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# PREGNANCY COMPLICATIONS ASSOCIATED WITH POLYCYSTIC OVARY SYNDROME: A CROSS SECTIONAL STUDY

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## ABSTRACT

**Background:** Polycystic ovary syndrome (PCOS) is an endocrine disease in women among thirteen to forty years of reproductive age. Women with PCOS usually experience pregnancy complications like gestational diabetes (GDM), gestational hypertension, preeclampsia, preterm and caesarean delivery. The aim of the study was to identify the prevalence of PCOS and non PCOS women, maternal and neonatal complications associated with PCOS , to study the adverse pregnancy outcomes in women with and without PCOS and to compare quality of life in pregnant women with and without PCOS. **Methods:** This is an online survey-based cross-sectional study was conducted in pregnant and breastfeeding women in South India for a period of 6 months. **Results:** The sample size of the study was 500 [128 PCOS + 372 non PCOS]. Pregnancy complications like spontaneous abortions, gestational diabetes, hypertensive disorders of pregnancy, fetal complications like low birth weight, need of NICU care and lower APGAR and low HRQoL was more associated with PCOS. **Conclusion:** A statistically significant association was found that maternal and neonatal complications were more in PCOS women. The study concluded that PCOS women were having a low HRQoL compared to women without PCOS.

**KEYWORDS:** PCOS; PIH; SGA; HRQoL; NICU; APGAR.

## INTRODUCTION

PCOS is characterized by a combination of infrequent or absence of monthly periods, clinical or endocrine signs of increased androgen level and polycystic ovaries. The term PCOS was first described by Stein and Levinthal and its prevalence is between 5-10%.[1] World Health Organization (WHO) estimates that around 3.4% women to be affected by PCOS worldwide

in 2012. 2.2% to 26% is the prevalence estimate range of PCOS women globally whereas, in India, experts claim that about 10% of the women to be affected by PCOS.[2]

Many psychological problems are also related to PCOS other than physical disturbances.[3] Hypertensive disease in pregnancy (HDP) occurs in 8% of PCOS pregnancies and there is an inconsistent association between them. GDM (gestational diabetes mellitus) complicates 40-50% of PCOS pregnancies which is due to the inability of the pancreatic cells to beat the insulin resistance. Early pregnancy loss (EPL) happens in 30 to 50% of PCOS women as compared with 10 to 15% of normal women. The reason for EPL in PCOS women is elevated testosterone which down regulates the expression of HOXA10 gene, thereby reduces the uterine receptivity and implantation. Preterm birth complicates 6 to 15% of pregnancies of PCOS women. Preeclampsia itself could be a risk factor for preterm deliveries.[6]

Management of PCOS includes education on health condition, healthy lifestyle interventions (diet, exercise) and therapeutic interventions targeting their symptoms. The use of metformin is safe during pregnancy since it doesn't cross the placenta, also safe to take while breastfeeding the child. Trace amounts of the medication can be detected in breast milk, but it won't harm or affect infant's growth and development.[10] Despite all the available medications, life-style changes are the main therapy which improve all parameters of PCOS without the potential side effects of medication.[11] Hence, effective treatment can reduce the burden of those symptoms as well as the associated psychological disturbances and thus improve health-related quality of life (HRQoL).[14]

The DHEAS (Dehydroepiandrosterone sulfate) levels at gestational week 32 and 36 shows a weak negative correlation with breastfeeding at one-and three-months of delivery.[12] The low Apgar score within 5 min are more common in babies born to women with PCOS.[13]Usually the PCOS therapy focused on ameliorating its symptoms. Hence, effective treatment can.

Reduce the burden of those symptoms as well as the associated psychological disturbances and thus improve health-related quality of life (HRQoL).[14] PCOS women are at increased risk of adverse pregnancy and birth reduce the burden of those symptoms as well as symptoms. PCOS women are at increased risk of adverse pregnancy and birth outcomes, but a limited research has been done to review its severity. One of the most challenging aspects of PCOS is its ambiguous diagnostic criteria and also the vast complexity of characteristics.

