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Original Article

The Impact of Hormonal Imbalance on Physiological and Psychological Health in Young Females: A Cross-Sectional Study

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Abstract

This cross-sectional study compared the prevalence, symptomatology and lifestyle predictors of hormonal imbalance in 200 female students between the age of 16-26 years and living in Rawalakot, Pakistan. The information was gathered with the help of a questionnaire and processed with the help of descriptive statistics. The results showed that it had a high rate of prevalence of 58.85% in participants between the ages of 20 and 25 years with hirsutism (64.61%), thinning of hair (65.43%), irregular menstrual period (37.45) and frequent swings in mood (58.85) being the main manifestations of the condition. The main factors reported were academic stress (39.09%), and frequent intake of fast foods (50.21%). It is important to note that 75.72% of respondents had not consulted a physician on their symptoms and a large disparity exists in healthcare seeking behavior. The research concludes that hormonal imbalance is commonplace but underreported, with the largest role played by the fact that the condition is partly predetermined by the modifiable lifestyle aspects. Limitations are related to cross-sectional nature and use of self-reported data. The implications note the need to implement specific educational programmes, early clinical focus and lifestyle intervention. Future studies ought to include longitudinal study, wider sampling, and community-based health promotion to boost awareness, prevention, and treatment of hormonal disorders among young women.

Keywords: Hormonal Imbalance, Young Females, Cross-Sectional Study, Lifestyle Factors, Clinical Awareness.

Introduction

Hormones are also essential chemical messengers released by the endocrine glands which dictate the different metabolic activities and the reproductive efficiency of a person. These materials pass in small amounts in the blood stream to reach target tissues and organs with instructions as to when and how these organs are to operate (Jain, 2024). Hormones are the body-controlling substances of over 200 different ones that have been identified in the human body; these operate through receptors to regulate almost all the primary body processes, such as metabolism, appetite, heart rate, sleep pattern, and body temperature (Al-Tarawneh & Al-Tarawneh, 2024). They are therefore central to upholding mental health, physical and emotional well-being of an individual (Naveed *et al*., 2015). Hormonal imbalance happens due to endocrine disorder in cases where there is excessive or insufficient production of these chemicals, hence causing some disturbances in the natural balance of the body (Rafique & Alsheikh, 2018).

Hormonal imbalance is also mostly common among the females and is even more prevalent among the women's because of their unique endocrine organs and elaborate reproductive cycles. It is approximated that two females in five are victims of this condition across the world (Naveed *et al.,* 2015). Unattended, such imbalances may cause extensive physiological and psychological effects to the organism, including anxiety, depression, mental impairment, and menstrual cycle disruption. Moreover, persistent imbalances are likely to cause more serious illnesses, such as osteoporosis, heart disease, and infertility. Notwithstanding such risks, awareness and clinical reporting gaps are significant particularly in terms of the effects of changes experienced in the period of puberty and young adulthood on long-term well-being (Zakariah-Akoto *et al*., 2024).

The causes of hormonal changes may be divided into different categories, such as bad nutrition, obesity, and long-term stress (Gupta, 2020). High-energy diets in processed meats and fried food may interfere with the production of hormones, and obesity is commonly linked to insulin resistance that further disturbs the levels of estrogen and testosterone (Osman *et al*., 2019). Moreover, environmental poisoning, pollutants and some drugs such as birth control pills or steroids may worsen endocrine disease (Wieczorek *et al*., 2023). School and domestic pressure in young females are a significant cause that increases cortisol levels that subsequently suppress the thyroid activity causing weight gain and metabolic deterioration. Lack of professional medical advice also tends to complicate these problems, statistics show that an amazing 75.72% of young women never see a doctor when it comes to treating their hormonal changes (Sharma *et al*., 2013).

