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EVALUATING THE INCIDENCE OF PRE-DIABETES IN PCOS WOMEN WITH DEPRESSIVE SYMPTOMS: A CROSS SECTIONAL STUDY

Gopikanath.S¹, Farheena Thasneem¹, Haripriya.B¹, Janavi.M¹,
Dr. K. Karthickeyan*

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Abstract

INTRODUCTION: Polycystic ovary syndrome is one of the most common endocrine disorders in women of reproductive age (15- 49) which affects the QOL and can worsen with the presence of anxiety and depression particularly due to obesity or sudden weight loss, excessive body hairs(hirsutism), fertility issues, and changes in the physical appearances. Longer exposure of depression leads to the onset of type 2 diabetes mellitus while a considerable period of exposure of depression in women with PCOS leads to the onset of pre-diabetes due to the bidirectional association between depression and diabetes.

OBJECTIVES: The research aims to determine the potential incidence of Pre diabetes associated with depression in PCOS women of age 18-30. To provide appropriate lifestyle modification through counselling to manage the condition for patient who have high stress and depressive score. To improve quality of life of PCOS women.

METHOD: The study includes 37 patients aged 18-30 years, who are already diagnosed with PCOD and have depressive symptoms, which is assessed using a standard scale called Beck's depression scale which evaluates mild mood disturbance, borderline clinical depression and moderate, severe, extreme depression. Their stress levels are also assessed using perceived stress scale. All 37 patients are then monitored for their fasting blood sugar, HbA1c, OGTT (Oral Glucose Tolerance Test) to evaluate the occurrence of prediabetes and then compare it with the level of depression of the patient.

RESULT: A total of 37 patients were included in the study. The majority of the patient were between the age group 18- 30; about 40.5% have reported severe depression and more than 50% of the patients had hormonal imbalances, which contributed as major risk factors of PCO. More than 54.5% patient had risk factors of pre-diabetes. Beck's Depression Scale revealed that all the patients had risk factors of Depression.

CONCLUSION: Based on the findings of our research, we concluded that there is a strong connection between the rise in HbA1C level and depression, suggesting a possible link between rising depressive symptoms and prediabetes in PCOS patients. Diabetes mellitus and depression incidence would be significantly reduced by reducing the risk factors of PCOS patients, such as weight gain, acne, hirsutism, and scalp hair loss with the presence of depressed symptoms. The quality of life for patients with PCOS would be significantly improved by an early identification of diabetes mellitus and depression. Studies are also needed to determine the incidence of PCOS risk factors in a wider population.

KEYWORDS: Bi-directional, Poly Cystic Ovarian Syndrome-PCOS, Depression, Diabetes Mellitus, Beck's depression scale, Perceived stress scale, Pre-diabetes

Department of Pharmacy Practice, School of Pharmaceutical Sciences, Vels Institute of Science, Technology and Advanced Studies (VISTAS), Chennai, Tamil Nadu, India.

¹Pharm D, Department of Pharmacy Practice, Vels Institute of Science and Technology, Pallavaram, Chennai, Tamil Nadu, India

*Professor, Head of the Department of Pharmacy Practice, Vels Institute of Science and Technology, Pallavaram, Chennai, Tamil Nadu, India.

Corresponding Author: Dr. K. Karthickeyan (Professor and HOD)