In the future, more researches are required for the prevention as well as the successful treatment.[15]

## RESEARCH METHODOLOGY

### Study setting and design

An online survey-based cross-sectional study was conducted from November 2020 to May 2021 by distributing questionnaire to South Indian women via social media like WhatsApp, Facebook, and Instagram. Institutional Ethical Committee (IEC) clearance was acquired from the Bapuji Pharmacy College Ethical Committee. Electronic concurrence was taken from the participants and all the records were collected kept private. Participators were selected for the study based on inclusion criteria, such as pregnant and breastfeeding women of age 20-45 years and mother of child age ≤5 years were included in the study. Women unable to understand the survey, girls of age less than 20 years and women of age greater than 45 years were excluded.

### Data collection and procedure

An online link was sent to all the participators involved in the study. The questionnaire consist of different sections includes sociodemographic information, quality of life of pregnant women, details of pregnant women and breastfeeding mother, neonatal complications. The questionnaire was rectified and validated by a Gynaecologist.

### Data Analysis

Data collected during the survey was entered in Microsoft Excel. By manual counting we have prepared tables, charts, and bar-graphs of the results. Categorical data was constituted in the form of frequency and percentage. Association between variables was evaluated with Chi Square test. Data were analysed by using IBM SPSS Version 22 for windows.

## RESULTS

A total number of 500 subjects were participated in the study, in which 312 were pregnant and 139 were breastfeeding mothers. Among these, there were 65 pregnant and 43 breastfeeding women with polycystic ovary syndrome.

**Table 1: Distribution of subjects based on prevalence rate.**

| Prevalence | No of cases | Percent |
|---|---|---|
| PCOS | 128 | 25.6 |
| NON PCOS | 372 | 74.4 |
| Total | 500 | 100.0 |

Out of 500 women, there are 128 (25.6%) women with PCOS and 372 (74.4%) women without PCOS.

**Table: 2 Distribution of subjects based on body mass index.**

| GROUP | PCOS women | | Normal women | | Chi square test | |
|---|---|---|---|---|---|---|
| | NO. | % | NO. | % | Chi Square value | p-value |
| Normal weight | 51 | 39.84 | 281 | 75.54 | 56.90 | <0.001* |
| Over weight | 56 | 43.75 | 57 | 15.32 | | |
| Obese | 21 | 16.41 | 34 | 9.14 | | |

Out of 500 women, 51 (39.84%) PCOS women and 281 (75.54%) women without PCOS having normal weight. There are 56 (43.75%) PCOS women and 57 (15.32%) normal women having overweight, obesity found in 21 (16.41%) PCOS women and 34 (9.14%) normal women, P value <0.001 there is a significant difference in the body mass index of both groups.