Objectives

1. To determine the level of awareness and knowledge among young females on the nature of hormonal imbalances and their possible effects on their health.
2. To assess the physiological changes of hormonal variation, particularly in terms of such symptoms as menstrual changes, hirsutism, weight changes and acne.
3. To examine the psychological impact in relation to endocrine imbalances, such as the rate of mood swings, anxiety, depression and sleep disorders.
4. To discover the relationship between lifestyle choices and the health of hormones, it would be useful to analyze the role of diet, obesity, and other stressful factors (academic, domestic, and social) that contribute to the lack of balance.
5. To identify the effect on the overall quality of life and evaluate the fact of clinical reporting, it is important to emphasize the need to diagnose early and make changes in the lifestyle.

Literature Review

Hormone balance can ensure the holistic health of the mind and body since any form of imbalance at certain pivotal periods in life like puberty or menopause may result in life threatening conditions (Efeyan *et al*., 2015). Studies have also shown that fluctuation of hormones is also a major cause of certain psychological disorders, such as depression, chronic stress, insomnia, and cognitive dysfunction (Watrowski *et al*., 2016). As an example, a research in India pointed out that, rapid changes in allopregnanolone following delivery are the cause of postpartum depression and low

levels of estrogen may decrease serotonin levels resulting in anxiety and insomnia (Martelli & Brooks, 2023). Moreover, stress is one of the main factors that lead to endocrine disruption; under the influence of stress, the body also secretes more glucocorticoids, catecholamines and prolactin (Aolymat *et al*., 2022). In particular, the increase in cortisol level may disrupt the fragile hormonal balance, lead to insulin resistance, food cravings, and thyroid suppression, which eventually lead to low metabolic rates and weight gain (Vidhale *et al*., 2023).

Another determinant that is extremely vital is sleep deprivation because it disrupts the metabolic restoration and is more probable to occur in females than in males. The variation of estrogen levels caused by physical stress or using restrictive diets may lead to restlessness and frequent insomnia (Maimoun, *et al*., 2014). In addition to mood and sleep, hormones have a neuroprotective effect; estrogens improve blood flow and oxygen delivery to brain cells, and changes in their levels with age could predispose one to develop Alzheimer (Stegeman *et al.,* 2017). Also, studies conducted in the UK have indicated a major hormonal role in depressing females who are associated with changes in testosterone levels, which decline drastically with age and lead to low libido and osteoporosis (Al Dhaheri *et al*., 2021).

Hormonal imbalance on a physiological level can be represented in a very large number of disorders, including hirsutism, alopecia, and polycystic ovary syndrome (PCOS) (Alonso Bello *et al*., 2024). Hirsutism which is the coarse male-pattern hair growth is common in 5-10 percent of women all over the globe and is commonly brought about by an excess quantity of androgens or sensitivity to androgens (Borkar & Joshi, 2023). On the same note, loss or reduction of hair is common owing to a shortage of estrogen or too many androgens which make the hair follicles decrease (Lisco *et al*., 2021). The changes in progesterone and estrogen have also been linked to gastrointestinal problems such as bloating and painful cramps during menstrual cycle (Chandel *et al*., 2024). When considering the aspect of metabolic health, insulin resistance is a major cause of PCOS, which results in a series of disruptions in metabolic activities of the body.

Thyroid gland is a central controller of basic metabolism, and such an imbalance may cause dramatically opposite physical results: hypothyroidism contributes to gaining weight, depression, and coldness, whereas hyperthyroidism causes losing weight and increasing energy (Segarra *et al*., 2023). Obesity in adolescent girls has been specifically denoted by regional studies including one carried out in Pakistan which has attributed obesity to menstrual irregularities and hormonal variations (Yoon *et al*., 2021). Moreover, exposure to pesticides and industrial chemicals, which are environmental factors, are endocrine disruptors, because they bind to the hormone receptor and change the gene expression, which may cause infertility and early puberty (Teleayo, 2023). Taken altogether, these results emphasize that the endocrine system is not a single network but a complex web, in which a single change can affect all the aspects of physical and mental health in a woman.