E-Mail: hodpppractice@velsuniv.ac.in

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INTRODUCTION

Polycystic ovary syndrome is one of the most common endocrine disorders in women of reproductive age (15- 49)⁴² which affects the QOL and can worsen with the presence of anxiety and depression. This can be either due to the features of PCOS or due to the diagnosis of a chronic disease^{48,51}. Psychosocial consequences arise in patients with PCOS, as shown by various investigators^{49,50} particularly due to obesity or sudden weight loss, excessive body hairs(hirsutism), fertility issues, and changes in the physical appearances^{44,49}. There is a bidirectional association between depression and diabetes which is independent of sociodemographic, diet, and lifestyle factor^{1,2,13}. Depression leads to double the risk of diabetes^{3,8,17,52}. At least half of the people diagnosed with PCOS will develop diabetes or prediabetes (glucose intolerance) by the age of 40⁴⁵ and it also has also been defined as a nonmodifiable risk factor for type 2 diabetes by the American Diabetes Association⁴⁶. Longer exposure of depression leads to the onset of type 2 diabetes mellitus while a considerable period of exposure of depression in women with PCOS leads to the onset of prediabetes^{3,8,9,10,11}. Stress is also a major factor linking PCOS women with depressive symptoms to prediabetes which will eventually lead to diabetes mellitus⁴⁹. Prediabetes is a state of elevated plasma glucose in which the threshold for diabetes has not yet been reached and can predispose to the development of type 2 diabetes mellitus and cardiovascular diseases. The bidirectional association between depression and diabetes^{1,2,13} is evaluated in PCOS women who are prone to experiencing depressive symptoms are taken to assess the incidence of prediabetes to improve the QOL of such women.

METHODOLOGY

STUDY DESIGN

The purpose of this study is to evaluate the incidence of pre-diabetes in PCOS women with depressive symptoms. The methodology used in this study is a quantitative methodology. The quantitative data obtained provide the information whether the PCOS women's have depression.

Based on these data this study also aims to evaluate the incidence rate of pre diabetes associated with depression in PCOS women of age 18-30.

In this study, a survey research design was utilised. A quantitative research method was used in conducting this study in which questionnaires related to the title was used to achieve the quantitative method. There are two different questionnaires used to obtain data which are Beck Depression Inventory and Perceived Stress Scale. The survey is designed to know the score of depression in PCOS women.

SAMPLE SIZE

The population of this study are patient from ESI Hospital, Ayanavaram, Chennai. The total population of patients is 40 and the sample size of this study will be 37 patients with the confidence interval of 95% and the margin error of 5%. Patients who are diagnosed PCOS with depressive symptoms are taken as sample in this study.

STUDY DURATION

The study was completed in 6 months from the year 2022-2023.

STUDY SITE

The study was conducted in ESI Hospital, Ayanavaram, Chennai. In the department of Obstetrics and Gynaecology.

STUDY INSTRUMENTS

The instrument of this study used is Beck's Depression Inventory Scale and Perceived Stress Scale to find out the scoring for depression and stress. The Beck's Depression Inventory is a self-reporting

questionnaire which is used to evaluate the severity of depression in population. It was developed by Beck et al. in (1961). This BDI-Beck's Depression Inventory is a self-scoring questionnaire which has 21 questions with 4 types of different answers provided in it which evaluates different degree of their stage. The Perceived Stress Scale is a widely used instrument which is developed by Cohen et al. in (1983) for the assessment of stress. There are totally 10 questions in this scale to ask about the feeling and thought patient is going through over the last month. Both the questionnaire will take about 15-30 minutes to complete. Also, patient profile form where all the details of the patient was collected (Name, age, sex, height, weight, BMI, chief complaints, physical appearance changes, social history, past medical and medication history, lab values such as fasting blood sugar, Hba1c, OGTT will be noted) was used. Counselling aids are also provided to the patient who are evaluated with moderate to severe depression.

COMPLETE STUDY PROCEDURE

In this research, a set of questionnaires will be distributed to the sample. First consent form was given to each sample patient to get permission whether they are willing to participate in this study and are interviewed for inclusion criteria. The patient is instructed and explained about the clear purpose of the study, the importance of completing the questionnaire's and also the confidentiality of their responses whereby the data would only be utilised for the purpose of the study. If the concerned patient is okay with proceeding in the study, then the further process is be done. After the patient completed the questionnaire, the research collects the questionnaire and analyse the data collected. Then the patient's disease history and other data required is noted in the study instrument i.e, patient performa which includes BMI, completed medical history, social history,

history of present illness, lab investigations and diagnosis. The patients are given a self-scoring depression scale (Beck's depression inventory) and a stress scale to diagnose the level of depressive symptoms and stress levels. If the scoring is moderate to severe or above then counselling assistance is given to the patient. Also, in this study we are evaluating the incidence of pre diabetes for which the blood sugar levels are evaluated by investigating fasting blood sugar, HBA1C, OGTT values are taken for the patient.

