RESEARCH PAPER

Assessment of the Prevalence of White Discharge and Menstrual Cycle Patterns among College Students and the Impact of Unhealthy Dietary and Lifestyle Factors

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ABSTRACT

Background: Reproductive health concerns, such as abnormal white vaginal discharge and menstrual irregularities, are frequently reported by young female students. Lifestyle and dietary choices can affect hormonal balance and vaginal health. This study aimed to determine the prevalence of abnormal white vaginal discharge and menstrual irregularities and evaluate their association with selected dietary and lifestyle factors, including body mass index (BMI), stress, hydration status, and intake of high-fat foods, high-sugar foods, and dairy products among female college students.

Methods: A cross-sectional observational study was conducted among 943 female college students aged 18–24 years. To gather relevant data, a structured questionnaire was used to collect information on demographic characteristics, dietary patterns [consumption of high-fat foods, high-sugar foods, and dairy products], lifestyle factors [hydration habits, BMI, stress levels], and reproductive health indicators. Subsequently, statistical analysis was performed using GraphPad Prism software, and the chi-square (χ^2) test was applied to assess the association between lifestyle factors and reproductive health outcomes.

Results: The findings revealed a considerable prevalence of abnormal white vaginal discharge and menstrual irregularities among participants. Higher consumption of high-fat foods, high-sugar foods, and dairy products was significantly associated ($p < 0.0001$) with these reproductive health complaints. Participants with lower daily fluid intake (<1 L/day) and higher stress levels reported greater symptom frequency. Additionally, abnormal BMI values were significantly associated with menstrual irregularities.

Conclusion: This study demonstrates a significant relationship between certain dietary patterns, lifestyle factors, and reproductive health problems among female college students. Promoting healthy eating habits, adequate hydration, stress management, and maintaining a normal BMI may help reduce the occurrence of menstrual irregularities and abnormal white vaginal discharge in adolescents.

Keywords: Abnormal vaginal discharge, menstrual irregularities, reproductive health, Dietary habits, lifestyle factors, body mass index (BMI), and college students.

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Introduction

Unhealthy dietary patterns are becoming increasingly common among college-aged females and are emerging as important, modifiable factors that influence reproductive health. Frequent consumption of junk food, refined carbohydrates, and high-calorie processed foods has been associated with menstrual disturbances. These include irregular cycles and increased menstrual discomfort in young women[1]. Similarly, the increasing consumption of ultra-processed foods among college students has been associated with changes in body composition and gastrointestinal health. This also includes menstrual cycle

variations, suggesting broader systemic effects of poor dietary habits[2]. Studies among female university students have further shown that a high intake of fast food and sugar-rich diets is significantly associated with menstrual health disturbances and cycle irregularities[3]. In addition, excessive consumption of ultra-processed foods has been associated with increased severity of premenstrual syndrome symptoms. This occurs through hormonal and metabolic changes[4].

Diet also plays a critical role in aberrant white discharge and vaginal health through its impact on the vaginal microbiota. One of the most frequent causes of abnormal vaginal discharge among women of reproductive age, bacterial vaginitis, has been linked to unhealthy eating habits, including high consumption of processed foods, refined sugars, and fats[5]. Additionally, research indicates that high-glycaemic diets and nutritional inadequacies may upset the Lactobacillus-dominant vaginal flora, making women more vulnerable to vaginal infections and discharge symptoms [6]. Additionally, the composition of the vaginal microbiota varies with hormonal cycles and lifestyle factors, such as nutrition, suggesting a relationship between reproductive tract symptoms, microbiome stability, and menstrual physiology [7].

Among anthropometric factors, Body Mass Index (BMI) is considered a key determinant of menstrual cycle variations and is significantly influenced by dietary intake and lifestyle patterns. Both underweight and overweight statuses disrupt hormonal equilibrium. Obesity, characterized by excessive adipose tissue, leads to increased peripheral conversion of androgens to estrogens (aromatization) and reduced production of sex hormone-binding globulin (SHBG). This results in a hyperestrogenic state that can cause heavy menstrual bleeding, endometrial hyperplasia, and irregular menstrual cycle[8]. Hydration status is another often-overlooked lifestyle factor that may influence menstrual and vaginal health. Adequate hydration is essential for maintaining mucosal secretions throughout the body, including the cervical mucus. Poor hydration may lead to concentrated urine and altered viscosity of vaginal secretions, potentially affecting the local clearance of pathogens and irritants [9]. Additionally, improved water intake has been shown to reduce menstrual pain and distress in young female students [10].

