INTRODUCTION

Menstrual function is a significant factor of women’s psychological health. Stress can be a contributor condition to menstrual disorder, which may include abnormal uterine bleeding and non-bleeding disorders like dysmenorrhea and premenstrual syndrome.

Menstrual health implies a healthy hypothalamus-pituitary ovarian axis and a normal uterus. Psychosocial or perceived stressors are defined as challenges that individuals view as taxing or exceeding their coping abilities lead to dysregulation.

In Pakistan, first case of COVID-19 was reported in February 2020 and a month later lock down...
was imposed. During the pandemic, the disease itself, conspiracies, uncertainty, unemployment, isolations, and dubiousness led to many psychiatric epidemics concurrently globally. A recent meta-analysis has reported prevalence of stress, anxiety, and depression because of the pandemic in the general population significantly.

Environmental stressors are of particular concern for women’s health, as they cannot only risk their mental health, but they can also adversely affect the reproductive outcome as well. A prospective cohort study has indicated that it is recent stress that has the greatest impact on menstrual cycle parameters, including ovulatory function.

Review of literature showed many studies reporting a relationship between psychological stress and menstrual disorder. It is noticed that lockdown has increased this problem. As no such study was found in local perspective, we therefore planned this study in collaboration with psychologists, which will not only identify the new onset menstrual disorders and psychological stress during lock down, but women will also be provided counselling, prompt treatment of disorders and psychological support to cope up with the stress.

### Table-I: Comparison of premenstrual syndrome and dysmenorrhea with baseline characteristics among women with new onset menstrual disorder (n=59).

|                      | Premenstrual Syndrome | Dysmenorrhea | p-value |
|----------------------|------------------------|--------------|---------|
|                      | Yes (n=39) | No (n=20) | p-value   | Yes (n=31) | No (n=28) | p-value   |
| **Age, years**       |            |            |                   |            |            |         |
| ≤25                  | 16 (76.2)  | 5 (23.8)  | 0.003             | 13 (61.9)  | 8 (38.1)  |         |
| 26-40                | 21 (75)    | 7 (25)    | 0.01326           | 17 (60.7)  | 11 (39.3) | 0.013   |
| >40                  | 2 (20)     | 8 (80)    |                   | 1 (10)     | 9 (90)    |         |
| **BMI**              |            |            |                   |            |            |         |
| Underweight          | 10 (83.3)  | 2 (16.7)  | 0.248             | 6 (50)     | 6 (50)    | 0.814   |
| Normal               | 14 (73.7)  | 5 (26.3)  |                   | 11 (57.9)  | 8 (42.1)  |         |
| Overweight           | 10 (55.6)  | 8 (44.4)  | 0.248             | 10 (55.6)  | 8 (44.4)  |         |
| Obese                | 5 (50)     | 5 (50)    |                   | 4 (40)     | 6 (60)    |         |
| **Marital Status**   |            |            |                   |            |            |         |
| Unmarried            | 18 (75)    | 6 (25)    | 0.232             | 16 (66.7)  | 8 (33.3)  | 0.072   |
| Married              | 21 (60)    | 14 (40)   |                   | 15 (42.9)  | 20 (57.1) |         |
| **Parity (n=35)**    |            |            |                   |            |            |         |
| Nulliparous          | 3 (100)    | 0 (0)     |                   | 2 (66.7)   | 1 (33.3)  |         |
| Primiparous          | 10 (83.3)  | 2 (16.7)  | 0.045             | 6 (50)     | 6 (50)    | 0.560   |
| Multiparous          | 6 (40)     | 9 (60)    |                   | 6 (40)     | 9 (60)    |         |
| Grand Multiparous    | 2 (40)     | 3 (60)    |                   | 1 (20)     | 4 (80)    |         |
| **Education**        |            |            |                   |            |            |         |
| Primary or less      | 1 (16.7)   | 5 (83.3)  |                   | 1 (16.7)   | 5 (83.3)  |         |
| Intermediate or less | 17 (85)    | 3 (15)    | 0.007             | 12 (60)    | 8 (40)    | 0.166   |
| Graduate or more     | 21 (63.6)  | 12 (26.4) |                   | 18 (54.5)  | 15 (45.5) |         |
| **Occupation**       |            |            |                   |            |            |         |
| Unemployed           | 21 (65.6)  | 11 (34.4) | 0.933             | 15 (46.9)  | 17 (53.1) | 0.343   |
| Employed             | 18 (66.7)  | 9 (33.3)  |                   | 16 (59.3)  | 11 (40.7) |         |

