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Impact of Dietary Habits on Health Outcomes in Young Adult Females: A Cross-Sectional Study

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KEYWORDS

Dietary Practices, Young Adult Females, Menstrual Health, Polycystic Ovary Syndrome (PCOS), Health Literacy.

ABSTRACT:

Introduction:

The dietary patterns established in young adulthood are critical determinants of long-term health trajectories and chronic disease risk. In India, a nutritional transition characterized by rising consumption of ultra-processed foods is evident, particularly among young women. While this trend is a potential contributor to various adverse gynecological and metabolic health outcomes, region-specific epidemiological data exploring these associations in detail remain scarce.

Aim: To assess the influence of dietary habits on menstrual health parameters, the prevalence of symptoms suggestive of Polycystic Ovary Syndrome (PCOS), and the general well-being of young adult females in India.

Material and Methods:A quantitative, cross-sectional study design was employed, conducted between March and May 2024. A structured online questionnaire was administered to a convenience sample of 153 female students aged 18-25 years from higher education institutions. The instrument collected data on dietary intake patterns, menstrual cycle regularity and symptomatology, the presence of PCOS-related features, levels of fatigue, and health literacy. Data analysis was performed using descriptive statistics. The study protocol received approval from the Institutional Ethics Committee, and informed consent was secured from every participant prior to enrolment.

Results: The study population reported a high prevalence of menstrual irregularities (60%) and chronic fatigue (81%). Clinical features associated with PCOS, such as hirsutism and oligomenorrhoea, were present in 30-35% of respondents. Analysis revealed significant associations between unhealthy dietary patterns—specifically high junk food consumption, insufficient dairy intake, and poor hydration—and a higher incidence of menorrhagia and dysmenorrhea. Conversely, health literacy levels were suboptimal; only 35% of participants possessed adequate knowledge of Breast Self-Examination (BSE), with an even smaller proportion practicing it routinely. Healthier dietary choices were positively correlated with greater health awareness and a lower frequency of health complaints.

Conclusion: The findings demonstrate a strong association between poor dietary habits and negative health outcomes, including menstrual dysfunction and diminished well-being, in young Indian women. This evidence underscores an urgent public health imperative for integrated, youth-centric nutritional education and health promotion strategies. Such interventions are vital not only for improving immediate quality of

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life but also for mitigating the future burden of chronic non-communicable diseases in this demographic.

Introduction

A balanced nutritional intake, abundant in fruits, vegetables, whole grains, lean proteins, and unsaturated fats, is fundamental to sustaining female physiological homeostasis. This dietary paradigm supports critical functions, from immune surveillance to the homeostatic regulation of endocrine and metabolic pathways underpinning reproductive fitness. [1,2] The imperative for such support is amplified during life stages with elevated demands. Menstruation, pregnancy, and lactation, characterized by iron loss, fetal development needs, and high nutrient transfer, respectively, represent periods of heightened vulnerability to dietary inadequacies. [1,2] Consequently, as a modifiable health determinant, diet is a primary target for strategic public health interventions aimed at enhancing quality of life and cultivating favorable long-term health trajectories across the entire female lifespan.[3]

Within the Indian context, a concerning shift in dietary patterns has been observed, particularly among young women. The escalating consumption of ultra-processed foods (UPFs), driven by urbanization and changing lifestyles, has emerged as a significant public health challenge.[4] These energy-dense, nutrient-poor dietary choices are strongly implicated in the rising prevalence of adverse health conditions, including Polycystic Ovary Syndrome (PCOS), obesity, micronutrient deficiencies, and endocrine disruption.[5-7] The young adult years (18-25 years) constitute a developmentally crucial and behaviorally plastic period. During this transition to independence, individuals are highly susceptible to influences such as academic stress, body-image perceptions, and social media, all of which can profoundly and often detrimentally shape their dietary behaviors.[8]

Despite the globally acknowledged significance of nutrition, a salient evidence gap persists in the Indian literature concerning the specific dietary correlates of health in young adult women.[9,10] Targeted research that concurrently examines the relationship between dietary intake and a spectrum of outcomes—from menstrual and hormonal health to general well-being—is notably scarce.[9,10]

This study was conceived to address this critical void by systematically investigating the role of dietary patterns on menstrual health, hormonal regulation, and overall well-being in this demographic.[11] The insights garnered are expected to provide an empirical foundation for developing evidence-based nutritional guidelines, shaping effective public health policies, and designing timely intervention programs.