The psychosocial environment of college life also contributes to reproductive health complaints, such as abnormal vaginal discharge. Chronic stress can alter neuroendocrine regulation and immune responses, potentially leading to symptomatic vaginal discharge, even in the absence of infection. High cortisol levels associated with stress can suppress immune function and promote opportunistic microbial overgrowth of commensal organisms, leading to symptomatic discharge even in the absence of a sexually transmitted infection[11]. Stress activates the sympathetic nervous system and hypothalamic-pituitary-adrenal (HPA) axis, which may inhibit estrogen production and alter vaginal mucosal integrity, increasing susceptibility to irritation and infection [12].

Despite these findings, few studies have simultaneously evaluated unhealthy dietary components, vaginal discharge symptoms, and menstrual cycle patterns among college students. Therefore, this study aimed to comparatively analyze unhealthy dietary components and their effects on white discharge and menstrual cycle patterns among college students.

Materials and Method

A six-month cross-sectional observational study was conducted among female college students at a college campus in Namakkal District, Tamil Nadu, India, to assess the association between selected dietary and lifestyle factors and reproductive health issues. Initially, 952 students were screened, and after applying the inclusion and exclusion criteria, nine were excluded, resulting in a final sample size of 943 participants. Data were collected using a structured self-administered questionnaire that included demographic details, dietary habits, and lifestyle factors of the participants. The assessed variables were Body Mass Index (BMI), perceived stress, hydration status, and consumption patterns of high-fat foods, high-sugar foods, and dairy products. Reproductive health parameters, including abnormal white vaginal discharge and menstrual irregularities, were also recorded. Female students aged 18–24 years who had attained menarche and provided informed consent were included in the study. Students with known gynaecological or endocrine disorders other than menstrual-related complaints, those undergoing hormonal therapy affecting menstrual patterns, and individuals with chronic illnesses influencing diet or menstrual health were excluded. Incomplete questionnaires and responses without consent were also excluded. The study was carried out in three

phases: study planning and questionnaire development, participant recruitment and data collection, and data compilation with statistical analyses. Data were entered into Microsoft Excel and analysed using GraphPad Prism software. The Chi-square test was applied to determine the associations between variables, and a p-value <0.05 was considered statistically significant. Ethical standards were maintained through voluntary participation, confidentiality, and informed consent of the participants.

Results

Association between Lifestyle Factors and Reproductive Health

TABLE 1: Assessment of Body Mass Index (BMI)

BMI Category	Number of Students (n =943)	Abnormal WD (%)	Menstrual Irregular (%)	Chi square Test p-value
Obese (≥30)	156	112 (71.8)	119 (76.3)	<0.0001
Overweight (25-29.9)	287	150 (52.3)	167 (58.2)	
Normal (18.5-24.9)	432	184 (42.6)	193 (44.7)	
Underweight (<18.5)	68	32 (47.1)	35 (51.5)	

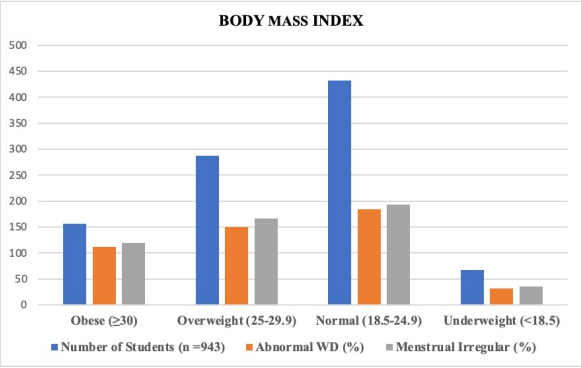

Figure 1: Assessment of Body Mass Index (BMI)

Body Mass Index (BMI) showed a statistically significant association and impact on abnormal white discharge and menstrual irregularities (χ^2 test, $p < 0.0001$). The highest prevalence was observed among obese students (BMI ≥30), where 71.8% reported abnormal white discharge, and 76.3% experienced menstrual irregularities. Overweight students (BMI 25–29.9) also demonstrated elevated prevalence rates of 52.3% and 58.2%, respectively, indicating a considerable impact of increased body weight on reproductive health.

