Original Article

# EPIDEMIOLOGY OF POLYCYSTIC OVARIAN SYNDROME IN A RURAL MEDICAL COLLEGE AND HOSPITAL- A SURVEY BASED RESEARCH

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## Abstract

Epidemiology of PCOS among female medical students and nursing staff was conducted in a rural medical college in Himachal Pradesh using a pretested self designed questionnaire. A data of 200 study population was collected and analyzed. After interpretation it was concluded that 98.98% of the study population was aware about PCOS.A prevalence of 29.50% was observed among the study population based on responses to the questionnaire. As PCOS is associated with BMI, higher calorie intake and low physical activity, similar findings were observed in our study. Among the subjects with normal BMI, 86% have no complaints related to PCOS, while the remaining 14% have some complaints. Whereas the population with BMI categorized under pre-obesity (WHO) 62% have complaints and population with BMI categorized under obesity (WHO) 75% have complaints. Concerning the association with calorie intake, 27% of population with a surplus calorie intake (FDA criteria) has complaints. Coming to the physical activity (WHO), study population with low physical activity(Sedentary) 62% have complaints/symptoms, whereas the percentages are significantly lower in population with moderate or strenuous physical activity. One more emerging and important parameter for diagnosis of PCOS is waist to hip ratio (WHR). WHR between 0.81-0.85 (Categorized under moderate risk by WHO) 30% of study population had complaints, WHR greater than or equal to0.86 (Categorized under high risk by WHO), 74.5% of population have complaints related to PCOS. The high prevalence in this study must be attributed to lower physical activity and higher stress level.. There is an imbalance between the awareness about the disease which comes out to be 98.98% and the awareness about complications which comes out to be 52.5% even among the medical students and staff. So health camps and regular screening should be conducted in every hospital to prevent long term complications. This will facilitate in focusing on our young population and population in reproductive age group among our future healthcare professionals as, their knowledge and practices towards PCOS will have a major impact on the society.

**Key words:** Polycystic Ovarian Syndrome, Rural Population, Epidemiology, obesity

## INTRODUCTION

India is one of the largest developing countries in the world. It contributes around 1/6 of the total global

population. India is a growing young country since young population contributes maximum component of the whole population. The future of our country rests in the children who will become future citizen and leaders of tomorrow. Endocrinological disorder at reproductive age of females named Polycystic ovarian syndrome is spreading fast and silently[1].

In all over the world, polycystic ovarian syndrome is also defined as heterogeneous disorder, ovulation disorder, hypothalamus pituitary ovarian disorder and insulin signaling pathwaydisorder[2]. This disorder is related with hyper-androgenmism, metabolic syndrome, obesity, reproductive abnormalities. It has probability of cardiovascular diseases and increase in insulin resistances[3].

In 1935 Stein and Levental were the first scientists who described this syndrome as ovulation Disorder[4]. In 1990 National Institute of Child Health and Human Development had a conference on PCOS and define the PCOS by the following points

1. Hyper-androgenism
2. Ovulatory dysfunction[5].

It excluded related disorders such as hyper prolactinanaemia, thyroid disorders and non classical adrenal hyperplasia[5].

The prevalence of PCOS in India was found to be 22.5% in Maharashtra and 9.13% according to a study conducted in South India[6]. In 2010, National Institute of Health consensus on the prevalence of this syndrome states the range from 9% to18% with the Rotterdam consensus[7]. As per the Rosenfield's hypothesis, hyperactivity of protein Cyt p450c17-alpha encoded by CYP17 is responsible for PCOS causing increased luteinizing hormone (LH) release and thus action of LH on the cells is amplified and they work more like the testicular leydig cells rather than normal ovarian theca cells[5]. It is reported now that increased expression of finterleukin-18 is associated with PCOS[8]. Now a days there is a universal consensus on the choice of follicular excess and ovarian enlargement as criteria to define PCOS by ultrasound. However, establishing the normal values for follicle number per ovary (FNPO) and especially the setting of accurate thresholds for distinguishing normal ovaries from PCOS, is still the subject of great controversy[4.]

Some of the researchers found that this disorder affecting up 6% -10% of females in their reproductive age while others reported that 6.6 % to 8% of the human population of the world affected with this disorder. But majority of reports says that 5-10% of women at reproductive age are affected. Brower and co-workers evaluated the relationship between menstrual dysfunction and insulin resistance in 494 women with PCOS. Oligomenorhoea (menstrual cycles>35 days) was evident in >80% of the women with PCOS. Compared with 138 control women who were eumenorrheic and non hirsute, patients with PCOS who had menstrual cycles >35 days or amenorrhoea had a higher degree of insulin resistance (as estimated by homeostasis model assessment), after adjustment for age, BMI and ethnicity; the highest degree of insulin resistance was found in women with amenorrhoea. Recent studies suggest that variation in the gene encoding the cysteine protease calpain-10 are associated with insulin resistance and influence genetic susceptibility to type 2diabetes. PCOS and type 2 diabetes share some of etiologic factors[9.]