Methods and Materials

Study Design

This study was done as a cross-sectional study over a period of six months of study between the months of January and June 2024. This design was chosen as it will assess the occurrence of endocrine disruptions and the ensuing physiological and psychological effects among young women at a particular time.

Study Setting and Population

The research was mainly carried out in academic fraternity of Rawalakot, Azar Jammu and Kashmir (AJK). In particular, the data collection was limited to the group of female students at the Post Graduate College, Poonch Medical College, and the University of Poonch Rawalakot. The target group was comprised of both medical and non-medical female students that are going through the hormonal changes that accompany young adulthood.

Sample Size and Sampling

The entire number of females in the chosen institutes was estimated to be 2,500 to 3,000 people. A sample of 200 participants was selected out of this group, and this is the required sample of about 10 percent of the total target population. The research used certain inclusion and exclusion criteria to guarantee the integrity of data:

1. **Inclusion Criteria**: The inclusion criteria were that females aged 16 to 26 years were eligible.
2. **Exclusion Criteria:** The individuals with abnormal mental status, pregnant or lactating women and the individuals who refused to give consent were excluded in the study.

Data Collection Tool

The main data collection tool in this study was a self-administered questionnaire with 20 questions. These questionnaires were distributed to the respondents by the investigator personally. The instrument was separated into two:

Part A: Dedicated to the collection of demographic data and the biodata of the subjects.
Part B: It is aimed at measuring the symptoms of hormonal imbalance and the specified physiological and psychological health alterations that the students may have gone through. The conditions that this section was aimed at were mood swings, menstrual irregularities, and dietary habits.

Data Analysis

After the end of the collection exercise, coding and statistical analysis of the data was done by use of the Statistical Package for the Social Sciences (SPSS) version 22. The researchers applied descriptive statistics to find the percentages of different health conditions and graphical illustration, including pie charts, to demonstrate how hormonal imbalances affected the overall quality of life of the participants.

Results and Findings

The results obtained in this cross-sectional research on a sample of 200 female respondents between the ages of 16 and 26 years give a comprehensive account of the occurrence and the symptoms of the hormonal imbalance among the student community of Rawalakot.

Demography and Socioeconomic Distribution

The statistics show that hormonal imbalance is the most common in young women between the ages of 20-25 with 58.85 of the affected cases (25.10 in the 15-20 age). The spatial distribution of cases showed that it was concentrated more in rural regions (58.44) than in the urban locations (41.56). Interestingly, the family history of hormonal imbalance among the participants was only 18.11% indicating that in most participants (81.89) the condition could not be termed as inherited, but it could be due to external or lifestyle influences.

Lifestyle Contributing Factors and Stressors

The paper has determined academic stress as the most commonly occurring psychological trigger, at 39.09 percent across the sample. Additional stresses identified included the social stress (18.93%), domestic stress (7.82%) and a high percentage (34.16) of no specific stress was reported. It seems that diet was also a significant factor, with 50.21% of the participants often eating fast food, after which packaged milk contained second place (30.45%), and poultry eggs, other packaged foods were a lower frequency of the daily food intake. These eating patterns were often related to the cravings for salty food (39.09) and sweet food cravings (35.39).

Physiological Impacts

The hormonal disturbance had physiological manifestations that were many and varied:

- Menstrual Health: A huge percentage of the participants reported menstrual problems with 37.45% of respondents complaining of painful or irregular periods and an additional 40.74% having it occasionally.
- Dermatological and Physical Change: 64.61 per cent of the respondents complained of excess hair growth, and 65.43 per cent complained that they could see a lot of hair thinning or loss. Also, 45.27% had acne problems, especially around the face and backline.
- Pain and Weight: 64.61 of the young women had muscle weakness or joint pains. On the matter of weight, 46.91% of respondents had no change yet there was an almost equal percentage of respondents who had weight loss (26.75%), and weight gain (26.34%).
- Clinical Findings: A small percentage of 15.64% had been decisively diagnosed with ovarian cysts or fibroid, whereas 26.75% had no idea about it.