The primary objectives of this study were threefold: first, to assess the relationship between self-reported dietary habits and markers of menstrual health, including cycle regularity, dysmenorrhea, and menorrhagia; second, to determine the association between PCOS-related symptoms and specific dietary patterns, such as high junk food intake and low consumption of fruits and vegetables; and third, to evaluate the level of nutritional knowledge and the practice of key preventive health behaviors, such as breast self-examination (BSE), within the cohort.

Materials and Methods

Study Design

This investigation utilized a quantitative, cross-sectional research framework to examine the relationships between dietary habits, lifestyle factors, and self-reported health outcomes within a defined population. Data collection was executed through a structured online questionnaire, composed predominantly of closed-ended and multiple-choice items. This instrument was designed to quantitatively assess key variables, including eating patterns, lifestyle practices, self-reported health status, and foundational nutritional knowledge.

Ethical Considerations

The study protocol received full review and was granted formal approval by the Institutional Ethics Review Board. Prior to accessing the questionnaire, all potential participants were presented with a detailed digital information sheet and consent form. This document outlined the study's objectives, procedures, potential risks and benefits, and the mechanisms in place to ensure data confidentiality. Participation was entirely voluntary, and informed consent was electronically obtained from everyone before proceeding. To

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safeguard participant privacy, the study design explicitly precluded the collection of any personally identifiable information, including names, institutional identification numbers, or electronic metadata such as IP addresses. All collected data were maintained on a secure, encrypted server with access restricted exclusively to the principal investigators.

Study Population and Sampling

The target population for this research was defined as female students, aged 18 to 25 years, who were actively enrolled in undergraduate or postgraduate programs across a consortium of affiliated universities and colleges. Given the exploratory nature of the study and constraints on resource accessibility, a non-probabilistic convenience sampling strategy was employed for participant recruitment. This approach was selected for its operational practicality and efficiency in reaching the target demographic. Consequently, the final sample size was not determined by an *a priori* statistical power calculation but was instead defined by the total number of complete and valid questionnaires received during the pre-established three-month data collection window. This process yielded a final analytic cohort of 153 participants.

Data Collection Tool and Procedure:

Data were collected remotely over a three-month period from March 2024 to May 2024. A structured questionnaire was developed using Google Forms and distributed through institutional email lists and student-focused social media platforms. The questionnaire was pre-tested for clarity and comprehension. It comprised closed-ended and multiple-choice questions organized into several domains:

1. The final instrument was organized into distinct domains, comprising exclusively closed-ended and multiple-choice items to facilitate quantitative analysis:
2. Socio-demographic Profile: This section captured baseline characteristics, including age, current year of academic study, and field of education.
3. Dietary Patterns: This domain assessed habitual consumption behaviors, including typical meal frequency, average daily water intake, and the weekly consumption frequency of specific food groups (fruits, vegetables, protein-rich foods, and fast food).
4. Lifestyle Practices: Participants reported on non-dietary factors, such as their level of physical activity and average nightly sleep duration.
5. Nutritional and Health Awareness: Knowledge and practices were evaluated through questions on the use of nutrition facts labels on food products and awareness of Breast Self-Examination (BSE) procedures.
6. Self-Reported Health Status: This section gathered data on existing medical diagnoses, specifically Polycystic Ovary Syndrome (PCOS), and the presence of associated symptoms (e.g., menstrual irregularity, hirsutism, acne). Perceived fatigue levels were also self-rated using a categorical scale (low, moderate, high).

The estimated time for completion of the entire questionnaire was 10 to 15 minutes. Submission of the form was construed as consent and finalized the participant's involvement in the study.

Statistical Analysis:

Upon the conclusion of the data acquisition phase, the assembled dataset underwent a rigorous pre-processing protocol. This involved systematic compilation, coding for analytical tractability, and subsequent migration into a dedicated statistical software environment (IBM SPSS Statistics, Version 28.0) to facilitate a comprehensive examination. The analytical strategy was executed in sequential stages.

The initial stage involved the application of descriptive statistical techniques to delineate the fundamental demographic and behavioral characteristics of the study population. All categorical variables, such as self-reported dietary habits and symptom prevalence, are expressed as absolute frequencies and corresponding percentages (n, %). Continuous variables, exemplified by participant age, are summarized using appropriate measures of central tendency and dispersion, presented as the arithmetic mean accompanied by the standard deviation (Mean ± SD).