Students with a normal BMI (18.5–24.9) showed a comparatively lower prevalence, with 42.6% reporting abnormal white discharge and 44.7% experiencing menstrual irregularities. Underweight students (BMI <18.5) exhibited moderate rates of 47.1% and 51.5%, which were slightly higher than those in the normal BMI group but lower than those in the overweight and obese categories. Overall, these findings highlight the significant impact of elevated body weight, particularly obesity, on menstrual and vaginal health among female college students, emphasizing the importance of maintaining a healthy BMI for better reproductive health outcomes (Table & Figure 1).

TABLE 2: Evaluation of Stress Levels

Stress Score Category	Interpretation	Number of Students (n=943)	Abnormal WD (%)	Chi square Test p-value
30–50	Likely to have a severe disorder	254	179 (70.5)	<0.0001
25–29	Likely to have a moderate disorder	434	210 (48.4)	
20–24	Likely to have a mild disorder	210	57 (27.1)	
10–19	Likely to be well	45	7 (15.6)	

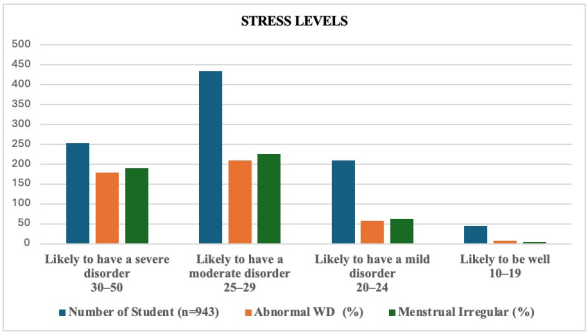

FIGURE 2: Evaluation of Stress Levels

Stress level showed a statistically significant impact on abnormal white discharge and menstrual irregularities ($p < 0.0001$). Students with stress scores between 30 and 50, indicating a severe disorder, had the highest prevalence, with 70.5% reporting abnormal white discharge and 75.2% experiencing menstrual irregularity.

Students with moderate stress scores (25–29) showed lower but still considerable levels, with 48.4% reporting abnormal white discharge and 51.8% experiencing menstrual irregularities. Those with mild stress (20–24) had further reduced percentages of 27.1% and 29.5%, respectively. Participants who were likely to be well (10–19) had the lowest occurrence, with only 15.6% reporting abnormal white discharge and 8.9% experiencing menstrual irregularity. These findings indicate that higher stress levels have a strong negative impact on menstrual cycle patterns and vaginal health among female college students (Table & Figure 2).

Association between Dietary Habits and Reproductive Health

TABLE 3: Prevalence of High-Fat Food Consumption

Consumption Frequency	Number Of Students (n=943)	Abnormal WD (%)	Menstrual Irregular (%)	Chi square Test p-value
Daily	173	139 (80.3)	144 (83.2)	<0.0001
More than twice/week	162	118 (72.8)	125 (77.2)	
Weekly twice	214	94 (43.9)	101 (47.2)	
Weekly once	279	103 (36.9)	112 (40.1)	
Never	115	27 (23.5)	29 (25.2)	

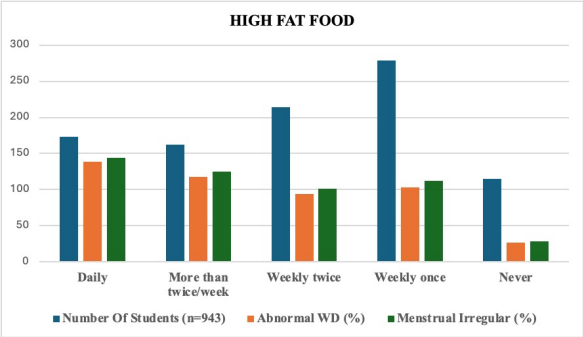

FIGURE 3: Prevalence of High-Fat Food Consumption

A clear and statistically significant association was observed between high-fat food intake and its impact on abnormal white discharge and menstrual irregularities ($P < 0.0001$). Students who consumed high-fat foods daily had the highest prevalence, with 80.3% reporting abnormal white discharge and 83.2% experiencing menstrual irregularities. Those consuming high-fat foods more than twice per week also showed a high occurrence, with 72.8% and 77.2% affected, respectively.