The clinical manifestations of PCOS are heterogeneous and it looks possible that patients may present some of various symptoms and signs. The heterogeneity seems to be adjusted by several factors, such as genetic factors, nutritional condition in the uterus, prenatal androgen exposure, insulin resistance, exaggerated adrenarche, and body weight changes[10] Environmental status and factors, such as obesity, appear to exacerbate the underlying genetic predisposition. PCOS is characterized by increased levels of circulating androgen, poly-cystic ovarian morphology (PCOM), arrested follicle development, and an ovulatory infertility[11]This disorder is related with over production of male hormones in females. Studies also show that some inflammatory markers like IL-18, IL-1ß, adiponectin, TNF-a and IL-6 and increased level of CRP are associate with PCOS[8.]

The patients are frustrated with long diagnostic procedures and visit multiple physicians for the purpose. To better understand these perceptions worldwide, authors have surveyed a large international group of 1,385 women with PCOS and found that one third of them reported more than 2 years before diagnosis was

established. Also, approximately half of them had seen more than two health care providers before the diagnosis was confirmed. It has been suggested that time to diagnosis of PCOS is independently associated with increased risk of anxiety and depressive symptoms[12.]

These are the reasons why diagnosis of PCOS is undeniable because females with this syndrome have high risk for the diseases related to cardiovascular system, diabetes mellitus and other metabolic syndrome like dyslipidemia, material carcinoma and hyper insulinism[13].In females, subcutaneous (SC) abdominal adipose normally stores lipid as protection against insulin resistance, while intra-abdominal adipose has the opposite effect[14] A regulatory-II component (PKA-Regl). These findings imply an androgen-related disorder of abnormal SC abdominal adipocyte size and/or function. If so, impaired capacity of SC abdominal adipose to store fat could enhance free fatty acid (FFA) uptake in non-adipose cells and intra-abdominal fat, promoting oxidative/endoplasmic reticulum stress linked with insulin resistance and inflammation through a process called lipotoxicity[15,16].Some authors also found and suggested that the diagnosis of disease is associated with increased risk of anxiety and depressive symptoms so to improve the patient satisfaction and opportunity to improve care, one has to take steps on the early diagnosis of this disease at the age of 16. So, It is mandatory because of presence of high risk of future infertility that gives birth to social, family problems and related with many other diseases as mentioned above.

As PCOS is on a rise in Indian women where it remains an under diagnosed disease and there exists a general lack of awareness about the condition and keeping the fact into consideration that no study has yet been done in a North Indian state as Himachal Pradesh.

We have planned this research on questionnaire-based survey to find out the knowledge of young professionals on PCOS. We ultimately aim to improve our health professional manpower on the knowledge of PCOS. This will also provide target specific knowledge and how to determine the primary symptoms of PCOS. This will facilitate our professionals to draw attention to the issue of early symptoms in young females. Our questionnaire is to form the future strategies on targeted areas of research and focus to improve evidence-based care of

PCOS patients. This also helped in finding the prevalence of PCOS in young healthcare professionals.

## AIMS & OBJECTIVES

The purpose of the research is to assess the prevalence of PCOS with a survey based on knowledge, lifestyle, food habits etc.

1. To assess the knowledge of PCOS among female medical and nursing students/staff.

2. To assess prevalence of PCOS among female healthcare professionals/medical and nursing students based on response on questionnaire.

3. To advise bioassay levels of androgens-in susceptible females after conducting the questionnaire based survey.

## MATERIALS AND METHODS

### STUDY AREA

The study was conducted at Solan district.

### Study population

The study was conducted among the female students who are enrolled in 1st, 2nd 3rd and 4th professional of

MBBS and nursing students and those pursuing courses of health sciences other than medical.

**Study design**

It is a cross-sectional descriptive type of study. For the purpose of screening of PCOS among students their daily routine and their life style was assessed through a pretested and self-designed questionnaire.

**Sample size**

200 Female Medical students and nursing staff

**ICMR Approval**

Approval of the ICMR (STS-2020-09202)

**Study tools**

The methods and procedures employed for the collection of data are called techniques and the instruments used are called tools. In this study, a self-designed questionnaire has been prepared which comprises of 4 sections.

SECTION1: It comprises the socio-demographic profile of the participants. This includes age, sex, caste, religion and other particulars like height and weight.