INCLUSION CRITERIA

The sample patient under the inclusion criteria are those patients who are diagnosed with PCOS between the age group of 18-30 years who are experiencing depressive symptoms. Patients with comorbidities of (Obese, Hypercholesterolemia, Anaemia) are also included.

EXCLUSION CRITERIA

And the exclusion criteria include patients who has a history of Psychiatric disorder or Diabetes Mellitus, either as a familial history or a personal history to rule out the possibility of developing depression or pre-diabetes from other causes than the underlying disease condition i.e. PCOS, patients who are asthmatic or have any allergies as its drugs of therapy may affect the insulin levels and patients who has epilepsy and thyroid disorders.

DATA ANALYSIS

The obtained data is represented as bar graphs and pictorial graphical presentations.

STATISTICAL ANALYSIS

The data is collected and entered in Microsoft Excel (2021). And the data is analysed using Statistical Package for The Social Sciences (SPSS) in the version 29.0. The categorical data is represented in frequencies and percentage.

RESULTS

Socio-demographic details:

Table 1:

S. No	Variable		Frequency	Percentage
1	Mean	18-21	14	37.9%
		22-26	12	32.4
		27-30	11	29.7
2	Acne	0	14	37.8
		1	23	62.2
3	Fertility	0	17	45.9
		1	19	51.4
4	Anaemia	0	14	37.8
		1	23	62.2
5	Depression Level	BCD	5	13.5
		ED	1	2.7
		MD	11	29.7
		MMD	5	13.5
		SD	15	40.5

6	Hair Loss	0	15	40.5
		1	22	59.5
7	Facial Hairs	0	16	43.2
		1	21	56.8
8	Weight	0	15	40.5
		1	22	59.5
9	BMI	18.5-24.9	15	40.5
		25.0-29.9	16	43.2
		Above 30.0	6	16.2
10	BMI		25.373	4.0975
11	HBA1C		5.8216	0.49280
12	BECK'S		27.35	8.779
13	STRESS		16.78	4.995
14	OGTT		168.73	14.358

Table 2

WEIGHT	HbA1C			P
	Normal	Pre-Diabetic	Diabetic	
Normal Weight	9(60.0%)	6(40.0%)	0(0.0%)	0.12
Weight Gain	4(18.2%)	12(54.5%)	6(27.3%)	