Asian criteria-based BMI was used: <18.5 for underweight, 18.5-22.9 for normal-weight, 23.0-27.5 for overweight, and >27.5 for obese women. Fisher-exact test, chi-square test, p-value <0.05 considered significant.
METHODS

This cross-sectional study included patients who contacted outpatient or tele clinic of Pakistan Air Force Hospital Faisal Base, Karachi due to new onset menstrual disorder and consented to participate. Ethical approval was granted from the institute. (Ref.002 dated October 3, 2020) Data was collected from the 1st April to 31st July 2020. Women with menstrual disorders in the preceding 6-month, age less than 20 years or more than 45 years, breast feeding, on hormonal contraception, and with known medical condition were excluded.

Epi Info sample size calculator is used for the estimation of sample size taking confidence interval 95%, margin of error 8%, frequency of menstrual disorder during COVID-19 in previous study 10.5%. The estimated sample size came out to be 56 patients with new onset menstrual disorder at least. The term dysmenorrhea was defined as painful menstruation. A cycle duration of more than 35 days was labeled as Oligomenorrhea whereas lesser than 21 days was labeled as Polymenorrhea. Excessive flow (>5 pads/day) and/or length (>5 days) were used to describe menorrhagia. Hypomenorrhea (scanty periods) was described as <3 days period or the use of <two pads per day. The absence of menstruation for three cycles was considered amenorrhea. Premenstrual syndrome was characterized as any symptom that occurs 5-10 days before menstruation and disappears after menstruation, such as painful/tender breasts, bloating/swelling of the abdomen, mood changes, depression, or others.

The questionnaire was developed by the principal investigator and was divided into three parts. The first encompassed the demographic data including age, parity, educational and employment status. The second part comprised of anthropometric measurements including height, weight, and BMI. The third part, menstrual history, included last menstrual period, previous cycle, dysmenorrhea, and premenstrual syndrome. Pilot testing of the questionnaire was done to check its sequencing, phrasing, and understanding. Level of stress was determined by psychiatrist by filling the Perceived Stress Sale questionnaire. There were 10 questions with five-point scale (0=never, 1=Almost never, 2=sometimes, 3=fairly often, 4+very often). Six items of this scale, i.e., 1, 2, 3, 6, 9 and 10 were scored in an ascending order and the rest of seven items, i.e., 4, 5, 6, 7 & 8 were scored in descending order. The total score on PSS was taken as sum of score for all the 10 items.

Statistical analysis was performed using SPSS version 24. Descriptive statistics were explored using frequencies and percentages. While for the purpose of inferential statistics, Chi-square test/Fisher Exact test were applied. The p-value of <0.05 is considered as significant.

Table-II: Comparison of premenstrual syndrome and dysmenorrhea with clinical characteristics among women with new onset menstrual disorder (n=59).

| Weight gain          | Yes (n=39) | No (n=20) | p-value | Yes (n=31) | No (n=28) | p-value |
|----------------------|------------|-----------|---------|------------|-----------|---------|
| None                 | 16 (64)    | 9 (36)    | 0.332   | 13 (52)    | 12 (48)   |         |
| Up to 5 kg           | 19 (63.3)  | 11 (36.7) |         | 15 (50)    | 15 (50)   | 0.641   |
| More than 5 kg       | 4 (100)    | 0 (0)     |         | 3 (75)     | 1 (25)    |         |

| Menstrual Pattern    | Yes (n=39) | No (n=20) | p-value | Yes (n=31) | No (n=28) | p-value |
|----------------------|------------|-----------|---------|------------|-----------|---------|
| Regular              | 15 (71.4)  | 6 (28.6)  |         | 13 (61.9)  | 8 (38.1)  |         |
| Scanty               | 13 (61.9)  | 8 (38.1)  |         | 9 (42.9)   | 12 (57.1) |         |
| Amenorrhea           | 0 (0)      | 4 (100)   |         | 0 (0)      | 4 (100)   |         |
| Oligomenorrhea       | 4 (66.7)   | 2 (33.3)  | 0.037   | 3 (50)     | 3 (50)    | 0.062   |
| Polymenorrhea        | 2 (100)    | 0 (0)     |         | 1 (50)     | 1 (50)    |         |
| Menorrhagia          | 5 (100)    | 0 (0)     |         | 5 (100)    | 0 (0)     |         |
| No                   | 10 (62.5)  | 6 (37.5)  |         | 4 (25)     | 12 (75)   |         |

Fisher-exact test, chi-square test, p-value <0.05 considered significant.
RESULTS

Out of 916 gynecological consultations 59 (6.44%) were due to new onset menstrual disease. Among them 28(47.5%) belonged to age range of 26-40 years, 35(59.3%) were married and 15(42.9%) were multiparas.