SECTION2: Routine lifestyle of the participants

SECTION3: Project based questionnaire mainly assessing the presence or absence of various symptoms which might be predisposing or a causative factor of the PCOS.

SECTION4: Knowledge of the participants regarding PCOS.

The questionnaire was pretested before the same could be used for the study.

After conducting survey, evaluation was done as per [14], subjects were sub divided according to the presence or absence of menstrual dysfunction and hirsutism into four groups:

1) No hirsutismor menstrual dysfunction,
2) Menstrual dysfunction only,
3) Hirsutism only,
4) Menstrual dysfunction and hirsutism.

The evaluation of each of these groups was planned as per clinical criteria

a. Number of subjects: 200
b. Inclusion criteria:

1) The female students from MBBS from the all phases and Nursing College
2) Individuals who gave consent of the study subjects.

c. Exclusion criteria: Study subjects who did not give consent.

## RESULT AND OBSERVATIONS

A total of **200 subjects** participated in this questionnaire based study, which included both female medical students and nursing staff. Mean Age (SD) of the study population was **21.81(1.97) years,** the mean B.M.I (SD) was observed to be **24.083(4.1077)** $kg/m^2$ and mean Waist to Hip ratio(SD) was observed to be**0.82(0.04)**. [As seen in tableno.1 and figureno.1]

Based on the responses to the questionnaire about knowledge and awareness about PCOS (poly cystic ovarian syndrome), 98.98% of the study population had knowledge about PCOS. Among this population, knowledge about most common chief complaint was observed as menstrual disturbance (100%), weight gain (81%), facial hair (81.5%) and excessive hair fall (58.5%) [As seen in table no.20]. Awareness about common precautions against PCOS was observed as lifestyle modification (91.5%), dietary modification (83.5%), regular exercise (81.5%) and regular screening (65%) [As seen in tableno.20]. Awareness about complications of PCOS was observed as infertility (32%), metabolic disturbance (6%), endometrial cancer (4.5%), cardiovascular disorder (3%) and gestational diabetes (2%)[As seen in table no.21].

Based on responses to the questionnaire about practices related to PCOS among study population, 29.1% of the study population had some complaints related to PCOS. Most common complaint was menstrual disturbance in 20% of population, followed by weight gain (19.5%), facial hair (18%) & excessive hair fall (12.5%) [As seen in table no.17]. An observation of 26.13% of population had other associated complaints which included hypertension, diabetes, etc. On assessing the dietary habits & physical activities of the study population based on their responses, 82.91 of the study population had a sufficient dietary intake while other responses were observed to be deficit (12%) and surplus (12%)[As seen in table no.14]. Corelation of complaints related to PCOS related to physical activities was observed as sedentary(12%) , light(31.5%), moderate (54.5%) & strenuous(2%) [As seen in table no.15].

Table No.1 Details of study subjects in relation to physical measurements

| Variable | Total Obs. | Mean | Max. | Min. | Std. Dev |
|---|---|---|---|---|---|
| **Weight(In Kgs)** | 200 | 60.93 | 88 | 40 | 10.1287 |
| **Height(in cms)** | 200 | 159.18 | 174 | 144 | 5.7901 |
| **Waist Circumference(in inches)** | 200 | 31.85 | 40 | 28 | 3.0265 |
| **Hip Circumference (in Inches)** | 200 | 38.33 | 47 | 30 | 3.2378 |
| **Age** | 200 | 21.81 | 29 | 19 | 1.9757 |
| **BMI** | 200 | 24.0836 | 35.0861 | 17.2248 | 4.1077 |
| **W:H** | 200 | 0.821 | 0.9375 | 0.6829 | 0.0433 |

FIGURE No 1 Bar diagrams showing the physical measurements –mean and dispersion os sstudy subjects