As the frequency of high-fat food consumption decreased, the prevalence of reproductive health problems also decreased. Among students who consumed high-fat foods twice a week, 43.9% reported abnormal white discharge and 47.2% had menstrual irregularities. Students consuming it once weekly showed lower rates of 36.9% and 40.1%. Participants who never consumed high-fat foods had the lowest prevalence, with 23.5% reporting abnormal white discharge and 25.2% experiencing menstrual cycle irregularities. These findings indicate that frequent intake of high-fat foods has a considerable negative impact on the menstrual and vaginal health of female college students (Table & Figure 3).

TABLE 4: Prevalence of High-Sugar Food Consumption

Consumption Frequency	Number of Students (n=943)	Abnormal WD (%)	Menstrual Irregular (%)	Chi square Test p-value
Daily	196	160 (81.6)	168 (85.7)	<0.0001
More than twice/week	187	136 (72.7)	146 (78.1)	
Weekly twice	205	92 (44.9)	98 (47.8)	
Weekly once	241	87 (36.1)	95 (39.4)	
Never	114	26 (22.8)	28 (24.6)	

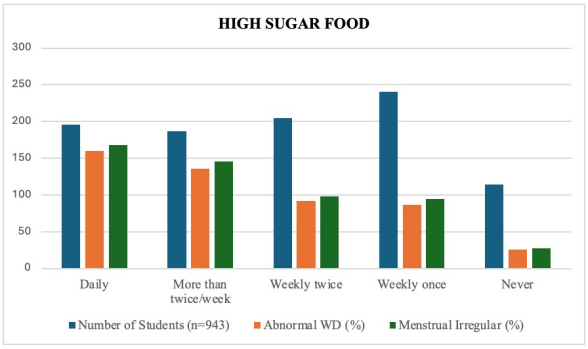

FIGURE 4: Prevalence of High-Sugar Food Consumption

High sugar food consumption significantly impacted abnormal white discharge and menstrual irregularities ($p < 0.0001$). Students who consumed high sugar foods daily had the most serious problems, with 81.6% reporting abnormal white discharge and 85.7% experiencing menstrual irregularities. Those who consumed them more than twice a week also showed high percentages, 72.7% and 78.1%, respectively.

As the intake of high-sugar foods decreased, the number of students with problems also decreased. Among those who consumed them twice a week, 44.9% experienced abnormal white discharge, and 47.8% experienced menstrual irregularities. Students who consumed them once a week showed lower percentages (36.1% and 39.4 %). Students who never consumed high-sugar foods had the lowest occurrence, with 22.8% reporting abnormal white discharge and 24.6% experiencing menstrual

irregularities. These results clearly show that frequent consumption of high-sugar foods negatively impacts menstrual and vaginal health among female college students (Table & Figure 4).

TABLE 5: Dietary Assessment of Dairy Product Consumption

Consumption Frequency	Number of Students (n=943)	Abnormal WD (%)	Menstrual Irregular (%)	Chi square Test p-value
Daily	267	76 (65.9)	93 (72.3)	**0.0001** <
More than twice/week	189	18 (62.4)	32 (69.8)	
Weekly twice	234	0 (38.5)	6 (41.0)	
Weekly once	178	3 (35.4)	8 (38.2)	
Never	75	2 (29.3)	2 (29.3)	

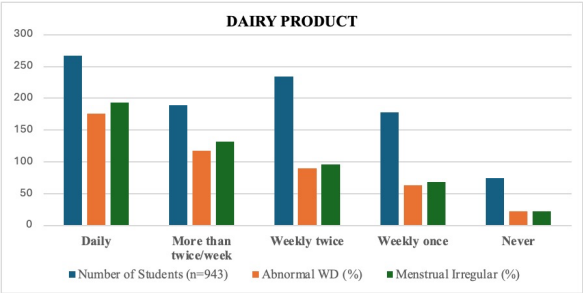

FIGURE 5: Dietary Assessment of Dairy Product Consumption

An evident association was found between dairy product consumption and its impact on abnormal white discharge and menstrual irregularities ($P < 0.0001$). Students who consumed dairy products daily showed a higher prevalence, with 65.9% and 72.3% of them reporting abnormal white discharge and menstrual irregularities, respectively. Those consuming dairy more than twice a week also had similar high levels (62.4% and 69.8 %, respectively).