Subsequently, inferential statistical methods were employed to probe the relationships between predetermined independent variables—including the frequency of fast-food consumption and the self-reported adequacy of fruit and vegetable intake—and key dependent health outcomes, such as the prevalence

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of chronic fatigue and the regularity of menstrual cycles. The assessment of associations between categorical variables was primarily conducted using Pearson's Chi-square test, which evaluates the independence of distributions in contingency tables. For all inferential tests, a two-tailed p-value of less than 0.05 was established a priori as the threshold for statistical significance, denoting the rejection of the null hypothesis of no association.

Results

The analysis of primary data collected from 153 participants elucidated significant correlations between specific dietary practices and a spectrum of health parameters within the young female demographic. The findings reveal a landscape marked by nutritional inadequacies and their consequential impact on physiological and gynecological well-being.

Dietary Intake Patterns and Nutritional Adequacy:

An evaluation of dietary habits uncovered substantial nutritional deficits among the cohort. Consumption of fresh fruits and vegetables was insufficient, with a mere 42% of respondents incorporating these food groups into their daily diet. In contrast, a majority of 58% reported consuming them fewer than three times per week. Similarly, dairy intake was inadequate, as only half of the participants consumed milk or its products with regularity. Concurrently, there was a high prevalence of energy-dense, nutrient-poor foods; approximately 75% of participants indicated a weekly intake of packaged snacks, fried items, or sugar-sweetened beverages. Protein consumption, particularly from sources such as eggs, meat, and legumes, was notably minimal. This pattern raises clinical concerns regarding the potential for deficiencies in critical micronutrients like iron and vitamin B12, especially amongst individuals adhering to vegetarian diets. Atypical meal timing was also commonplace, with 60% of the cohort regularly omitting breakfast. Furthermore, the use of dietary supplements was limited, as nearly 70% of respondents did not engage in regular supplementation (Table/Fig-1).

Menstrual Health and Hormonal Symptomatology:

A high prevalence of menstrual irregularities was observed, with 60% of participants reporting irregular or missed menstrual cycles. Dysmenorrhea was the most frequently reported symptom, affecting over 65% of respondents, followed by menorrhagia. Symptoms consistent with premenstrual syndrome (PMS) and painful cramps were also commonly documented (Table/Fig-2). Comparative analyses revealed a robust association between unfavorable dietary patterns—characterized by high consumption of "junk" foods and low intake of fruits, vegetables, and dairy—and an increased propensity for menstrual anomalies. Inadequate hydration was similarly correlated with more severe menorrhagia and dysmenorrhea. A constellation of symptoms suggestive of Polycystic Ovary Syndrome (PCOS), including oligomenorrhoea, weight gain, acne, and hirsutism, was observed in 30-35% of participants. These symptoms demonstrated a higher incidence in individuals with erratic meal patterns and elevated consumption of processed foods. Despite this symptomatic presentation, a formal diagnosis of PCOS was absent in the majority of cases (69.7%), while 18.1% expressed uncertainty regarding their diagnostic status (Table/Fig-3). Notably, over half of the participants (55.5%) reported that significant dietary modifications, often instigated by academic stress or examination periods, exerted a discernible influence on their menstrual cyclicity (Table/Fig-4).

Awareness, Preventive Health Practices, and Perceived Health Outcomes:

Awareness pertaining to micronutrient requirements and preventive health strategies was found to be suboptimal. Less than half of the study cohort reported a conscious effort to consume foods rich in essential minerals such as calcium, iron, or magnesium. Health literacy concerning Breast Self-Examination (BSE) was particularly low; only 35% of participants claimed proficiency in the technique, and fewer than 20% performed it on a regular basis. A significant proportion, 36.4%, had never engaged in BSE (Table/Fig-5).

Regarding self-perceived health outcomes, an overwhelming majority of participants (81%) reported experiencing chronic fatigue, which was frequently exacerbated during or immediately following menstruation. Emotional and affective disturbances, including mood swings, irritability, and anxiety, were reported by 72% of respondents, with many attributing these states directly to their dietary habits. Furthermore, over 60% of participants associated their dietary choices

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with the onset of gastrointestinal complaints, such as constipation, bloating, and acid reflux. A clear gradient was evident, wherein individuals who adhered to healthier dietary patterns and possessed greater nutritional knowledge reported a lower frequency of such complaints. This subgroup also demonstrated a more proactive engagement with preventive healthcare activities.