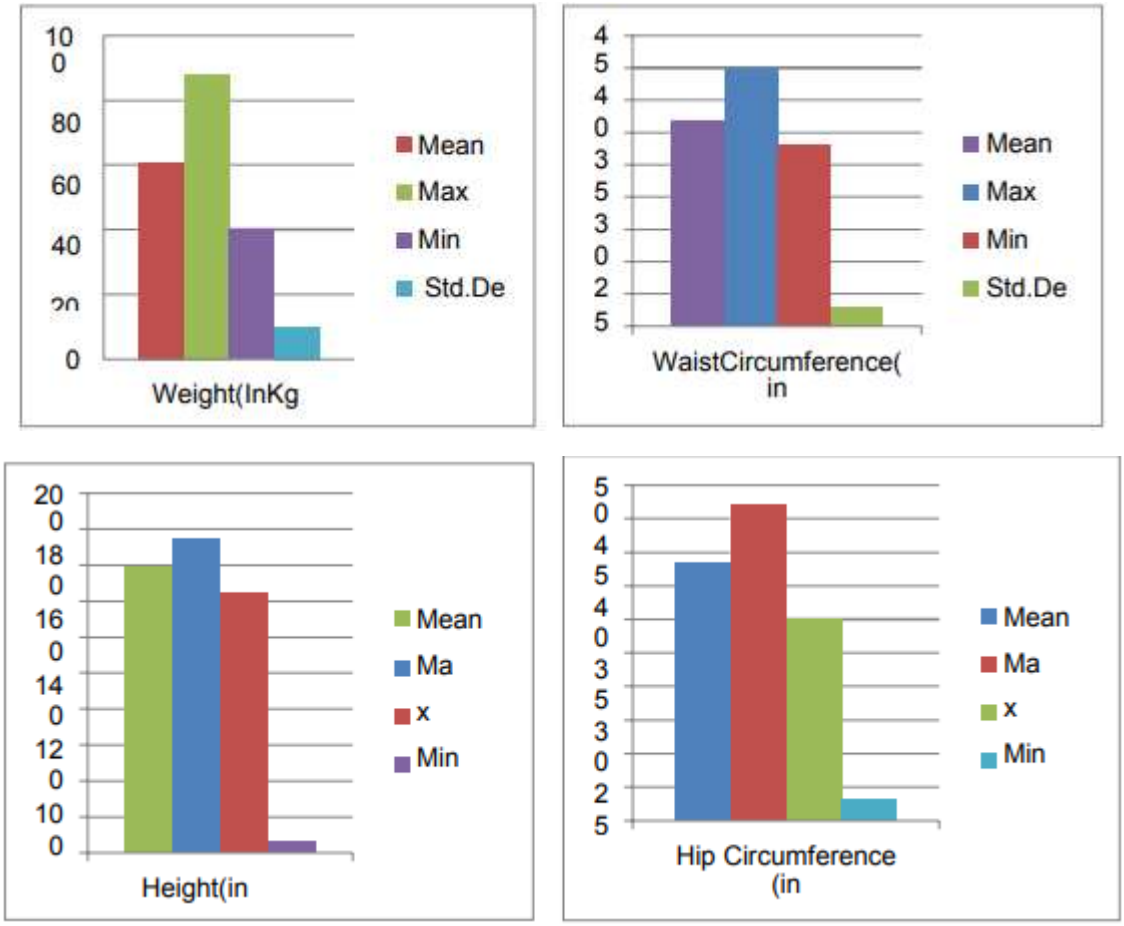



Table No.2- Distribution of study subjects according to age

| Age in yrs | Freq. | Percent | Cum. |
|---|---|---|---|
| **15-20** | 47 | 23.5 | 23.5 |
| **21-25** | 142 | 71 | 94.5 |
| **>25** | 11 | 5.5 | 100 |
| **Total** | 200 | 100 | |

Table No.3- Distribution of study subjects according to professional stream

| Profession | Freq. | Percent | Cum |
|---|---|---|---|
| **Medical Students** | 169 | 84.5 | 84.5 |
| **Nursing Staff** | 31 | 15.5 | 100 |
| **Total** | 200 | 100 | |

Table No.4- Distribution of study subjects based on Native states

| State | Freq. | Percent | Cum. |
|---|---|---|---|
| **H.P.** | 100 | 50.00 | 50.00 |
| **Punjab** | 34 | 17.00 | 67.00 |
| **Haryana** | 14 | 7.00 | 74.00 |
| **Delhi** | 31 | 15.50 | 89.50 |
| **Chandigarh** | 15 | 7.50 | 97.00 |
| **Rajasthan** | 4 | 2.00 | 99.00 |
| **U.P** | 2 | 1.00 | 100.00 |
| **Total** | 200 | 100.00 | |

Table No.5–- Distribution of study subjects based on number of years staying in the study area

| Stay in years in study area | Freq. | Percent | Cum. |
|---|---|---|---|
| **1-5yrs** | 148 | 74.00 | 74.00 |
| **>5yrs** | 52 | 26.00 | 100.00 |
| **Total** | 200 | 100 | |

Table No.6- Distribution of study subjects based on Religion

| Religion | Freq. | Percent | Cum. |
|---|---|---|---|
| **Hindu** | 167 | 83.50 | 83.50 |
| **Sikh** | 24 | 12.00 | 95.50 |
| **Jain** | 6 | 3.00 | 98.50 |
| **Muslim** | 3 | 1.50 | 100.00 |
| Total | 200 | 100.00 | |

