phase. Among the poisoning cases, more or less an equal number of them were in the secretory or proliferative phases of their menstrual cycles.

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DISCUSSION

In the present study, 116 cases of suicidal deaths in females of reproductive age were studied. Histopathological reports of the uterus and ovaries were obtained. Sociodemographic profiles were also perused and analyzed.

In our study, most of the subjects committing suicide were in the age group of 15–25 years. This is in concurrence with the study done by Behera C. et al., who reported 52 out of 86 cases of completed suicides to be in the age group between 16 - 25 years.[4] Similar results were also observed in the studies of Rahim M et al,[5] Mohanty MK et al,[6] and Sharma BR et al.[7] The high incidence of suicide among young and middle-aged females (reproductive age groups) may be attributed to various socioeconomic factors like dejection in love, early marriage and marital disharmony, dowry-related issues or a lack of employment opportunities and financial instabilities, besides the psychological effects of hormonal interplay. Regarding menstrual phases in relation to the age groups, the maximum number of cases was in the secretory phase (43 out of 60 cases).

In our study, it was observed that Hinduism is the most predominant religion, accounting for 90 cases (77.6%) of the total 116 suicidal deaths, followed by Muslims with 26 cases (22.4%). This is in accordance with studies by Kulshreshtha P et al,[8] and Jidhin VS et al,[9] Factors responsible for this finding may be due to the difference in population ratio between these two religions within the study area.

Regarding occupation, suicidal deaths are more common among housewives, which constitute 63 of the 116 total cases. This was followed by 15 cases (19.2%) of self-employed persons and 13 cases (11.2%) of daily wage earners. As per NCRB India data for 2021, out of 45,026 females who committed suicide in the country, 23,178 were housewives, followed by students (5,693) and daily wage earners (4,246).[2] Behera et al,[4] Kulshreshtha P et al,[8] and Geeta S et al,[10] have all reported housewives to be the major sufferers. Homemakers in this region have limited economic freedom and social agency. Interpersonal issues with husbands and in-laws start mostly when they are confined to the four walls of their houses. And these result in impulsive feats where such women choose self-harm.

Our study reveals that most of the suicidal victims were from rural backgrounds, with 81.9% of cases. This may be due to the demographic profile of the Cooch Behar region, which is mostly rural and where the social issues of early marriage and dowry are still incessant. Geeta S. et al,[10] in a study at Orissa and Girish Gutte,[11] in a study in Maharashtra shared similar data in which the majority of victims were from rural backgrounds.

Since most victims are rural housewives, in the majority of the cases, the place of occurrence was indoors 81.8% (96 cases). This is precisely associated with the self-restriction of females inside their houses.

Most of the suicidal deaths were observed in married women, 69.8 % (81 cases), and only 28.5% (33 cases) were unmarried. This observation is concurrent with those of Mukhopadhyay S et al,[12] and Biswas S et al,[13] both of whom observed 68.1% of the victims to be married. Shetty CK et al,[14] and Radhakrishnan R et al,[15] in their studies, have also predicted marriage as being one of the most important risk factors for suicide. Behera et al,[4] though, give a conflicting observation where out of 86 suicidal cases, 45 of them were unmarried. But the overall perception is that in a developing country like India, marriage is an aggravating factor for suicide rather than being protective. This may be due to early arranged marriages, young motherhood, low socio-economic status and domestic violence, all of which may lead to depression, which ultimately culminates in pushing such women into committing suicide.

Hanging is the most common method chosen to commit suicide in our study (84 cases). Among them, 64 cases were in the secretory phase, followed by the proliferative phase and the least in the menstrual phase. The second most common method was poisoning in 22 cases (19%).

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Among them, 10 cases were in the secretory phase and the fewest cases were in the menstrual phase. Burn comes in third with 7 cases (6%).