Psychological Effects and Health Seeking Behaviour

Mental health was also severely impacted and 58.85% indicated that they had frequent mood swings and were emotionally up and down. In addition, 42.39% were out of touch with their friends and community. Sleep disorders were common too since only 36.63 out of the participants did not complain of any difficulties falling and maintaining sleep. Although such symptoms were common, a crucial gap on clinical reporting was found: 75.72% of the respondents have never sought medical care when it comes to having their hormonal changes treated (Zakariah-Akoto *et al*., 2024). 200 female participants, ages 16 to 26, from institutions in Rawalakot, Azad Jammu & Kashmir, provided data for the study. The physiological and psychological effects of hormonal imbalance were the focus of the data analysis, and table 1 presents the main findings for each of the variables covered below.

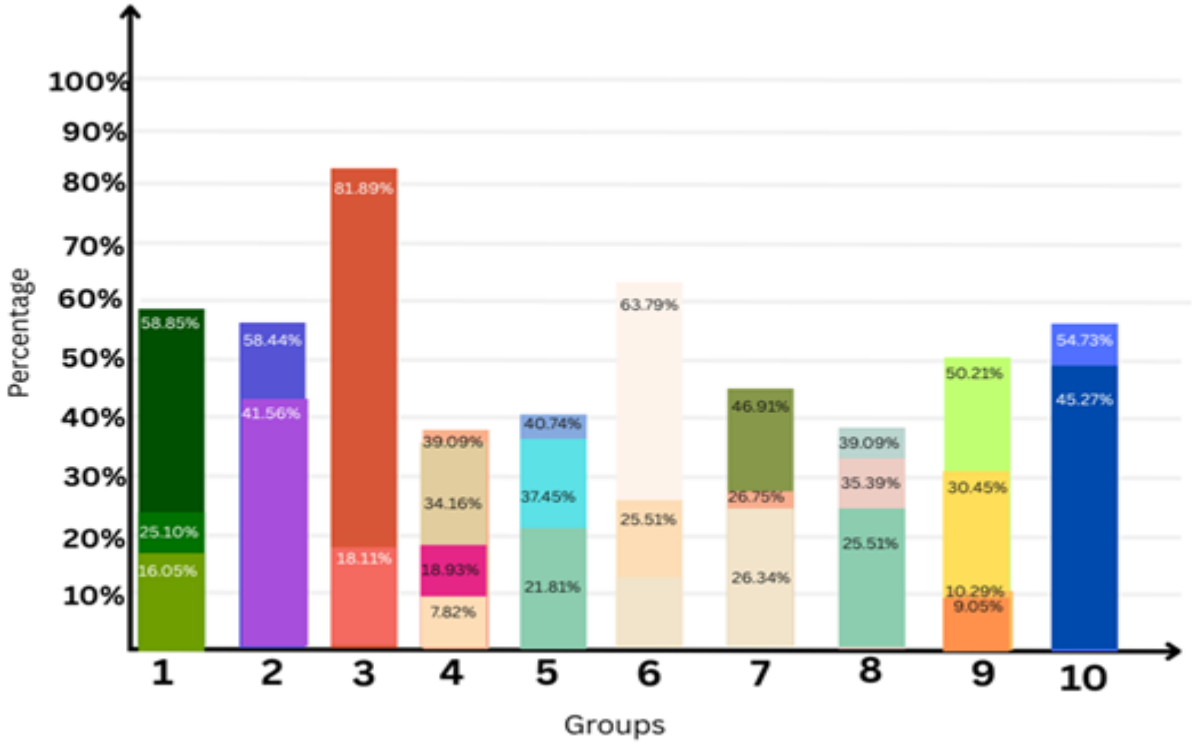
Table 1:
Prevalence of Hormonal Imbalance Indicators and Associated Factors Among Young Females (n=200)