Table No.7- Distribution of subjects based on Annual Income of family

| Annual Income in Lakhs | Freq. | Percent | Cum. |
|---|---|---|---|
| **<5L** | 52 | 26.00 | 26.00 |
| **6-15L** | 110 | 55.00 | 81.00 |
| **16-25L** | 16 | 8.00 | 89.00 |
| **>25L** | 22 | 11.00 | 100.00 |
| **Total** | 200 | 100.00 | |

Table no.8- Distribution of subjects based on B.M.I (WHO Criteria).

| BMI | Freq. | Percent | Cum. |
|---|---|---|---|
| **<18.4** | 5 | 2.50 | 2.50 |
| **18.5-24.9** | 133 | 66.50 | 69.00 |
| **25-29.9** | 42 | 21.00 | 90.00 |
| **>=30** | 20 | 10.00 | 100.00 |
| **Total** | 200 | 100.00 | |

Table No.9- Distribution of study subjects based on waist to hip ratio (WHR-FDA Criteria

| WHR | Freq. | Percent | Cum. |
|---|---|---|---|
| **<=O.80** | 84 | 42.00 | 42.00 |
| **0.81-0.85** | 81 | 40.50 | 82.50 |
| **>=0.86** | 35 | 17.50 | 100.00 |
| **Total** | 200 | 100.00 | |

TableNo.10- Distribution of study subjects based on awareness of PCOS

| Awareness present | Freq. | Percent | Cum. |
|---|---|---|---|
| **No** | 2 | 1.02 | 1.02 |
| **Yes** | 195 | 98.98 | 100.00 |
| **Total** | 200 | 100 | |

Table No-11 Distribution of subjects based on awareness on number of symptoms of PCOS

| Awareness about knowledge of number of symptoms | Freq. | Percent | Cum. |
|---|---|---|---|
| **Knowing 1symptom** | 26 | 13 | 13 |
| **Knowing 2symptoms** | 10 | 5 | 18 |
| **Knowing 3symptoms** | 57 | 28.5 | 46.5 |
| **Knowing 4symptoms** | 107 | 53.5 | 100 |
| **Total** | 200 | 100 | |

Table No-12– Distribution of subjects based on awareness on number of complications of PCOS

| Awareness about number of complications | Freq. | Percent | Cum. |
|---|---|---|---|
| **Knowing no complications** | 95 | 47.5 | 47.5 |

| | | | |
|---|---|---|---|
| **Knowing 1 complication** | 52 | 26 | 73.5 |
| **Knowing 2complications** | 18 | 9 | 82.5 |
| **Knowing 3complications** | 29 | 14.5 | 97 |
| **Knowing 4complications** | 6 | 3 | 100 |
| **Total** | 200 | 100 | |

TableNo-13 Distribution of subjects based on awareness on number of precautions of PCOS

| **Awareness about number of precautions** | **Freq.** | **Percent** | **Cum.** |
|---|---|---|---|
| **Knowing no precautions** | 8 | 4 | 4 |
| **Knowing 1precaution** | 28 | 14.07 | 17.59 |
| **Knowing 2precautions** | 15 | 7.54 | 25.13 |
| **Knowing 3precautions** | 19 | 9.55 | 34.67 |
| **Knowing 4precautions** | 130 | 65.33 | 100 |
| **Total** | 200 | 100 | |

Tableno-14 Distribution of study subjects based on dietary habits

| **Calories intake** | **Freq.** | **Percent** | **Cum.** |
|---|---|---|---|
| **Deficient Calories** | 24 | 12 | 12 |
| **Sufficient calories** | 165 | 82.91 | 94.47 |
| **Surplus Calories** | 11 | 5.53 | 100 |
| **Total** | 200 | 100 | |

Tableno-15 Distribution of study subjects based on physical activity (WHO Criteria)

| **Physical activity type** | **Freq.** | **Percent** | **Cum.** |
|---|---|---|---|
| **Sedentary** | 24 | 12 | 12 |
| **Light** | 63 | 31.5 | 43.5 |
| **Moderate** | 109 | 54.5 | 98 |
| **Strenuous** | 4 | 2 | 100 |
| **Total** | 200 | 100 | |

TableNo-16 Distribution of study subjects based on number of presenting complaints 9 according to questionnaire)

| Number of presenting complaints in subjects | Freq. | Percent | Cum. |
|---|---|---|---|
| **Having no complaints** | 141 | 70.5 | 70.5 |
| **Having 1complaint** | 19 | 9.5 | 80 |
| **Having 2complaints** | 18 | 9 | 89 |
| **Having 3complaints** | 7 | 3.5 | 92.5 |
| **Having 4complaints** | 15 | 7.5 | 100 |
| **Total** | 200 | 100 | |