Discussion

This investigation delineates a significant and clinically relevant correlation between suboptimal dietary practices and a multifaceted profile of adverse gynecological and general health outcomes among a cohort of young adult women in India. The high prevalence of self-reported menstrual irregularities, a symptomatology suggestive of Polycystic Ovary Syndrome (PCOS), pervasive fatigue, and generally low health literacy underscores a pressing public health concern. This concern is particularly salient given that its primary drivers are modifiable lifestyle factors. The present findings are not anomalous; rather, they align cogently with an expanding corpus of international literature that substantiates the profound influence of nutritional intake on endocrinological and metabolic homeostasis.

The demonstrated association between a dietary pattern rich in processed carbohydrates and refined sugars and a higher incidence of menstrual disturbances is underpinned by well-established physiological pathways. As corroborated by prior research, consumption of high-glycemic foods can precipitate a state of hyperinsulinemia [12]. This elevated insulin level is known to disrupt the delicate signaling of the hypothalamic-pituitary-ovarian (HPO) axis, leading to aberrant gonadotropin secretion and subsequent ovulatory dysfunction, which manifests clinically as irregular menstrual cycles [13]. Furthermore, the frequent reporting of PCOS-like symptoms—such as oligomenorrhoea, hirsutism, and acne—within our study population finds a plausible explanation in the existing scientific consensus. Diets characterized by high consumption of fast food and a concomitant deficiency in dietary fiber are recognized contributors to the development of insulin resistance and compensatory hyperinsulinemia [14]. This metabolic milieu, in turn, stimulates ovarian stromal tissue to produce excess androgens, thereby propagating a key pathological feature of PCOS [15]. The pro-inflammatory state often induced by such poor-quality diets may further exacerbate this metabolic and endocrine dysregulation.

Conversely, our data indicate a protective association with the adequate consumption of certain food groups. The beneficial trends linked to sufficient dairy and protein intake find support in the work of Pereira et al., who demonstrated that such dietary components can improve metabolic parameters and satiety, potentially mitigating some of the risk factors associated with metabolic and reproductive disorders [16]. Furthermore, the pervasive reports of chronic fatigue and mood disturbances among participants can be reasonably attributed to underlying micronutrient deficiencies. This is a well-documented phenomenon; institutions like the World Health Organization and the American College of Obstetricians and Gynecologists have explicitly identified deficiencies in iron, calcium, and magnesium as primary contributors to fatigue and neuropsychiatric symptoms in women of reproductive age [17,18].

A particularly salient finding of this investigation was the high prevalence of nutritional imbalances and poor eating habits within an educated, urban demographic. This suggests that academic attainment and relatively higher socioeconomic status do not inherently translate to the adoption of healthier nutritional practices or greater health literacy in this specific context. The alarmingly low level of awareness and practice of Breast Self-Examination (BSE), a fundamental component of proactive health surveillance, further accentuates a critical gap in essential, life-skills-based health education that extends beyond formal schooling.

The analysis also revealed a complex interplay between psychological well-being and dietary behaviors. The high frequency of meal skipping and emotional eating points to the influence of underlying factors such as academic pressure, social stressors, and body image anxieties. This interconnection necessitates a paradigm shift in public health strategy. Effective interventions must be multidimensional, integrating psychological support and stress management techniques with conventional nutritional guidance to address the root causes of unhealthy eating behaviors.

This study is not without its limitations. The cross-sectional design precludes the determination of causality between the reported dietary habits and health outcomes. The reliance on self-reported data for

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symptoms, dietary intake, and practices like BSE is susceptible to recall and social desirability biases. Furthermore, the sample was drawn from an urban, educated population, which may limit the generalizability of the findings to rural or less-educated demographics across India. Future longitudinal studies incorporating objective clinical, biochemical, and dietary assessments are warranted to confirm these associations and explore causal pathways.

Limitations

Notwithstanding the valuable perspectives this investigation offers on dietary associations with health parameters in young women, several methodological constraints warrant careful consideration when extrapolating from the results. The cross-sectional design of the study, while useful for identifying correlations, is inherently limited in its capacity to establish temporality or infer causality between the identified dietary patterns and the health outcomes reported. The recruitment strategy, which relied on convenience sampling—a non-probability-based approach—poses a challenge to the external validity of the findings. This method may introduce selection bias, potentially limiting the applicability and generalizability of the results to the broader population of young women.