Where, 0 = Normal weight, 1 = Weight gain

Table 2 depicts about the relation between Weight and HbA1C

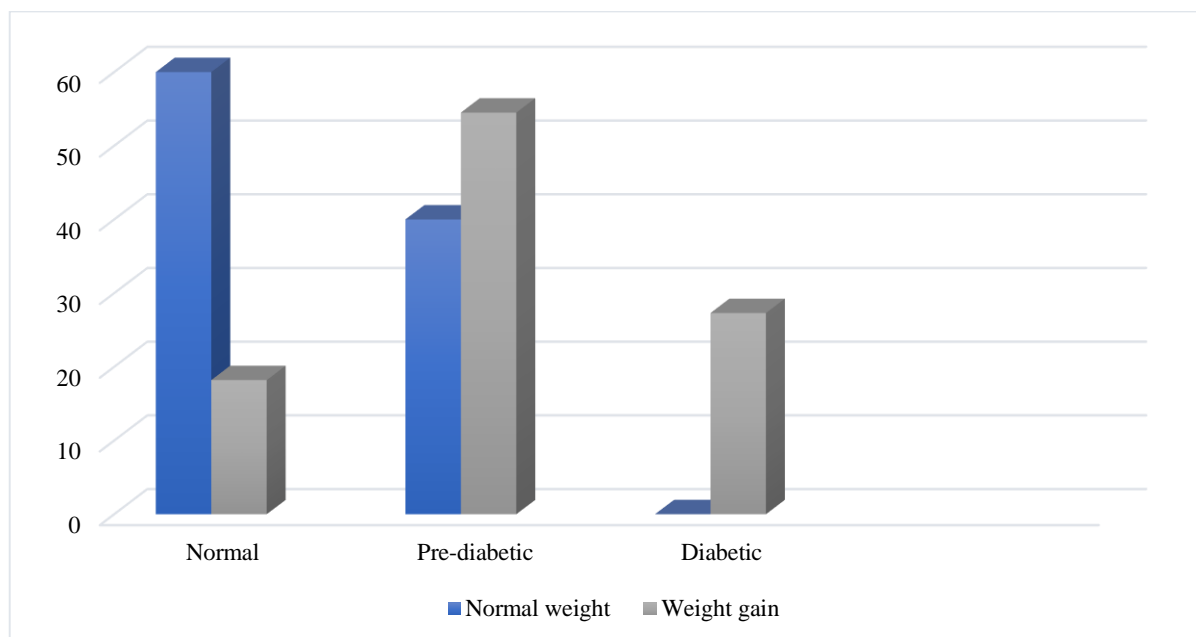


Figure 1: Relation between Weight and HbA1C

The above-mentioned graph explains about Relation between Weight and HbA1C

Table 3: Relation between Beck's Depression Scale and HbA1C

Beck's Depression Scale	HbA1C			P
	Normal	Pre-Diabetic	Diabetic	
11-16	3(60%)	2(40%)	0(0%)	<0.005*
17-20	5(100%)	0(0%)	0(0%)	
21-30	4(36.4%)	6(54.5%)	1(9.1%)	
31-40	1(6.7%)	10(66.7%)	4(26.7%)	
Over 40	0(0%)	0(0%)	1(100%)	

Table 3 explain the relation between Beck's Depression Scale and HbA1C

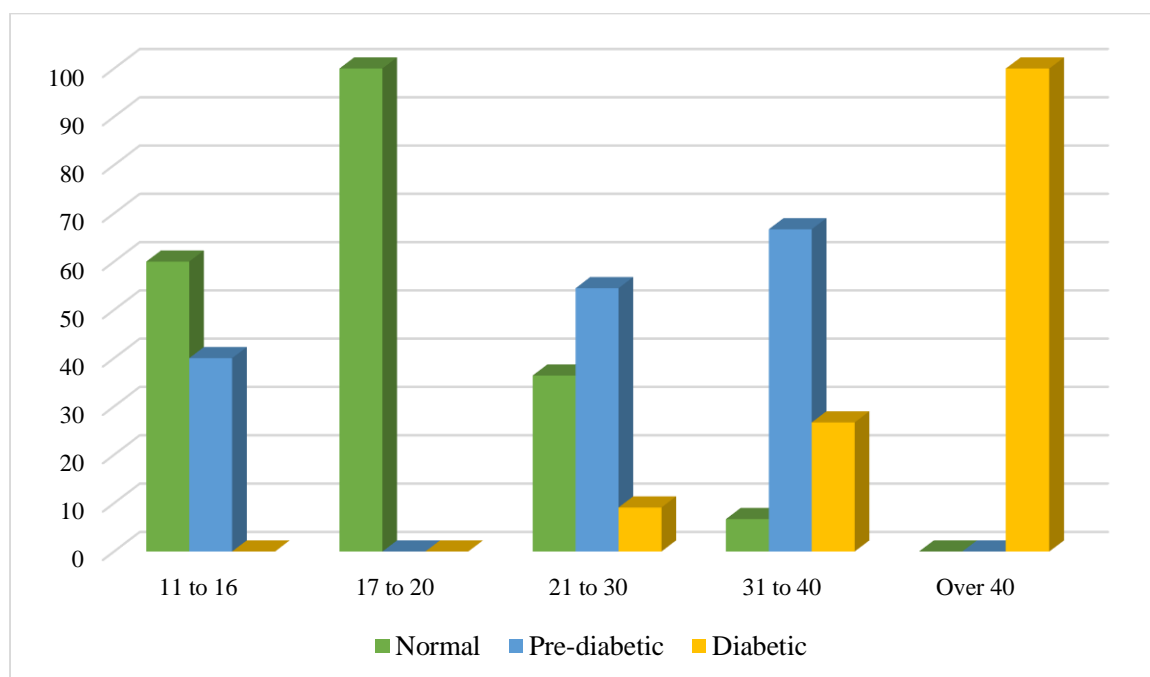


Figure:2 Relation between Beck's Depression Scale and HbA1C

The above-mentioned figure describes the relation between Beck's Depression Scale and HbA1C

Table 4: Correlation between Body Mass Index and Beck's Depression Scale.