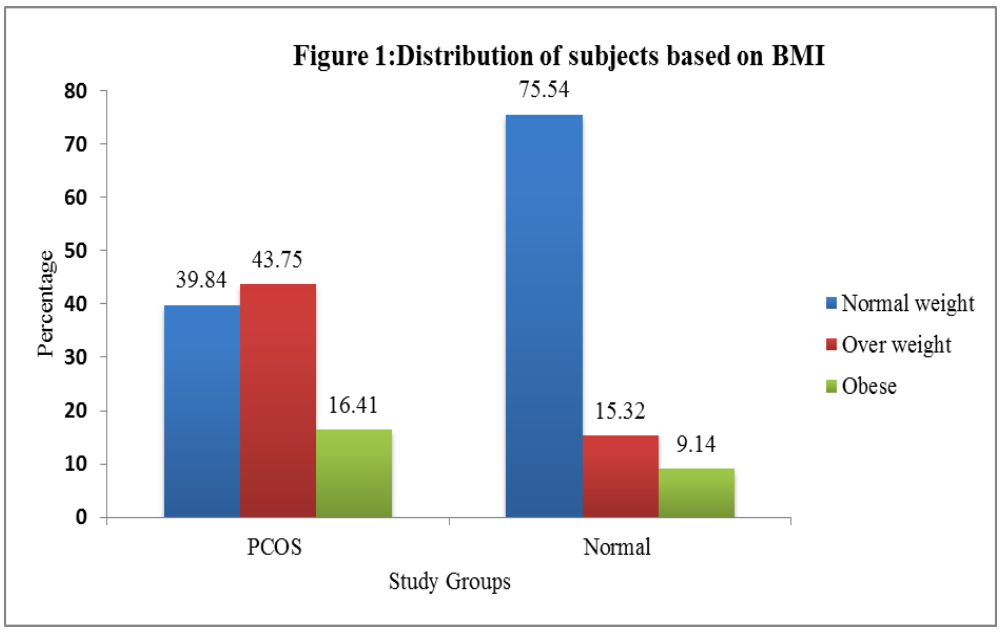


**Table 3: Distribution of subjects based on the symptoms experienced.**

| Symptoms/ Features | Women with PCOS | | Women without PCOS | | Chi Square test | |
|---|---|---|---|---|---|---|
| | NO. | % | NO. | % | Chi square value | P-value |
| Irregular menstrual cycle | 95 | 74.22 | 28 | 7.53 | 228.36 | <0.001* |
| Weight gain | 89 | 69.53 | 40 | 10.75 | 171.87 | <0.001* |
| Hirsutism | 60 | 46.88 | 13 | 3.49 | 143.731 | <0.001* |
| Facial acne | 75 | 58.59 | 44 | 11.83 | 114.84 | <0.001* |
| Psychological disturbances | 45 | 35.16 | 11 | 2.96 | 99.28 | <0.001* |

In 500 women, 95 (74.22%) PCOS women and 28 (7.53%) women without PCOS is having irregular menstrual cycle. 89 (69.53%) PCOS women and 40 (10.75%) women without PCOS is having weight gain. Hirsutism is experienced by 60 (46.88%) PCOS women and 13(3.49%) women without PCOS. 75(58.59%) PCOS women and 44 (11.83%) women without PCOS is having facial acne and 45 (35.16%) PCOS women and 11(2.96%) women without PCOS is exhibiting psychological disturbances, which shows that parameters such as irregular menstrual cycle, weight gain, hirsutism, facial acne, psychological disturbances were identified as problem by 50% of more of the PCOS women, P<0.001there is significant difference between PCOS women and women without PCOS.

**Table 4: Health-related Quality of life Questionnaire for women with and without PCOS.**

| FACTOR | ITEMS | FREQUENCY | | Chi Square test | |
|---|---|---|---|---|---|
| | | With PCOS | Without PCOS | Chi Square value | p-value |
| 1. Menstrual problems | Irregular menstrual periods | 104 | 24 | 279.74 | <0.001* |
| | Menstrual periods with clots | 50 | 10 | 119.32 | <0.001* |
| | Heavy menstrual bleeding | 61 | 15 | 140.60 | <0.001* |
| | Menstrual cramps | 50 | 28 | 71.93 | <0.001* |
| | Abdominal bloating | 7 | 6 | 5.59 | 0.02* |
| 2. Body hair | Growth of hair on abdomen | 49 | 19 | 89.19 | <0.001* |
| | Growth of visible hair on face | 83 | 19 | 209.27 | <0.001* |
| | Growth of hair on upper arms or upper legs | 28 | 8 | 55.45 | <0.001* |
| | Male type of balding | 12 | 2 | 27.33 | <0.001* |