TableNo.17- Distribution of complaints and their prevalence in study subjects

| Present Complains | Freq. | Percent |
|---|---|---|
| **Facial hair** | 36 | 18 |
| **Weight gain(recent)** | 39 | 19.5 |
| **Menstrual disturbance** | 40 | 20 |
| **Excessive hairfall** | 25 | 12.5 |

Table18- Distribution of study subjects having other associated complaints (diabetes, hypertension, bald spots on scalp etc.)

| Associate complaints or diseases/disorders | Freq. | Percent | Cum. |
|---|---|---|---|
| **Absent** | 148 | 74 | 74 |
| **Present** | 52 | 26.13 | 100 |
| **Total** | 200 | 100 | |

Tableno-19 Distribution of study subject's knowledge about individual precautions to prevent PCOS

| Precaution | Frequency | Percentage |
|---|---|---|
| **Regular Exercise** | 163/200 | 81.5 |
| **Diet** | 167/200 | 83.5 |
| **Regular Screening** | 130/200 | 65 |
| **Lifestyle Modification** | 183/200 | 91.5 |

Table No-20 Distribution of signs and symptoms according to their awareness in study subjects

| **Sign & symptoms** | **Frequency** | **Percentage** |
|---|---|---|
| **Weight Gain** | 162/200 | 81 |
| **Menstrual Disturbance** | 200/200 | 100 |
| **Facial hair** | 163/200 | 81.5 |
| **Excessive hair fall** | 117/200 | 58.5 |

Table No-21 Distribution of complications according to their awareness in study subjects

| **Complication** | **Frequency** | **Percentage** |
|---|---|---|
| **Infertility** | 64/200 | 32 |
| **Endomertial cancer** | 9/200 | 4.5 |
| **Cardiovascular problems** | 6/200 | 3 |
| **Metabolic disturbances** | 24/200 | 12 |
| **Gestational diabetes** | 4/200 | 2 |
| **Menstrual disturbances** | 12/200 | 6 |

Table No-22 Table showing correlation of B.M.I. with complaints in Study population

| BMI | **0C/c** | **1C/c** | **2C/c** | **3C/c** | **4C/c** | **Total** |
|---|---|---|---|---|---|---|
| **under weight** | 5 | 0 | 0 | 0 | 0 | 5 |
| **Normal** | 115 | 9 | 6 | 0 | 3 | 133 |
| **pre obesity** | 16 | 7 | 6 | 6 | 7 | 42 |
| **Obesity** | 5 | 3 | 6 | 1 | 5 | 20 |
| **Total** | 141 | 19 | 18 | 7 | 15 | **200** |

Figure No-2 Correlation of B.M.I. with Chief complaints in Study population

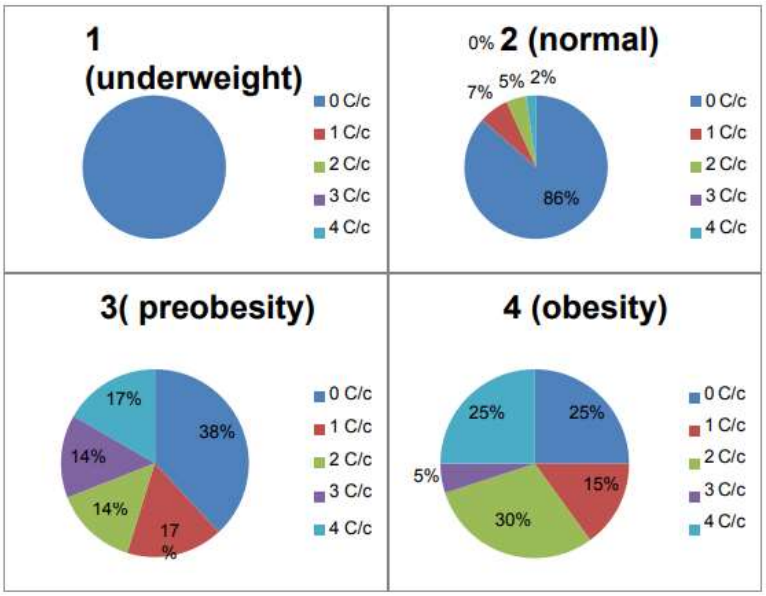
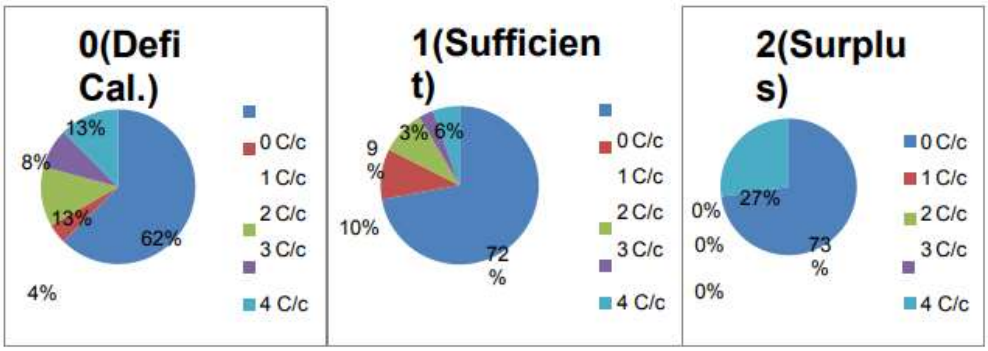



