Original Research Article

ESTIMATION OF BLOOD PRESSURE, PULSE RATE, WAIST CIRCUMFERENCE, BMI AND BMR AMONG PCOS INDIVIDUALS

Running title: Blood pressure among PCOS and healthy individuals

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ABSTRACT:

Introduction: Polycystic ovarian syndrome (PCOS) is an endocrine disorder which will affect the female's reproductive health, there are many risk factors found in the PCOS individuals such as irregular menstrual cycle, infertility, obesity, excess hair growth, hyperandrogenemia. The aim of the study is to estimate the blood pressure and pulse rate among PCOS individuals and to compare it with the normal subjects.

Materials and methods: A group of 20 PCOS individuals and 20 normal individuals have been chosen from Saveetha dental college with age of 18-25 years whose blood pressure, pulse rate, waist circumference, BMI, BMR are measured, the blood pressure and pulse rate were measured with a automatic blood pressure monitoring machine and the waist circumference was measured with a inch tape from last rib and the iliac crest at its small parameter. The simple random sampling method is used to minimize the sampling bias. Data was collected and analyzed by an independent sample't' test.

Results: When comparing with control healthy individuals, the systolic blood pressure (SBP) of PCOS individuals seem to be higher than the control subjects. The diastolic blood pressure (DBP) is also slightly higher for PCOS individuals. The pulse rate of normal individuals is higher than the PCOS individuals. The diastolic blood pressure had a significant value of about 0.002 which is less than 0.05 so it is significant

Conclusion: From this study it is evident that when PCOS is seen in women it not only affects the gynecological sphere it also affects the cardiovascular activity which may even have fatal outcomes. So it is mandatory for the PCOS subjects to have a proper diet, proper sleep, physical activity, and very importantly to have a stress free life.

KEYWORDS: Endocrine, reproductive system, irregular menstrual cycle, infertility, obesity, hyperandrogenemia, cardiovascular diseases, Innovative techniques

INTRODUCTION:

Polycystic ovarian syndrome, also called PCOD ie polycystic ovarian disease, is a complex endocrine problem. It causes hypertension, sweating, tiredness, and many disturbances in daily life. It causes major problems in our body such as infertility, menstrual disturbances, hirsutism (1). It is mostly seen in women of reproductive age, overweight, obese. It is still not clear that people who are obese are developing PCOS or people who have PCOS already become obese (2)(3). PCOS can be kept under control by doing exercises, walking, proper diet, proper sleeping pattern. The PCOS will cause metabolic risk, the android fat is seen in males but females with hypersecretion of androgen also have found to have this android fat, and importantly they are diagnosed to have PCOS (4). The feature of overweight PCOS patients is abdominal obesity but it is seen in normal patients as well. Abdominal obesity means more production of fatty acids(5) . The people with PCOS are treated with clomiphene which causes the rise in serum level of LSH and FSH levels. Both hormones will induce ovulation which in turn induces the conception rate.

Blood pressure is the force of blood moving against the walls of the arteries. Pulse rate is the number of times the heart beats per minute. The risk of cardiovascular diseases, atherosclerosis, hypertension is controversial among PCOS individuals (6). The reason behind the risk of developing cardiovascular disease in PCOS individuals might be the characteristics of hyperandrogenism. The blood pressure profiles of the PCOS patients are altered and unclear. Due to the influence of obesity the hypertension in PCOS individuals are uncontrolled (7)(2)(8)(9). It does not mean only people who are obese are prone to PCOS people who are lean also affected but they are less in number. PCOS causes anovulation which will lead to reproductive concerns. Infertility can be treated but it is a complex procedure (10)(11).

Clomiphene citrate is the best therapy to treat infertility or anovulation but people may not respond to clomiphene citrate at times because the ovary will not respond so alternatives such as gonadotropins, pulsatile GnRH, are used to treat the anovulation(12). The promising results have been seen only in the use of metformin and insulin sensitizing agents. Long term results are not seen yet. The most devastating reproductive concern is the pregnancy loss, which is the abortion. The abortion rate is high with people who are with PCOS conditions (13)(14). The PCOS condition causes abnormality in the levels of lipid and lipoprotein which in turn increases the level of cholesterol and finally gets deposited in the arteries or vessels which causes atherosclerosis (15)(16). Coronary diseases are more prevalent in women who are obese and has the PCOS condition (17)(18)(19) . PCOS has a high risk of cancer also(20)(21). That too the endometrial cancer the risk of ovarian cancer is increased day by day in women with PCOS, they were at 19% higher risk of developing cardiovascular diseases than women who did not have PCOS (22). There are 4 types of PCOS: insulin resistant, inflammatory, hidden causes, pill induced. There is a bottom line that hysterectomy can cure PCOS by removing the ovary from the body but the best way to cure PCOS is to do weight loss(23). PCOS individuals report on excess hair growth compared to normal subjects(17)(24) .The aim of the study is to estimate the blood pressure and pulse rate of PCOS individuals