A significant association of premenstrual syndrome was observed with age (p-value 0.003), parity (p-value 0.045), educational status (p-value 0.007), and menstrual pattern (p-value 0.037). However, dysmenorrhea was found significantly associated with age of the patients (p-value 0.013) and history of COVID-19 positivity only (p-value 0.010). (Table-II& III)

The frequency of new onset menstrual problems noted were scanty periods 21 (35.6%), oligomenorrhea 6 (10.2%), menorrhagia 5 (8.5%), amenorrhea 4 (6.8%), and Polymenorrhea two (3.4%) (Fig.1).

Most of the women with new onset menstrual disorder reported “very often” for felt nervous and stressed 23 (39%) and upset 19(32.2%) in the past last month. Moderate stress was observed in 57 (96.6%) while severe in 2 (3.4%) patients (Fig.1). A non-significant association of stress was observed with menstrual pattern (p-value 0.587), premenstrual syndrome (p-value 0.625) and dysmenorrhea (p-value 0.942).

DISCUSSION

The current study was aimed to determine frequency of new onset menstrual disorder and level of psychological stress among these women during lockdown phase of COVID-19 pandemic. Overall, we found high prevalence of stress among participants, majority were moderately and upto three percent were severely stressed. Similarly, a cross-sectional online survey involving frontline health care providers in India has reported almost four percent prevalence of high stress among them. The current study has explored the fact reproductive aged group women who seek gynecological consultation had stress equivalent to a frontline health care worker. Pakistan has been identified as a country with highest scores of stresses next to Canada and the United Kingdom during Covid pandemic.
Almost six percent of gynecological consultation were due to new onset menstrual disease burden. Earlier, outside the pandemic a much higher proportion of menstrual irregularity in outpatients was reported. Our reported frequency is much less as compared to the above mentioned study because have excluded a large number of women in view of our exclusion criteria. In the current study, insignificant p-values were observed between psychological stress and menstrual irregularities, premenstrual syndrome, and dysmenorrhea. Similarly, another study involving undergraduate medical students failed to determine association between psychological stress and menstrual abnormalities. Various studies have explored an association between psychological stress and menstrual abnormalities including premenstrual syndrome and dysmenorrhea. The mixed results highlight the disparity of evidence that exists in the literature regarding the association between stress and menstrual abnormalities.

The most commonly reported menstrual irregularity in this study was hypomenorrhea. In contrast, different associations were explored in other studies. A higher level of perceived stress was found to be associated with a higher prevalence of shorter cycle length and heavy bleeding. Another study conducted on hostellers of a medical college had found an association between high stress levels and irregular menstrual cycle. One reason for this difference in findings was the reduced sample size in our study as compared to the other. Moreover, in our study we have excluded all the women who have menstrual disorder in the preceding six months and included women belonging to a broader age range 20-45 years.

In the current study, premenstrual syndrome was observed in 66.1% of women. A significant association of premenstrual syndrome was found with age, parity, educational level, and menstrual pattern. Earlier, a study involving women of different sociodemographic strata has determined association between PMS and high education. The findings revealed that women who seek gynecological consultation either physically or virtually during lock down of COVID-19 pandemic were subjected to increased level of psychological stress. The COVID-19 pandemic affects menstrual health, and targeted interventions are needed to improve it. Future studies that explore psychological stress and menstrual disorders should include both psychological stress indices.

**Limitations of the study:** The main limitation is small number of participants; stress was assessed only subjectively and participants were not followed. Physiological biomarkers of stress like serum or salivary cortisol level were not measured.

**CONCLUSION**

The findings revealed that women who seek gynecological consultation either physically or virtually during lock down of COVID-19 pandemic were subjected to increased level of psychological stress. The COVID-19 pandemic affects menstrual health, and targeted interventions are needed to improve it. Future studies that explore psychological stress and menstrual disorders should include both psychological stress indices.
and measure biological markers of stress and simultaneously to determine causal biologic mechanism.

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**Authors’ Contribution:**

AT: Conceived, designed, data collection and manuscript writing.
RM & SAM: Did data collection its analysis and critical review of manuscript.
BN: Evaluate the psychological stress.