Table no-23: Table Showing correlation between Dietary habits and present complaints related to PCOS

| **Dietary habits** | **Number of Present Complaints** | | | | | |
|---|---|---|---|---|---|---|
| | **0C/c** | **1C/c** | **2C/c** | **3C/c** | **4C/c** | **Total** |
| **Deficient Calories.** | 15 | 1 | 3 | 2 | 3 | 24 |
| **Sufficient calories** | 119 | 17 | 15 | 5 | 9 | 165 |
| **Surplus calories** | 8 | 0 | 0 | 0 | 3 | 11 |
| **Total** | 142 | 18 | 18 | 7 | 15 | 200 |

Figure3- Showing correlation between Dietary habits and present complaints.



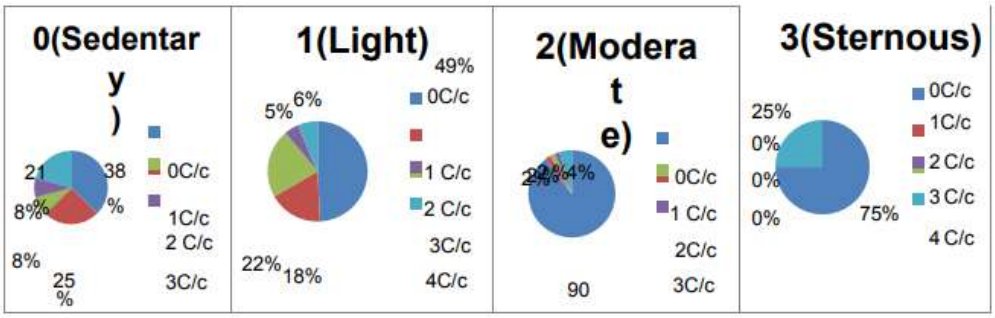
TableNo-24 Showing correlation between waist hip ratio and present complaints

| **Waist Hip ratio** | **Number of subjects having number of Present Complaints** | | | | | |
|---|---|---|---|---|---|---|
| | **0C/c** | **1C/c** | **2C/c** | **3C/c** | **4C/c** | **Total** |
| **<=O.80** | 75 | 7 | 1 | 0 | 1 | 84 |
| **0.81-0.85** | 57 | 2 | 11 | 4 | 7 | 81 |
| **>=0.86** | 9 | 10 | 6 | 3 | 7 | 35 |
| Total | 141 | 19 | 18 | 7 | 15 | 200 |

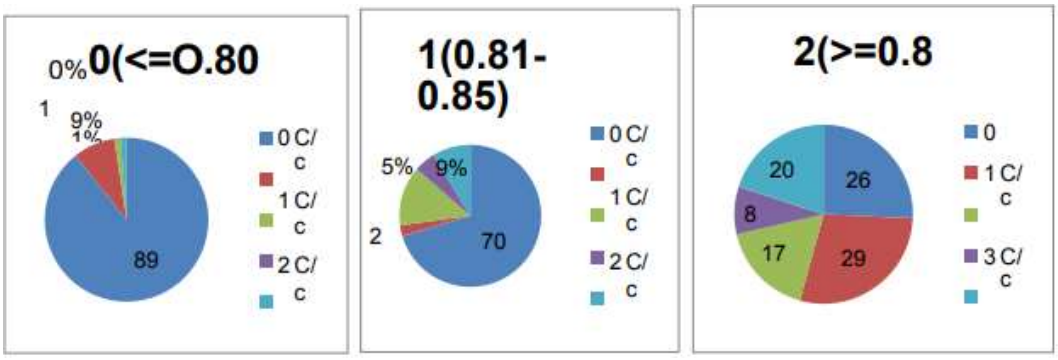
TableNo-25 Showing correlation between physical activity and present complaints

| **Physical activity** | **Present Complaints** | | | | | |
|---|---|---|---|---|---|---|
| | **0C/c** | **1C/c** | **2C/c** | **3C/c** | **4C/c** | **Total** |
| **Sedentary** | 9 | 6 | 2 | 2 | 5 | 24 |
| **Light** | 31 | 11 | 14 | 3 | 4 | 63 |
| **Moderate** | 98 | 2 | 2 | 2 | 5 | 109 |
| **Strenuous** | 3 | 0 | 0 | 0 | 1 | 4 |
| **Total** | 141 | 19 | 18 | 7 | 15 | 200 |