MATERIALS AND METHOD:

A study through quantitative methods was among 20 PCOS individuals and 20 normal individuals of 18 to 25 years of age in Saveetha Dental College, Chennai. Individuals who are aware that they are having PCOS for the past one year alone are included in this study. The excluding categories were the males, children, women above 25 years and women below 18

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years of age. It was a simple random sampling method. The standardized blood pressure and a pulse rate monitor has been used to measure the BP and Pulse rate. Tape has been used to measure the waist circumference of the individual; the standardized height and weight measuring machines were used to measure the height and weight of the individual. All of the parameters have been measured for the individual at rest. No personal details were taken, eventually the confidentiality was maintained. The measurements were compared between the PCOS and the normal control subjects. The simple random sampling method is used to minimize the sampling bias. Data was collected and analyzed by an independent sample 't' test.

RESULTS:

The mean value of systolic blood pressure (SBP) for normal and PCOS individuals 104.15 and 112.57 respectively. The mean value of diastolic blood pressure (DBP) for PCOS individuals is 79.73 and the mean value of diastolic blood pressure for normal individuals is 77.78. The mean value of pulse rate of normal individuals is 91.15 and the mean value of pulse rate of PCOS individuals is 88.36(Figure 1). The diastolic blood pressure had a significant value of about 0.002 which is less than 0.05 so it is significant.

BMI and waist circumference of control and PCOS individuals: The BMI and the waist circumference for the PCOS individuals are 26.96 and 41.52 respectively and The BMI and the waist circumference for the normal individuals are 36.84 and 21.17 respectively(Figure 2). Only waist circumference has significance with PCOS condition, the significant value of waist circumference is 0.03 which is less than 0.05 so it is significant (Table 1). The waist circumference is higher in PCOS subjects because one of the symptoms of PCOS is obesity so obviously people who are obese will have higher waist circumference. BMR for normal and PCOS subjects are 1281.84 and 1433.05 respectively. (Figure 3) but it was insignificant in this study that it has no relation with PCOS condition

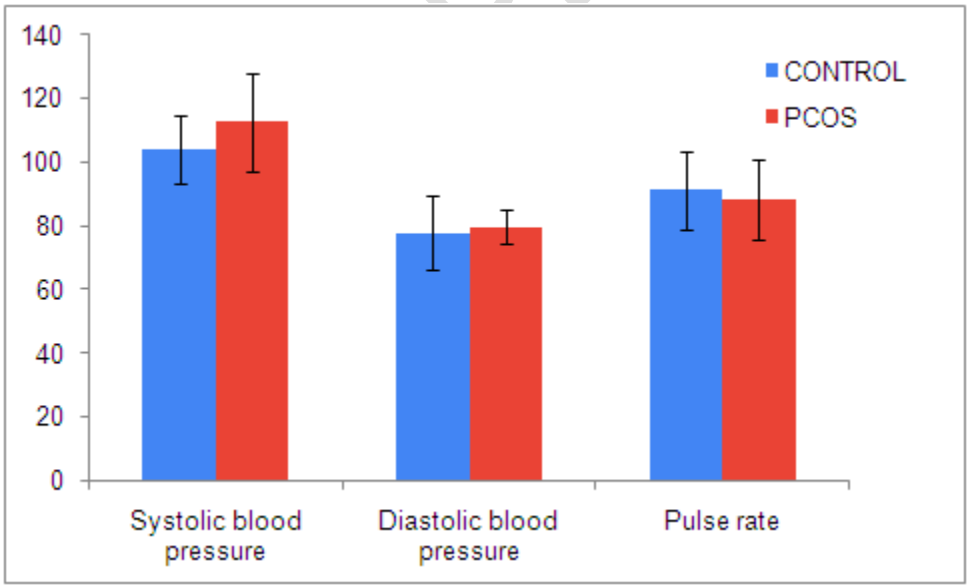

Figure 1: Bar graph represents the mean value of SBP, DBP and PR of PCOS and control individuals. Blue represents control subjects and red represents PCOS subjects. X axis represents the SBP, DBP and PR and the Y axis represents the mean values of the participants. The mean value of systolic blood pressure (SBP) for normal and PCOS individuals is 104.15 and 112.57