Question	Group	Percentage (%)	Interpretation
Age Group	0:15−20 years 1:20−25 years 2:>26 years	25.10% 58.85% 16.05%	Less than the peak group Peak for hormonal imbalance Rare for hormonal imbalance
Zone of Area	0:Rural 1:Urban	58.44% 41.56%	Peak for hormonal imbalance Less than the peak group
Family History	0:No 1:Yes	81.89% 18.11%	Peak (Hormonal imbalance is high among those with no family history) Less than the peak group
Type of Stress	0:Academic stress 1:Domestic stress 2:No stress 3:Social stress	39.09% 7.82% 34.16% 18.93%	Peak for hormonal imbalance Rare for hormonal imbalance Less than the peak group Rare for hormonal imbalance

Sudden Change in Mood	0:No 1:Sometimes 2:Yes	10.70% 63.79% 25.51%	Less than the peak group Peak (Mostly females) Rare for this issue
Unexplained Weight Variation	0:None 1:Weight gain 2:Weight loss	46.91% 26.34% 26.75%	Peak (Mostly females) Rare for this issue Less than the peak group
Cravings for Certain Foods	0:None 1:Salty foods 2:Sweet food	25.51% 39.09% 35.39%	Less than the peak group Peak (Mostly females) Rare for this issue
Frequent Diet Usage	0:Fast food 1:Packaged food 2:Poultry eggs 3:Packaged milk	50.21% 9.05% 10.29% 30.45%	Peak (More women) Rare (Limited number) Rare (Limited number) Less than the peak group
Acne on Facial/Backline	0:No 1:Yes	54.73% 45.27%	Peak (Most of the females) Less than the peak group
Excessive Facial Hair Growth	0:Yes 1:No	64.61% 34.98%	Peak (Most of the females) Less than the peak group
Hair Thinning/Extreme Hair Loss	0:No 1:Yes	34.16% 65.43%	Less than the peak group Peak (Most of the females)
Mood Swings/Emotional Ups & Downs	0:No 1:Yes 2:Sometimes	9.47% 58.85% 31.69%	Limited for this issue Peak (Mostly females) Fewer than the peak group
Muscle Weakness or Joint Pain	0:No 1:Yes	35.39% 64.61%	Limited for this issue Peak (Most of the females)
Visited a Physician for Treatment	0:No 1:Yes	75.72% 24.28%	Peak (Most of the females) Limited number of females

Graph 1

The graph visually represents the data presented in the table for the first ten groups. Each group is represented by a set of bars, with the percentage for each category clearly labeled above the corresponding bar.



Discussion

The results of this cross-sectional study show that hormonal imbalance is a widespread problem among young females and the highest prevalence of 58.85% was found in the age group of 20 to 25 years. This is consistent with international statistics that indicate that about two women in every five are victimized by endocrine imbalances (Ibragimov *et al*., 2023). A sharp regional difference was observed with a larger rate of prevalence in rural setting (58.44) than the urban setting (41.56) that may indicate the difference in lifestyle, dietary habits or environmental exposures in the regions. Additionally, 81.89% of the respondents had no family history of the condition supports the conclusion that external conditions and not genetics are the major causes of these imbalances in the local population (Maimoun *et al.*, 2014). The main conclusions that this study has made are that the issue of academic stress prevailed and it influenced 39.09% of the participants, more than domestic and social stressors. This has been supported in the available literature, with the publication stating that chronic stress causes the release of cortisol, which may suppress thyroid activity, destabilize insulin concentrations, and cause weight gain. This physical stress is further exacerbated by unhealthy eating habit as more than half of the respondents (50.21) eat fast food every day. These diets that are rich and processed fats and sugars are known to disrupt hormone production and are often associated with the pathogenesis of Polycystic Ovary Syndrome (PCOS) and insulin resistance (Petersen, 2025).