Body Mass Index	Beck's Depression Scale					P
	11-16	17-20	21-30	31-40	Over 40	
18.5-24.9	4 (26.7%)	4 (26.7%)	5 (33.3%)	2 (13.3%)	0 (0.0%)	<0.01*
25.0-29.9	1(6.3%)	1(6.3%)	4(25%)	10(62.5%)	0(0%)	
>30.0	0(0%)	0(0%)	2(33.3%)	3(50%)	1(16.7%)	

Table 4 depicts correlation between Body Mass Index and Beck's Depression Scale.

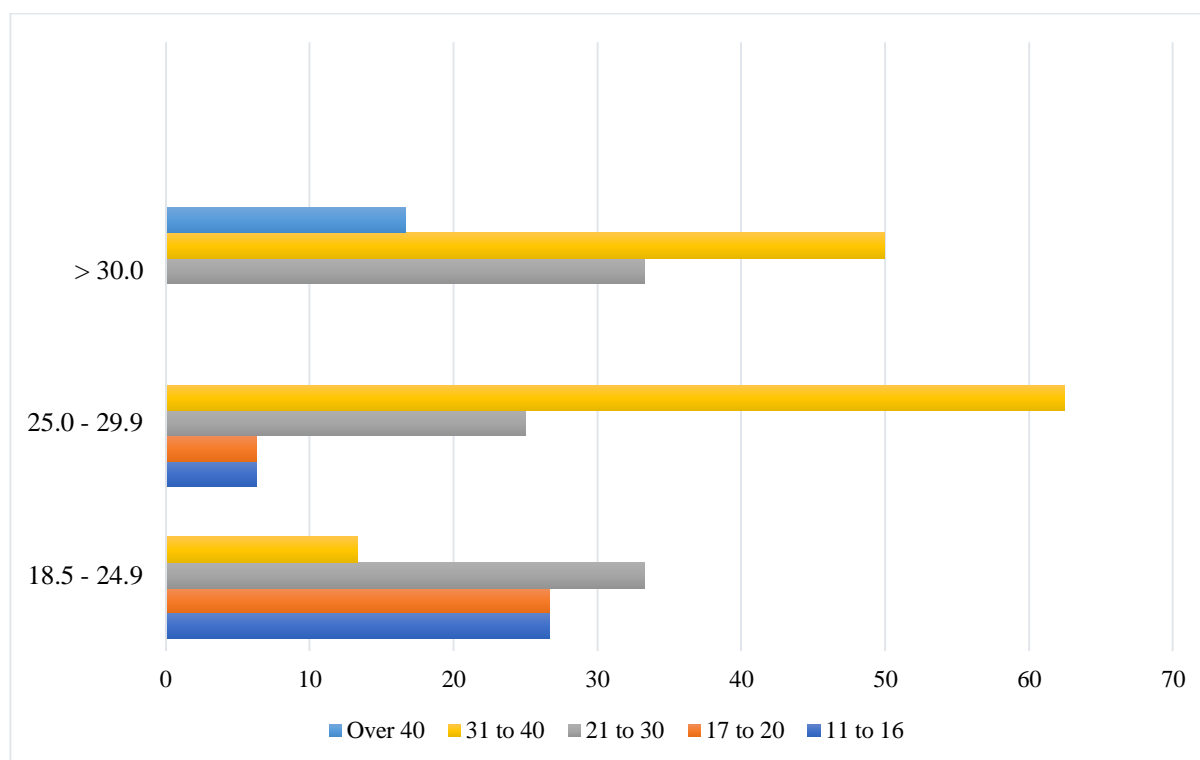


Figure 3: Correlation between body mass index and Beck's depression scale.

The above mentioned graph describes about correlation between Body Mass Index and Beck's Depression Scale.

DISCUSSION:

The present study aimed to evaluate the occurrence of pre-diabetes among women with polycystic ovary syndrome (PCOS) who exhibit symptoms of depression. The current study employed a quantitative methodological approach. Using the quantitative data collected, it was determined if depressive symptoms are prevalent in PCOS women.