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respectively. The mean value of diastolic blood pressure (DBP) for PCOS individuals is 79.73 and the mean value of diastolic blood pressure for normal individuals is 77.78. The mean value of pulse rate of normal individuals is 91.15 and the mean value of pulse rate of PCOS individuals is 88.36

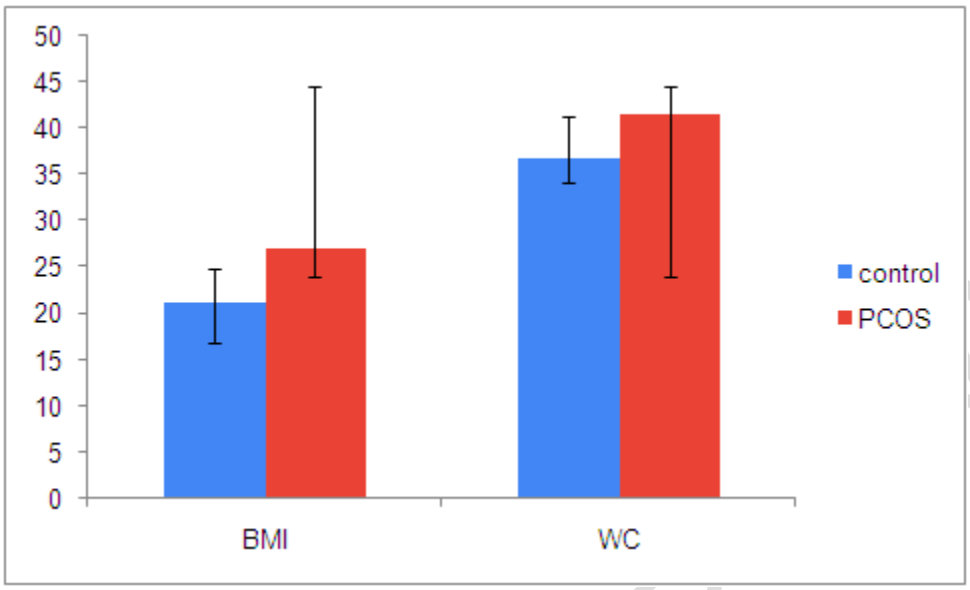

Figure 2: Bar graph represents mean value of waist circumference and BMI of PCOS and normal individuals. Blue represents control subjects and Red represents PCOS subjects. X axis represents BMI, WC and the Y axis represents the mean values of participants. BMR for normal and PCOS subjects are 1281.84 and 1433.05 respectively. The BMI and the waist circumference for the PCOS individuals are 26.96 and 41.52 respectively and The BMI and the waist circumference for the normal individuals are 36.84 and 21.17 respectively

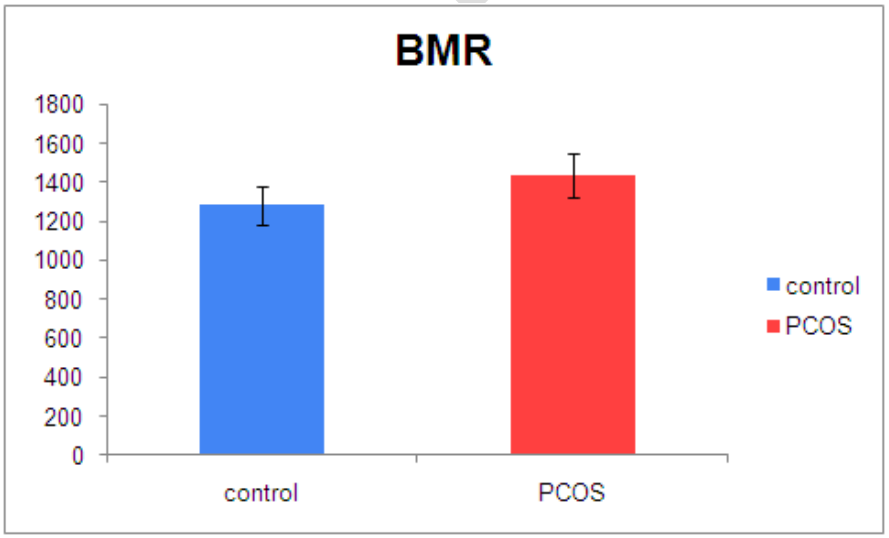

Figure 3: Bar graph represents the mean value of BMR of PCOS and control subjects. Blue represents control subjects and orange represents PCOS subjects. X axis represents groups and the Y axis represents the mean values of participants. BMR for normal and PCOS subjects are 1281.84 and 1433.05 respectively.