| | | | | | |
|---|---|---|---|---|---|
| | or frontal hair loss | | | | |
| 3. Emotions | Angry | 62 | 23 | 120.51 | <0.001* |
| | Anxiety | 49 | 15 | 100.08 | <0.001* |
| | Insomnia | 64 | 31 | 107.43 | <0.001* |
| | Depression | 78 | 20 | 186.56 | <0.001* |
| | Fear / worried | 44 | 13 | 89.91 | <0.001* |
| | Feeling weak | 32 | 34 | 20.91 | <0.001* |
| 4. Fertility problems | Fear of infertility | 80 | 16 | 207.92 | <0.001* |
| | Feeling difficulty to conceive | 42 | 8 | 99.48 | <0.001* |
| | Abortion | 63 | 17 | 141.26 | <0.001* |
| | Do not feel sexy because of excessive hair growth | 12 | 0 | 35.73 | <0.001* |
| | Do not feel sexy because of overweight | 7 | 5 | 6.92 | 0.009* |
| 5. Weight | Unusual weight gain | 74 | 41 | 117.73 | <0.001* |
| | Frustrating with losing weight | 8 | 6 | 7.52 | 0.006* |
| | Trouble dealing with weight | 30 | 7 | 64.58 | <0.001* |
| | Difficulties staying at ideal weight | 37 | 11 | 73.89 | <0.001* |

When menstrual problems were compared between PCOS and non PCOS women, where maximum symptoms experienced by PCOS women were irregular menstrual periods (104), Heavy menstrual bleeding (61). Facial hair growth was the most common symptom seen in the majority of women with PCOS (83) and non PCOS (19). Emotional disturbances are commonly seen during pregnancy. Women with PCOS experienced greater frequency of depression (78), insomnia (64), angry (62), where depression (20), insomnia (31), angry (23) found to be less in non PCOS women. Among fertility problems, women with PCOS experienced greater rate of fear of infertility (80), abortion (63) and feeling difficulty to conceive (42), as compared to women without PCOS. Women with PCOS had increased rates of unusual weight gain (74) than women without PCOS and least have been found with losing weight in case of PCOS (8) and non-PCOS women (6), $P<0.001$ which is significantly different in pregnant women with and without PCOS.

**Table 5: Distribution of subjects based on pregnancy outcome.**

| Pregnancy complications | Non PCOS | | PCOS | | Chi square test | |
|---|---|---|---|---|---|---|
| | | | | | Chi Square Value | p-value |
| | NO. | % | NO. | % | | |
| Spontaneous Abortions | 16 | 4.30 | 58 | 45.31 | 127.03 | <0.001* |
| Gestational Diabetes | 7 | 1.88 | 60 | 46.88 | 166.13 | <0.001* |
| Gestational Hypertension | 16 | 4.30 | 72 | 56.25 | 177.21 | <0.001* |
| Preterm Labour | 1 | 0.27 | 19 | 14.84 | 52.68 | <0.001* |

In this study, out of 128 women with PCOS 58 ended in spontaneous abortions (SAB) (45.31%), 60 had gestational diabetes (GDM) (46.88%), 72 had Gestational Hypertension (GHTN) (56.25%), 19 ended in preterm labour (PL) (14.84%). Among women without PCOS 16 had both GHTN and SAB (4.30%), 7 had GDM and 1 ended in preterm labour (0.27%), P<0.001 which is significantly different in both groups, revealed numerically a high percentage of pregnancy complications in PCOS compared to women without PCOS.