A further substantive limitation arises from the study's dependence on self-reported data for key variables, including dietary intake, menstrual history, and subjective symptomatology. This approach is susceptible to multiple forms of measurement error. Notably, recall bias may affect the accuracy of reported past dietary habits, while social desirability bias could lead to the underreporting of behaviors perceived as unfavorable. A particularly significant methodological shortcoming is the absence of objective clinical or biochemical measures to corroborate the self-reported data. The study design did not incorporate confirmatory diagnostic procedures, such as serum hormonal profiling for androgens or progesterone, assays for micronutrient status (e.g., Vitamin B12, Iron, Vitamin D), or pelvic ultrasonography. These tools are integral to the definitive diagnosis of conditions such as Polycystic Ovary Syndrome (PCOS). Consequently, the clinical features reported, though indicative, remain suggestive rather than constituting verified diagnoses.

Subsequent research in this domain would be substantially strengthened by adopting longitudinal or prospective cohort designs, which are better suited for elucidating causal pathways. The integration of objective metrics—including biochemical analyses, anthropometric assessments conducted by trained personnel, and diagnoses confirmed through established clinical criteria—would greatly enhance the reliability and validity of the evidence. Furthermore, employing larger, randomly selected, and population-representative sampling frameworks would improve the statistical robustness and generalizability of future findings.

Conclusion

In conclusion, the findings of this investigation substantiate the position that dietary patterns among young adult females represent a critical modifiable determinant of health, exerting influence that transcends basic nutrition to significantly affect physiological and psychological homeostasis. The data reveal a compelling association between suboptimal nutritional practices—characterized by excessive consumption of Ultra-Processed Foods (UPFs) and insufficient micronutrient density—and an increased prevalence of a spectrum of preventable health concerns related to endocrine, metabolic, and mental well-being. These results underscore the necessity for targeted public health action. Consequently, we posit that a multi-pronged intervention strategy is warranted. This should commence with the systematic integration of robust, evidence-based health education into academic curricula, specifically designed to foster literacy in nutrition, menstrual physiology, and dietary management. To translate knowledge into behavior, such educational initiatives must be complemented with practical, hands-on instruction in skills such as food label interpretation and nutritious meal planning. Concurrently, public awareness campaigns should be amplified to reinforce preventive health behaviors, including the regular practice of Breast Self-Examination (BSE). Finally, the establishment of readily accessible support services, offering counseling for both mental well-being and preventive health guidance, is crucial to address the psychosocial underpinnings of detrimental dietary choices. The implementation of this comprehensive and proactive framework is indispensable for empowering this key demographic, thereby curtaining the trajectory of long-

term morbidity and cultivating a sustainable foundation for lifelong health and wellness.

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Figure Legends

[Table/Fig-1]: Regular Dietary Supplement Intake among Participants.
The bar graph depicts the distribution of participants based on their regular intake of dietary supplements. A majority (69.7%) reported not taking any supplements. Among those who did, multivitamins were most used (18.1%), followed by Vitamin D (15.5%), iron supplements (12.3%), and calcium supplements (10.3%).

[Table/Fig-2]: Prevalence and Frequency of Menstrual Symptoms among Participants.
The clustered bar graph illustrates the frequency distribution of menstrual-related symptoms among respondents. Painful cramps (dysmenorrhea) and

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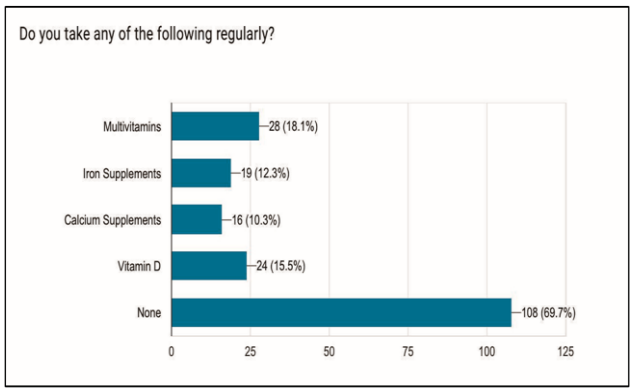
premenstrual syndrome (PMS) symptoms such as mood swings and bloating were reported 'often' by a considerable proportion of participants, whereas mid-cycle bleeding (metrorrhagia) was least common. Irregular periods and heavy bleeding (menorrhagia) were experienced 'sometimes' or 'rarely' by a moderate number of respondents.