As the frequency of dairy intake decreased, the percentage of reproductive health problems also decreased. Among students who consumed dairy products twice a week, 38.5% had abnormal white discharge, and 41.0% experienced menstrual irregularities. Those who consumed dairy once weekly showed slightly lower percentages (35.4% and 38.2 %). Students who never consumed dairy products had the lowest occurrence, with 29.3% reporting abnormal white discharge and the same percentage experiencing menstrual irregularities. Overall, these findings suggest that a higher consumption of dairy products may have a noticeable impact on the menstrual and vaginal health of female college students (Table & Figure 5).

TABLE 6: Hydration Status Assessment

Daily Intake	Number of Students (n=943)	Abnormal WD (%)	Menstrual Irregular (%)	Chi square Test p-value
<1L (Poor hydration)	174	132 (75.9)	122 (70.1)	<0.0001
1-2L (Inadequate)	488	158 (32.4)	175 (35.9)	
2-3L (Adequate)	203	60 (29.6)	66 (32.5)	
>3L (Optimal)	78	20 (25.6)	22 (28.2)	

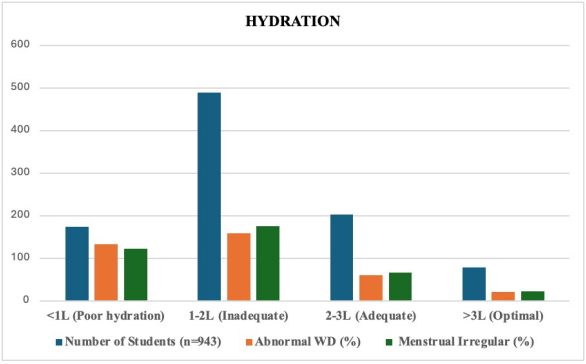

FIGURE 6: Hydration Status Assessment

Daily water intake had a statistically significant impact on abnormal white discharge and menstrual irregularities ($p < 0.0001$). Students with poor hydration, consuming less than 1 litre per day, had the highest prevalence, with 75.9% reporting abnormal white discharge and 70.1% experiencing menstrual irregularities.

As water intake increased, the incidence of reproductive health problems decreased. Among students who consumed 1–2 litres per day, 32.4% had abnormal white discharge and 35.9% experienced menstrual irregularities. Those with an adequate intake of 2–3 litres showed slightly lower percentages (29.6% and 32.5%, respectively). Students with optimal hydration (consuming > 3 litres daily) had the lowest prevalence, with 25.6% reporting abnormal white discharge and 28.2%

experiencing menstrual irregularities. These findings suggest that proper hydration positively impacts menstrual and vaginal health among female college students (Table & Figure 6**)**.

Discussion

The current study assessed the correlation between dietary and lifestyle factors and reproductive health outcomes, particularly white vaginal discharge and menstrual irregularities, among college students. The results showed a strong link between bad habits and problems with reproduction. This means that nutrition and lifestyle are important factors that can be changed to improve menstrual and vaginal health.

There was a strong link between eating a lot of high-fat foods and having irregular periods and strange vaginal discharge. Diets high in saturated fats may lead to the accumulation of visceral fat and metabolic imbalance, disrupting hormonal regulation and ovarian function [2, 13].

Eating a lot of sugary foods was also strongly linked to problems with reproduction. Consuming too much sugar can raise blood glucose levels and insulin resistance, which can make it easier for infections like Candida to happen and raise the risk of unusual vaginal discharge and bacterial vaginosis[6, 14]. Eating dairy products was linked to problems with menstruation. Dairy products are a good source of nutrients, but eating too much of them, especially high-fat dairy products, can change how hormones work and how the body reacts to inflammation. This could make the menstrual cycle less regular. Another important factor was not drinking enough water. Students who didn't drink enough water had more menstrual pain and irregular cycles, while students who drank enough water said that it made their periods less painful and stressful [10].

Lifestyle factors are also very important. An abnormal body mass index (BMI), especially overweight and obesity, correlates with menstrual irregularities attributable to insulin resistance and hormonal imbalance[15]. Psychological stress was similarly associated with menstrual irregularities, as chronic stress may modify hypothalamic–pituitary–ovarian axis function and interfere with normal menstrual cycles[12].

The results indicate that the consumption of high-fat and high-sugar foods, excessive dairy intake, insufficient hydration, abnormal BMI, and stress may lead to hormonal imbalances, metabolic disruptions, and alterations in vaginal microbiota, consequently elevating the risk of menstrual irregularities and abnormal white vaginal discharge in young women. These results show how important it is to eat better and change your lifestyle to improve your reproductive health.