This study aims to evaluate the incidence of pre-diabetes in correlation with depression among women diagnosed with PCOS, aged 18 to 30, utilising the available data.

The employed methodology in this current study was a survey. The present investigation utilised a quantitative research approach, with the objective of employing quantitative methods via the administration of questionnaires that were relevant to the study's topic. The Perceived

Stress Scale and the Beck Depression Inventory were employed as distinct questionnaires for data collection purposes. The objective of the survey is to ascertain the frequency of depression among women with Polycystic Ovary Syndrome (PCOS).

The study's population comprised patients from ESI Hospital located in Ayanavaram, Chennai. The study involved a sample size of 37 patients selected from a total population of 40. The confidence interval for this study is set at 95%, with a margin error of 5%. This study has selected a sample of patients who have been diagnosed with PCOS and exhibit symptoms of depression.

The Beck Depression Inventory Scale and Perceived Stress Scale were used in the study as evaluation measures for assessing participants' levels of stress and depression.

The Beck's Depression Inventory, a self-report questionnaire, was employed to assess the degree of depression severity within the general populace. The year of 1961 saw the inception of the creation of the

aforementioned by Beck et al. The Beck's Depression Inventory (BDI) is a self-administered assessment tool comprising of 21 items and 4 response options. The Perceived Stress Scale, developed by Cohen et al. in 1983, is a widely used instrument for assessing stress levels. The scale comprises 10 items that elicit information regarding the cognitive and affective experiences of the patient over the preceding month. The completion time for both questionnaires is estimated to range from 15 to 30 minutes. Furthermore, a patient profile form was employed to document comprehensive patient information, encompassing the patient's identity, age, gender, stature, mass, chief complaints, physiological alterations, societal background, past medical history, and diagnostic findings.

Counselling was provided to the patient to facilitate lifestyle adjustments in response to their presenting issue.

The study participants has received a set of questionnaires as part of the data collection process. Prior to being solicited for participation and undergoing questioning to determine eligibility, each prospective patient sample will be provided with a consent form. The study participant was provided with educational and informative materials regarding the research's specific objectives, the importance of completing the questionnaires, and the confidential nature of their responses. It is emphasised that the data collected was utilised solely for the purposes of the study. Once the patient has expressed comfort with the study, the subsequent course of action will be initiated. Upon completion of the questionnaire by the patient, the research team proceeded to gather and analyse the data.

After that, information such as the patient's body mass index (BMI), complete medical history, social history, present condition's history, test findings, and a diagnosis was entered in the research instrument patient performa. The Beck Depression Inventory,

a self-scoring depression scale, is administered to patients to assess the severity of their depressive symptoms and stress levels. In cases where the scoring exceeds moderate to severe levels, the patient is provided with counselling support. Furthermore, within the scope of this investigation, the incidence of pre-diabetes is being evaluated, and the patient's blood glucose levels was analysed through the assessment of fasting blood sugar, HbA1C, and OGTT values.

Sherita Hill Golden et al conducted a study on the bidirectional relationship between diabetes and depression. The study revealed that individuals with diabetes have a higher prevalence of clinical depression and elevated depressive symptoms compared to the general population. These associations may be linked to an increased risk of depressive symptoms in individuals with diabetes, an increased risk of type 2 diabetes in individuals with depressive symptoms, or both. Our study has revealed a noteworthy correlation between diabetes and depression.

Chi square test and correlation was used in this to analyse the data. A p value of less than 0.05 was considered to be statistically significant.

The association between HbA1C and becks depression score observed to be statistically significant indicating that there is a positive correlation between the depressive symptoms with diabetes in increasing trend.

CONCLUSION:

Based on the findings of our research, we concluded that there is a strong connection between the rise in HbA1C level and depression, suggesting a possible link between rising depressive symptoms and prediabetes in PCOS patients. Diabetes mellitus and depression incidence would be significantly reduced by reducing the risk factors of PCOS patients, such as weight gain, acne, hirsutism, and scalp hair loss with the presence of depressed symptoms.

The quality of life for patients with PCOS would be significantly improved by an early identification of diabetes mellitus and depression. Studies are also needed to determine the incidence of PCOS risk factors in a wider population.

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