Another significant finding of the study is a deep gap in awareness and a sense of clinical non-reporting as 75.72 percent of the surveyed young women had never seen a physician due to their symptoms. The reason behind this low consultation rate is a cause of concern, as reported symptoms are severe, with hirsutism (64.61%), hair thinness (65.43%), and frequent mood swings (58.85) being the most frequent (Vidhale *et al*., 2023). These findings are in alignment with the literature that indicates that several females tend to attribute natural life cycles as the cause of

endocrine related issues including menstrual irregularities or emotional fluctuations as opposed to medical ailments that are treatable. The prevalence of muscle weakness and joint pains (64.61) is also indicative of the fact that these imbalances are going a long way to undermine the physical quality of life of the participants (Laue, 2024).

The health and pharmaceutical intervention ramifications are significant to the population health. The paper concludes that hormonal imbalance is a treatable disorder although a transition to lifestyle changes such as a better diet, physical exercise, and stress control needs to take place. The educational campaigns should be conducted as part of the program on public health to eliminate awareness gap and promote early diagnosis to avoid long-term effects such as infertility or cardiovascular disease (Teede *et al*., 2010). In the pharmaceutical field, there is a definite necessity of the availability of diagnostic tests and specific interventions on symptoms such as hirsutism and irregular cycles to achieve endocrine balance.

The table below gives an overall description of the results of the cross-sectional study which was carried out among 200 female students at the University of Poonch Rawalakot. These findings demonstrate the age structure, additive lifestyle variables, and the remarkable physiological and psychological symptoms of hormonal imbalance among such a population.

Table 2
Prevalence of Hormonal Imbalance Indicators and Lifestyle Factors (n=200)

Category	Variable	Percentage (%)
Demographics	• Age:20–25 years (Peak Prevalence)	• 58.85%
	• Resident: Rural Area	• 58.44%
	• Family History of Imbalance: No	• 81.89%
Stressors	• Academic Stress	• 39.09%
	• Social Stress	• 18.93%
	• Domestic Stress	• 7.82%
Dietary Habits	• Frequent Fast-Food Consumption	• 50.21%
	• Cravings for Salty Foods	• 39.09%
	• Cravings for Sweet Foods	• 35.39%
Physiological Symptoms	• Hair Thinning or Extreme Loss	• 65.43%
	• Excessive Facial Hair Growth	• 64.61%
	• Muscle Weakness or Joint Pain	• 64.61%
	• Irregular or Painful Periods	• 37.45%
	• Struggle with Acne	• 45.27%
Clinical Behaviour	• Never Visited a Physician for Treatment	• 75.72%

Analysis of Findings

The information in Table 1 highlights the existence of a great awareness-action gap among young females. Though an overwhelming 58.85% of the respondents in the 2025 age group are affected by hormonal imbalances, over three-

quarters (75.72) have never visited a medical practitioner. This implies that such symptoms as mood swings (58.85%), hair thinning (65.43%), and hirsutism (64.61) are either ignored or not reported in clinical practice. The findings also determine lifestyle to be a major cause of such imbalances as opposed to genetics since more than 81 percent of the respondents had no family history of the condition. The most alarming modifiable risk factors are the high dependency on fast food (50.21) and the presence of academic stress (39.09). These should be addressed with lifestyle changes including weight control and reduction of stress so that in the long run damage to health such as infertility or PCOS will be prevented.

To establish the correlation between these variables, the hormonal system of the body could be regarded as a fine-tuned clock; when the external forces such as academic stress or improper nutrition serve as the dust in the mechanism, the whole clock starts falling out of time causing the symptoms (applicants) that were registered in this study.