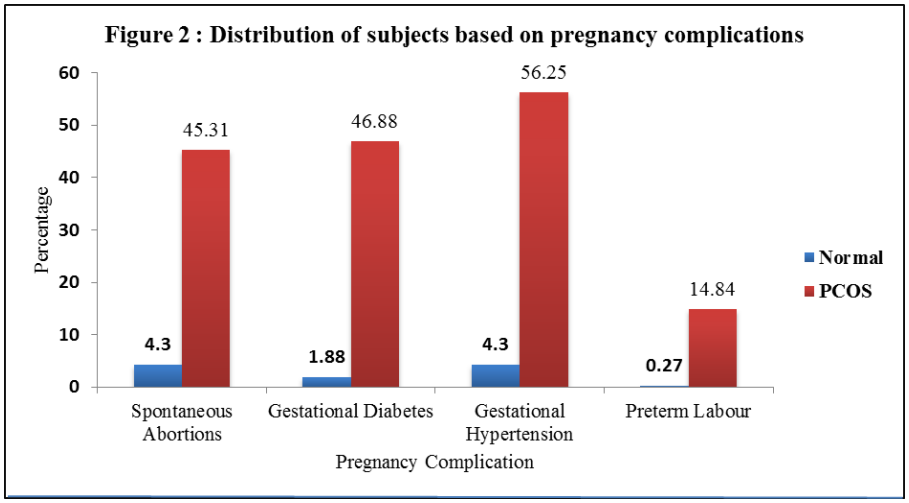



**Table: 6 Distribution of subjects based on caesarean rate.**

| GROUP | NO. | % | Chi Square test | |
|---|---|---|---|---|
| | | | Chi Square value | p-value |
| Normal women | 29 | 22.66 | 115.27 | <0.001* |
| PCOS women | 65 | 80.24 | | |

The caesarean rate in PCOS group was 65 (17.47%) and in non PCOS 29 (22.66%), P<0.001 which is significantly different in both groups, showed that caesarean rate was higher in the PCOS group than non PCOS.

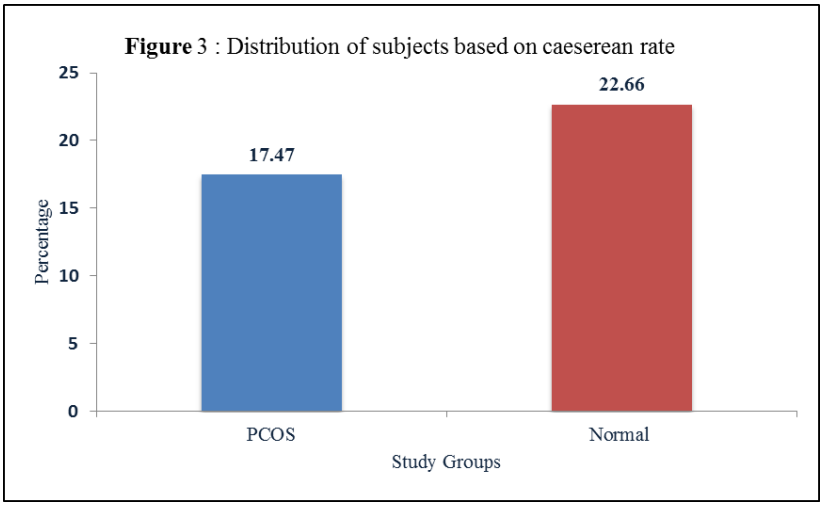
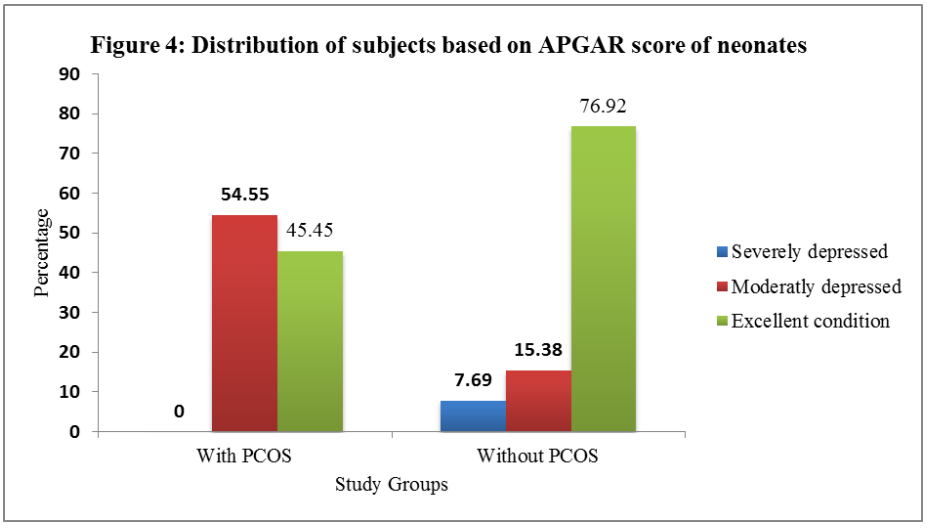