This is in concurrence with Jidhin VS et al,[9] who similarly reported that more than 50% of females had adopted hanging as the method of suicide, followed by burns and poisoning. Behra et al,[4] in their study at AIIMS, New Delhi, reported that more than 90% of suicide deaths were due to hanging. While Mukhopadhyay S et al,[12] in their study in a more urban setup in Kolkata, found 54.9% of women chose self-immolation and a mere 6% preferred hanging for commission of suicide. Similar findings were reported by Biswas et al,[13] and Vijayakumar L. et al,[3] All of them have suggested that the easy availability of substances to set up a fire and most women being confined to the kitchen might be the prime reasons for such findings. Srivastava et al,[16] and Geeta S. et al,[10] in their respective studies, have also concluded that hanging is the commonest method adopted by females for committing suicide. And we believe the primary reason attributed to this is the effortless accessibility of the ligature materials and the expectation among those who attempt it that death is more rapid and definite in complete hanging.

Family-related issues were responsible for 40 cases (34.5%) of suicides, followed by psychological issues and health issues respectively. Srivastava et al,[16] shared similar data, where 74.8% of cases had unhappy family lives. This could be attributed to the pressure of dowry by in-laws, the inability of victims to adjust properly, suspect or illicit relationships, etc. Studies in developed countries like Singapore,[17] and Wolverhampton,[18] have ascertained psychiatric illness to be a precipitating factor in more than half of the cases. This is in contrast to our study and may be due to the hesitancy of women in the Cooch Behar region to attend psychiatric clinics and social fearmongering about getting their issues documented. Similar issues were also reported by Geeta et al,[10] wherein only 6% were found to be mentally ill.

It was observed that among those who have committed suicide, 67.2% were in the secretory phase, while 25% were in the proliferative phase and 7.8% were in the menstrual phase. So, it can be concluded that the secretory phase dominated over the proliferative and menstrual phases in our study. This is in concurrence with the observations of Behera C et al,[4] who reported that suicidal deaths were more frequent in the secretory phase (56.9%) of the menstrual cycle. Similar findings were revealed in studies by both Mukhopadhyay S et al,[12] and Biswas et al,[13] both of whom suggested that about 64% of women committed suicide in the secretory phase.

Other studies, though, have given contrasting results. According to Dogra T.D et al,[19] 54.46% of the study population committed suicide in the menstrual phase, while D'Souza HL et al,[20] disclosed that more than half of the victims (52%) were in the proliferative phase of the menstrual cycle at the time of committing suicide. So, there are variables regarding the phases of the menstrual cycle in relation to the suicidal tendency.

Premenstrual syndrome (PMS) is the amalgamation of physical and emotional symptoms experienced by women every month during the week prior to their periods, i.e., in the secretory phase. Its severe form is often referred to as Premenstrual dysphoric disorder (PMDD), which is characterized by mood swings, anxiety, feeling overwhelmed or hopeless, and depression. During the secretory phase, estrogen falls initially, then rises, and then falls again just before menstruation. Now, estrogen acts on the 5HT receptors and increases serotonergic activity, which has a protective role against suicidal ideation. In the secretory phase, low levels of estrogen lead to decreased serotonin levels, which in turn increases suicidal ideations. When such a phase of emotional turmoil, against the backdrop of hormonal fluctuations, combines with the various socio-cultural factors discussed above, it leads to the exacerbation of suicide cases.

CONCLUSION

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Suicide constitutes a major public health problem that is largely preventable. And for this reason, understanding and mitigating suicidal deaths have been identified as both local and global priorities.[1] Factors like unemployment, rural areas of residence, and early marriage were associated with the majority of the suicidal women in our study. So, women with such socio-demographic backgrounds need more economic security by creating job opportunities and being made self-dependent. Better educational facilities, as well as increasing the age of their marriages and strict execution of the prevention of forced marriages, should be prioritized. Our study also specifies that the secretory/luteal phase of the menstrual cycle in a woman has a greater association with suicidal deaths in comparison with the proliferative/follicular phase, which is supported by various studies conducted worldwide. Hence, psychological counselling, self-motivational workshops, and health education for the target groups as well as for their family members are of the utmost importance for superior comprehension of the mental status of women during the menstrual cycle, which may in turn help reduce the consequential burden of suicidal deaths in society. However, our study trails behind in the fact that the evaluation is region-specific and does not represent the entirety of the population. Exploration of the preventive aspect of suicide, based on the findings of the present study, should take these factors into account. Further research to confirm the findings of this study is needed. Nonetheless, it is anticipated that this research will generate much-needed awareness regarding the social menace of suicide and aid law-enforcing authorities in formulating appropriate, target-specific preventive strategies.

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