FigureNo-4 Showing correlation between physical activity and present complaints




FigureNo-5 Showing correlation between waist hip ratio and present complaints



## DISCUSSION

PCOS is the most common endocrinal disorder and an emerging health problem in females of reproductive age group. Lack of awareness and delayed diagnosis can lead to serious complications in the long term. In our study, the prevalence of PCOS is taken based only upon the clinical symptoms as our survey is only questionnaire based and for the confirmed diagnosis of PCOS, further evaluation was needed. The prevalence in our study population came out to be 29.5%.

Globally, the prevalence is highly variable, ranging from 2.2% to 26%[27,28]. In India, the prevalence was found to be 22.5% in Maharashtra and 9.13% according to a study conducted in South India [6]. So, clearly the prevalence obtained in our study is on the higher side. Regarding awareness knowledge about PCOS percentage came out to be 98.98%. Other studies report the awareness to be in much less percentage. This observation is explained by the fact that our study subjects were from medical and paramedical stream. Majority of studies on PCOS have been done on diagnosed patients of PCOS rather than on general population and showed an awareness level of 20-50%[29,30]. Our study is among the very few studies conducted on undiagnosed population. Another study conducted in Department of Obstetrics & Gynecology in AIIMS Bhubaneswar[31] Showed an awareness of 2.79% in total population and 25.9% among adolescent rural population.

PCOS is also associated with or preceded by increased BMI, higher calorie intake and low physical activity. In our study, similar results were found. Out of 200 subjects, 70.5% had no complaints and thus were deemed as not having PCOS. Out of the remaining 29.5%, based only on clinical symptoms we have taken them as susceptible individual for PCOS as our study is only questionnaire based. However, diagnosis of PCOS can be made if two of the three criteria are satisfied, according to the Rotterdam Criteria[7]. So, the susceptible individuals need further evaluation including radiological (ultrasonography) and biochemical test. Due to the lock down following Covid-19 outbreak and skeleton emergency services in the hospital, we could not do the blood /serum bioassay and Radiological investigations.

Among the underweight subjects, no one had any relevant complaints. Similarly among the subjects with normal BMI, 86% of them had no related complaints whereas the remaining 14% have some complaints related to PCOS. The study subjects with BMI categorized under pre-obesity (WHO) 62% had PCOS related complaints. Subjects with BMI categorized as obese (WHO) 75% had PCOS related complaints.

27% of population with a surplus calorie intake (FDA criteria) had related complaints. Similarly, to support association with physical activity population with low physical activity (Sedentary) 62% had complaints whereas the percentages are significantly lower in population with moderate or strenuous physical activity.

One more emerging and important parameter for diagnosis of PCOS is waist to hip ratio (WHR).According to WHO criteria waist hip ratio of less than or equal to 0.80 comes under low risk category for PCOS in which complaints are only present in 11% of study population.WHR between 0.81-0.85 (Categorized under moderate risk by WHO) 30% of study population had complaints. WHR greater than or equal to 0.86 (Categorized under high risk by WHO) 74.5% of population had complaints related to PCOS.[As seen in table no.24 and figure5]

Regarding awareness about precautions, among 200 subjects 81.55 were aware about regular exercise, 83.55 were aware of dietary association,65% were aware of regular screening and 91.5% were aware of lifestyle modifications. [As seen in table no.19] Similar to this study, role of diet and exercise in PCOS was known to be 62%-70% of subjects[29,30].

## CONCLUSION

Increasing incidence of PCOS while it still remains an under diagnosed disorder makes it a matter of concern to prevent its long-term complications. Based upon clinical symptoms prevalence of PCOS is 29.5% and the susceptible individuals in our questionnaire-based study are still undiagnosed. Susceptible individuals were advised to undergo further evaluation to confirm the diagnosis which would increase the awareness about importance of early diagnosis of the disorder. The prevalence has come to be on the higher side. The study being

conducted on medical students and staff, the high prevalence must be attributed to lower physical activity and higher stress levels. There is an imbalance between the awareness about the disease which comes out to be 98.98% and the awareness about complications which comes out to be 52.5% even among the medical students and staff. So, health camps and regular screening should be incorporated in every hospital to prevent long term complications and target our young population and population in reproductive age group among our future healthcare professionals as their knowledge and practices towards PCOS will have a major impact on the society.

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