**Table 7: Distribution of subjects based on APGAR score of neonates.**

| GROUP | With pcos | | Without pcos | | Chi Square test | |
|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Chi Square value | p-value |
| Severely depressed | 0 | 0.00 | 1 | 7.69 | 0.35 | 0.56 |
| Moderately depressed | 18 | 54.55 | 2 | 15.38 | 45.37 | <0.001* |
| Excellent condition | 15 | 45.45 | 10 | 76.92 | 16.35 | <0.001* |

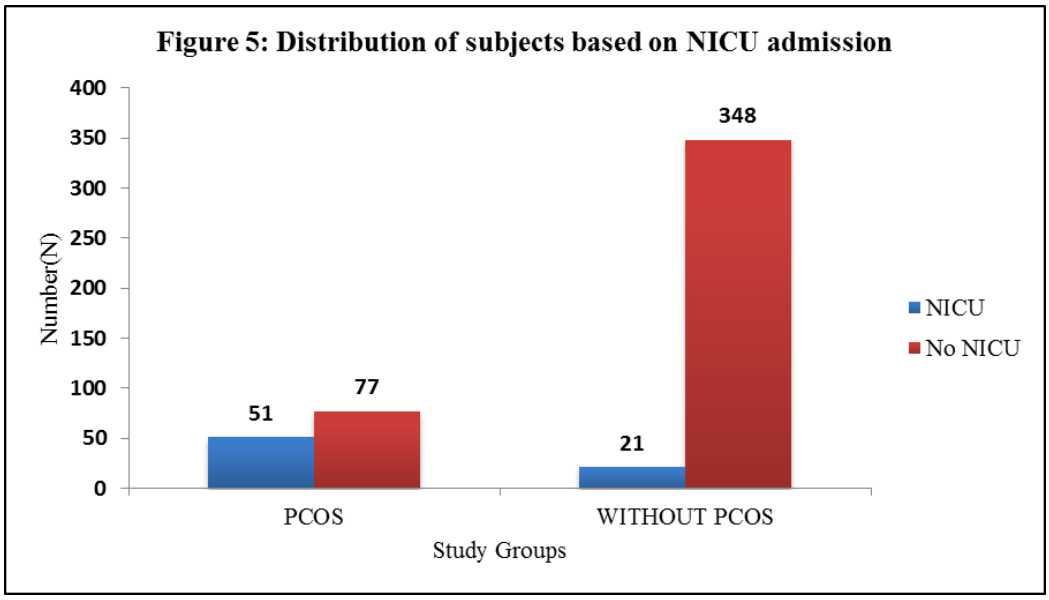
Low APGAR score at 5minutes were more frequent in offspring of women with PCOS. Moderately depressed 18 (54.55%) compared with 2 (15.38%) of non PCOS women, P value <0.001, there is a significant difference in the APGAR score of offspring of women with and without PCOS.



In neonatal outcome, 51 (39.84%) neonates born to women with PCOS required NICU admission and in women without PCOS, 21 (5.64%) babies required NICU admission P<0.001 are significantly different in neonates born to women with and without PCOS.