Conclusion

Hormonal disorder is a very common and grossly under-reported disorder, whereby world results reveal that one in every five women is susceptible to the condition. These trends are supported by this research, which indicated a high endocrine disruption among young women between the ages of 20 to 25 years with the prevalence among the young women being 58.85. Although such a high rate of symptoms: painful menstrual cycles to serious mood swings, the participants had never sought the help of a physician in treating such changes (75.72 per cent). It shows that there is a significant lack of awareness and reporting in clinical conditions that should be filled to avoid the development of health complications in the long run, including infertility and chronic metabolic illnesses. To fill this gap, there is a pressing necessity to conduct educational programs and public health campaigns that will equip females with knowledge required to identify the symptoms, especially as far as Polycystic Ovary Syndrome (PCOS) and its associated outcomes are concerned. The paper emphasizes the fact that hormonal imbalance is a treatable disorder that can be controlled mainly through lifestyle changes. These programs must be based on weight control, physical exercise, and nutritional changes in preference of nutritious food in lieu of fast food. Moreover, clinical screening needs to be promoted at younger stages in life, specifically at puberty, because the changes can be spotted in time to cause extreme physiological or mental decline. Healthcare providers and pharmacists are key elements of this management strategy. Since they are the most convenient medical practitioners, they are well placed to spot the symptoms of endocrine malfunction and give advice on pharmaceutical intervention and lifestyle modification. Healthcare providers are enabled to help young women improve the quality of life and mental well-being through proactive response to these imbalances. Finally, the best weapons to rehabilitate the natural endocrine level of the body are early diagnosis and adherence to a healthy lifestyle.

Future Recommendations

According to the results of the findings in the sources, it is paramount that the educational establishments launch focused awareness actions and continuous education to address the vast gap in knowledge as far as the understanding of menstrual disorders and hormonal disruptions is concerned. Such efforts ought to be using workshops, seminars, and other mediums to spread scientific information, which can be used in destigmatizing mood disorders by emphasizing on its biological nature and not as a sign of weakness (Mazza et al., 2024). Also, the study contends that hormonal health should be incorporated into the routine of health checks and mental health checks done among young women. Early detection and identification of people at great risk of severe mood disturbances can enable proactive medical care intervention and this will greatly decrease the extent and the duration of any possible endocrine-related disorders. These screenings must contain the detailed health history, physical examination and laboratory tests to determine the level of hormones in the blood, urine or saliva (Meena *et al*., 2024).

To support all these clinical measures, lifestyle modification programs should be developed to offer information on how to have a balanced and nutritious diet that will not have processed fats and sugars that have been known to disrupt the synthesis of hormones. Regular exercise, like brisk walking, necessary to control the level of cortisol and the healthy level of glucose metabolism, should also be encouraged by these programs (Olson *et al*., 2015). Since stress

is known to be a major cause of endocrine disruption, the use of stress management skills and trainings given on how to have a stress-free mind is a possible preventive action to prevent adrenal exhaustion. Lastly, it is essential to ensure proper sleep and rest because insomnia may cause metabolic deterioration and even increase the hormonal imbalance. With the help of a multidisciplinary strategy which implies the integration of education, screening and the maintenance of healthy daily routines, the healthcare professionals and educational organizations can contribute greatly to the overall quality of life of young women.

Limitations

Despite the useful information contained in this research, the cross-sectional nature of the study makes it impossible to establish causal connections between the control variables (lifestyle attributes stated) and hormonal disproportions. Using the data of the self-reported questionnaire can be subject to recall bias or social desirability bias. In addition, the sample was only limited to female students of institutions of Rawalakot and thus, it could not be generalized to larger or heterogeneous populations. The self-reported diagnoses and symptoms are even more limited by the fact that there is no clinical or biochemical confirmation of the hormone levels.

Declarations

Ethical Approval and Consent to Participate: This study strictly adhered to the Declaration of Helsinki and relevant national and institutional ethical guidelines. Informed consent was obtained. All procedures performed in this study were consistent with the ethical standards of the Helsinki Declaration.

Consent for Publication: The authors give their consent for publication.

Availability of Data and Materials: Upon request, the corresponding author will make the datasets used and/or analyzed during the current investigation available.

Competing Interest: The author declares that there is no clash of interest.

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