	CONTROL	PCOS	SIGNIFICANCE
Systolic blood pressure	104.15±10.69	112.57±15.37	0.164
Diastolic blood pressure	77.78±11.56	79.73±5.55	0.002
Pulse rate	91.15±12.06	88.36±12.61	0.721
BMI	21.17±3.64	26.96±4.31	1.187
Waist circumference	36.84±4.50	41.52±2.77	0.03
BMR	1281.84±97.95	1433.05±112.67	0.664

TABLE 1: Mean, Standard deviation, Significance of SBP, DBP, PR, BMI, Waist circumference, BMR of PCOS and normal subjects.

DISCUSSION:

In this study, the diastolic blood pressure and the waist circumference have more significance, that is they are more related to the PCOS conditions (25). People with great diastolic blood pressure and waist circumference had PCOS than the people with lesser Diastolic blood pressure and waist circumference (26). The blood pressure of PCOS individuals is greater than normal individuals. The PCOS individuals have a high risk of cardiovascular diseases (27).

The studies with similar findings had comparison of the parameters of subjects of PCOS and control whereas DBP and SBP were more concentrated which is more similar to the findings in this study(28).The mean and standard deviation value of systolic blood pressure and diastolic blood pressure is 106.4±11.3 for normal subjects and 107.9±8.7 for PCOS subjects, 67.14±6.15 for normal subjects and 69.6±7.02 for PCOS subjects respectively (17). People who have PCOS have greater SBP and DBP which means they are at a high risk of getting cardiovascular diseases (29). The systolic blood pressure and pulse rate did not have any significance whereas the diastolic Pressure has significance.

The average waist circumference of PCOS individuals in previous studies was found to be 87.31inches and in normal subjects was 86 inches, the average BMI in other articles was 37.3 ± 9.9, the BMI reading (3)(4). In previous studies, Mirianromittietal has mentioned that there is no difference in ambulatory blood pressure in PCOS individuals, but in this study the ambulatory blood pressure was higher in PCOS individuals than normal subjects (30). To finally infer that the waist circumference is more significant and the value is higher in PCOS individuals because one of the symptom of PCOS is obesity so once people are obese obviously their waist circumference will be higher (31).

Diastolic blood pressure is more significant and has higher value in PCOS individuals than normal subjects because subjects with PCOS are obese and are weight excess, this leads to increased sodium reabsorption, which overactivates the renin-angiotensinogen mechanism which

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will increase the level of aldosterone circulating in blood which inturn increase the cardiovascular activity, and increases the blood pressure finally(32). In a previous study, an experiment was done to check if testosterone is cause of increase in blood pressure level, male and female hypertensive rats were taken, the gonads were removed and decrease in blood pressure was observed only in males not in females(11), once the testosterone is administered or induced in females the blood pressure level was increased in females, so it infers that the gonads which was responsible for the synthesis of androgen when removed that is when the androgen level is decreased, the blood pressure level is also decreased, when the androgen is administered the level of blood pressure raises (30). The obesity which is said to be a symptom of PCOS is caused due to the fat accumulation, so the fat accumulation in the arterial walls will constrict the blood vessels and the blood flow will be decreased but the pressure will increase which eventually leads to hypertension (33). From this study, since there is significant increase in DBP and PR the causes of PCOS was found to be the obesity and the stressful life of people under the age group of 18-25 years, the stress is caused mostly due to studies and other factors that the people face during their adolescent age (34).The limitation of the study is that the readings are taken from a limited sampling, a convenient random sampling, only a particular age group were considered, only less parameters were taken in considerations (35).The study has to be done in a wide population, with different kinds of conditions such as pregnant women, women after menopause who had PCOS previously, it has to be done with even more parameters to find a definitive cause of PCOS (24).

CONCLUSION:

There were various parameters estimated and measured but only DBP and waist circumference showed a significant difference with the PCOS condition. The PCOS individuals have higher waist circumference which indicates that women with PCOS are obese. But it is still unclear if obesity is a symptom or effect of PCOS. From this study it is evident that when PCOS is seen in women it not only affects the gynecological sphere it also affects the cardiovascular activity which may even have fatal outcomes. So it is mandatory for the PCOS subjects to have a proper diet, proper sleep, physical activity, and very importantly to have a stress free life.

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