**Table 8: Distribution of subjects based on NICU admission.**

| Neonates born to mother | NICU | | NON NICU | | Chi Square test | |
|---|---|---|---|---|---|---|
| | | | | | Chi Square value | p-value |
| PCOS | 51 | 39.84 | 77 | 60.15 | 90.36 | <0.001* |
| WITHOUT PCOS | 21 | 5.64% | 348 | 94.30 | | |




## DISCUSSION

This was a community-based cross-sectional study among women in South India that elucidated the prevalence 25.6%. Considering BMI in the study, overweight (56) and obesity (21) was found higher in PCOS compared to women without PCOS. A similar study conducted by Anju E. Joham, et al.,[6] noted that the mean BMI was higher in women with PCOS (26.7±6 kg/m$^{2)}$ compared to women without PCOS (24.5±4.8 kg/m$^2$). In the present study, clinical features experienced by PCOS women are irregular menstrual cycle, weight gain, hirsutism, facial acne and psychological disturbances. Among these, major clinical features experienced by women with PCOS are irregular menstrual cycle (74.22%) and weight gain (69.53%). Furthermore, psychological disturbances (35.16%) seen only in few PCOS women. Whereas the similar study conducted by Huang-tz Ou, Meng-Hsing Wu, Chung-Ying Lin, Pei-Chi Chen[3] found that the above symptoms like acne, hirsutism and the issues of irregular menses and infertility caused by PCOS affect daily activities and bring considerable anxiety and depression to patients. The adverse pregnancy outcome associated

with PCOS was mainly gestational hypertension (72) followed by gestational diabetes (60), spontaneous abortion (58) and preterm labour (19) which is found to be occurs due to multiple factors such as hyperandrogenemia, insulin resistance and obesity. The same results was obtained from a study conducted by Chaitra Shivananjaiah, Abinaya Kannan, Mridula Devi, Jayanthi, Satish D., Renuka Ramaiah[7] and Heiddis Valgeirsdottir et al.,[8] were the maternal complications closely associated with PCOS pregnant women.

Pregnant women with PCOS are at increased risk of caesarean delivery because of preterm labour due to pregnancy complications. In this study, compared to normal women (29), women with PCOS (65) were more prone to have caesarean delivery. Similarly, Yu, Hai-Feng, MS; Chen, Hong-Su MS; Rao, Da-Pang MS; Gong, Jian MS[10] found that PCOS in pregnancy might affect the incidence of caesarean delivery. The main reason for NICU admission of neonates born to mothers with PCOS were low APGAR score and low birth weight and in case of neonates born to mothers without PCOS were anemia, ABO incompatibility and apnea. In normal group, 21 babies required admission in the NICU, where in case of babies born to PCOS women 51 were required NICU admission. This finding is comparable to the study conducted by Nivedhitha V.S., Sankareswari R.[12] and noted that NICU admissions are significantly higher in neonates born to women with PCOS (11%).

## CONCLUSION

The current study highlights the prevalence rate and HRQOL of pregnant PCOS women. The PCOS women have a low HRQoL while considering the factors like menstrual problems, body hair problems, fertility problems, emotional disturbances and weight problems. The complication associated with PCOS is not just confined to reduced fertility but also pregnancy complications like spontaneous abortions, gestational diabetes, hypertensive disorders of pregnancy, fetal complications like low birth weight, need of NICU care and lower APGAR: Moderately depressed. Pregnant women with PCOS are more likely to have a C-section because of the pregnancy complications associated with PCOS such as pregnancy induced high blood pressure. The management of PCOS was somewhat controllable with modifying the life style, diet, etc. But metformin had a great significance in throughout the pregnancy period which will dramatically reduce the EPL rate. Overall, proper care should be provided for PCOS women during their pregnancy period by conducting routine screening,

thereby early diagnosis of PCOS complications can somewhat be controlled for providing a better maternal and fetal outcome.

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**AUTHOR'S CONTRIBUTION**

All the authors have contributed equally.

**CONFLICT OF INTEREST**

The authors declare no conflict of interest

**ETHICS DECLARATION**

The protocol was verified by the institutional ethical committee, Davangere. Informed consent was obtained from all individuals voluntarily completed the online survey.

**CONSENT FOR PUBLICATION**

All authors have given their consent for publication.

**COMPETING INTERESTS**

The authors declare that they have no competing interests.

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