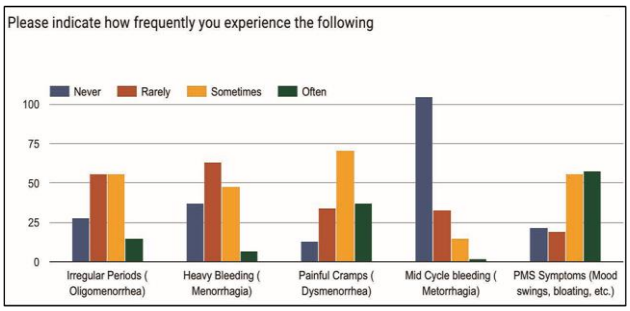
[Table/Fig-3]:Prevalence of Medically Diagnosed PCOD/PCOS among the Study Participants. The pie chart depicts the distribution of participants based on their medical diagnosis of Polycystic Ovarian Disease/Syndrome (PCOD/PCOS). Among the respondents, **18.1%** reported being medically diagnosed with PCOD/PCOS, while **69.7%** had not been diagnosed, and **12.3%** were uncertain about their diagnosis status.

[Table/Fig-4]:Self-reported Association Between Dietary Changes and Menstrual Regularity. The pie chart illustrates participants' responses regarding changes in their menstrual cycle associated with alterations in dietary habits (e.g., during exams, festivals, or stress). A majority (**55.5%**) reported experiencing menstrual changes, **17.4%** did not notice any variation, while **27.1%** were uncertain of the association.

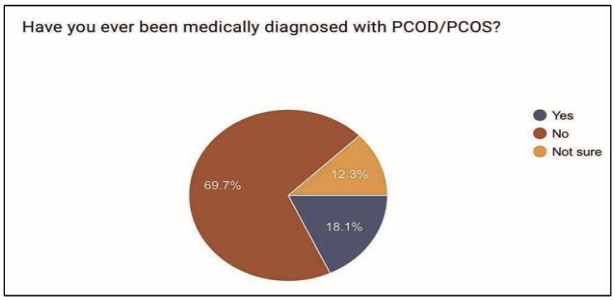
[Table/Fig-5]:Breast Self-Examination Practice and Knowledge.
The figure shows the distribution of participants based on their practice and awareness of Breast Self-Examination (BSE). Among the respondents, **13.6%** reported performing BSE monthly, **20.8%** performed it occasionally, **24%** rarely conducted BSE, and **36.4%** stated they did not know how to perform BSE.



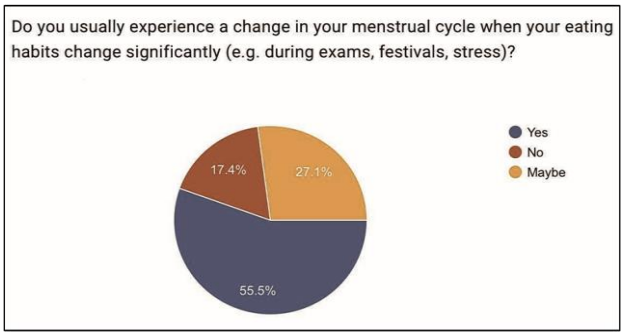
[Table/Fig -1]:Regular Dietary Supplement Intake



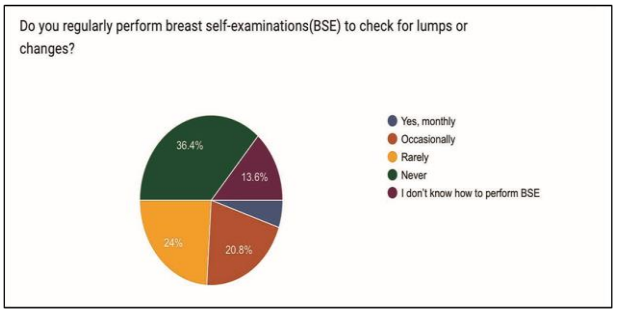
[Table/Fig-2]: Prevalence and Frequency of Menstrual Symptoms



[Table/Fig-3]: Prevalence of Medically Diagnosed PCOD/PCOS



[Table/Fig-4]:Self-Reported Association Between Dietary Changes and Menstrual Regularity



[Table/Fig-5]: Breast Self-Examination Practice and Knowledge