Conclusion

This study investigated the relationship between selected dietary practices and lifestyle factors with reproductive health problems among 952 female college students. The results indicate that lifestyle behaviours play a significant role in the occurrence of abnormal white vaginal discharge and menstrual irregularities. A higher intake of high-fat foods, high-sugar foods, dairy products, and inadequate hydration was associated with an increased prevalence of these conditions, whereas students following comparatively healthier dietary habits reported fewer symptoms.

Lifestyle determinants such as body mass index (BMI) and psychological stress also showed significant associations with reproductive health disturbances. Students classified as obese and those experiencing higher stress levels demonstrated a greater prevalence of menstrual irregularities and abnormal vaginal discharge, while participants with normal BMI exhibited relatively lower risk. These findings emphasise the influence of modifiable lifestyle factors on menstrual and vaginal health among young women.

Encouraging balanced dietary practices, adequate hydration, maintenance of healthy body weight, and effective stress management may contribute to reducing reproductive health problems in this population. Further studies are recommended to explore these associations in greater depth and to evaluate preventive lifestyle interventions aimed at improving menstrual and reproductive health among college students.

Reference

1. Latif S, Naz S, Ashraf S, Jafri SA. Junk food consumption in relation to menstrual abnormalities among adolescent girls: A comparative cross-sectional study. Pak J Med Sci. 2022; 8 (8):2307-2312.

2. Ghosh A, Muley A. Ultra-processed food consumption among college students and their association with body composition, bowel movements, and menstrual cycle. Int J Public Health. 2025; 70:1607712.

3. Qureshi N, Ali A, Qureshi FA. Association between junk food consumption and menstrual

health among early adult female university students. J Dev Soc Sci. 2023; 4(3):261-269.

4. Bodur M, Ersoy-Söke N, Karademir E, Özkan B, Uçar A. Premenstrual syndrome, ultra-processed food intake, and food cravings: A new perspective. Food Sci Nutr. 2025; 13:e70520.

5. Noormohammadi M, Eslamian G, Kazemi SN, Rashidkhani B. Association between dietary patterns and bacterial vaginosis: A case–control study. Sci Rep. 2022;12:12199.

6. Ram D, Julakanti P, Atiquzzaman NT, Nagy S, Lin AY, Kesselman MM. Dietary influence on bacterial vaginosis. Cureus. 2025;17(9):e93506.

7. Song SD, Acharya KD, Zhu JE, Deveney CM, Walther-Antonio MRS, Tetel MJ, et al. Daily vaginal microbiota fluctuations are associated with the natural hormonal cycle, contraceptives, diet, and exercise. mSphere. 2020;5:e00593-20.

8. Hossam A, El-Dayem SMA, Abd-Elghany AA. Relation of obesity and menstrual disturbances in adolescent females. *J Pediatr Endocrinol Metab.* 2016;29(9):1019-1025.

9. Palma F, Volpe A, Villa P, et al. Vaginal environment and hydration: a new perspective. *Minerva Ginecol.* 2018;70(6):721-727.

10. Torkan B, Mousavi M, Dehghani S, Hajipour L, Sadeghi N, Ziaei Rad M, et al. The role of water intake in the severity of pain and menstrual distress among females suffering from primary dysmenorrhea. BMC Womens Health. 2021;21:40.

11.Nillni YI, Toufexis DJ, Rohan KJ. Anxiety sensitivity, the menstrual cycle, and panic disorder: a putative neuroendocrine and psychological interaction. *Clin Psychol Rev.* 2011;31(7):1183-1191.

12.Culhane JF, Rauh V, McCollum KF, et al. Maternal stress is associated with bacterial vaginosis in early pregnancy. *Matern Child Health J.* 2002;6(2):127-136.

13. Begum RF, Rahman S, Islam MT, *et al.* Impact of junk food consumption on obesity, polycystic ovarian syndrome, and reproductive health outcomes. 2023.

14.Mohammed L, Jha G, Malasevskaia I, *et al.* The interplay between sugar and yeast infections: Do diabetics have a greater predisposition to develop oral and vulvovaginal candidiasis? *Cureus.* 2021;13(2):e13407.

15. Zhao H, Zhang Y, Liu X, *et al.* Insulin resistance in polycystic ovary syndrome: pathogenesis, evaluation, and treatment. *Reprod Biol Endocrinol.* 2023.