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## Psychological distress levels and its relationship with food preferences of PCOS population in Allahabad city

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### Abstract

In the current scenario, Indian females are reported to be among the world's most depressed population according to WHO and it has been found that Polycystic Ovarian Syndrome (PCOS) population are more likely to develop depression and other associated disorders. Along with it, food cravings found in the population simply reflects a desire for pleasure, relief and self-nurturing. It is well understood that eating sugary foods triggers release of insulin, and the need to get tryptophan into the brain is the reason many people experience carbohydrate cravings and sugar cravings when they are depressed. Depression is a direct result of low serotonin levels in the brain. Serotonin, an important neurotransmitter, has functions in appetite regulation as well as a mood enhancer and is made from the amino acid tryptophan which needs Insulin to cross the blood-brain barrier. Insulin resistance is the root cause behind polycystic ovarian syndrome and tryptophan non-bioavailability which makes PCOS population more vulnerable to extreme psychiatric comorbidities. A healthy lifestyle, nutritious diet, plentiful exercise, and targeted nutritional supplements can help PCOS population in overcoming their mood issues and symptoms under control. Along with it, Calming and positive thoughts lead to an increase in serotonin, which lower desire for food, and increases satisfaction, all of which helps control temper, improve sleep and enhancing quality of life.

**Keywords:** PCOS, food craving, tryptophan, serotonin, comorbidities, neurotransmitter

### Introduction

Polycystic Ovarian Syndrome is a serious endocrinopathy affecting females of reproductive age [1]. And the biggest concern is it's unknown cause, which is still a riddle for the whole world. In India, prevalence of PCOS was reported to be 9.13% in 2011 [2]. According to Rotterdam criteria, PCOS is defined as the presence of any two of the three features: (1) Oligo/amenorrhoea: absence of menstruation for 45 days or more and/or  $\leq 8$  menses/year. (2) Clinical Hyperandrogenism: Modified Ferriman and Gallwey Score of 6 or higher. (3) Polycystic ovaries: presence of  $>10$  cysts, 2–8 mm in diameter, usually combined with increased ovarian volume of  $>10$  cm<sup>3</sup>, and an echo-dense stroma in pelvic ultrasound scan [3]. On the basis of previous studies, insulin resistance believed to be a biggest culprit behind testosterone (a male hormone) overproduction which somehow affects the ovaries function & hampers hormonal homeostasis resulting into production of numerous small collections of fluid (cyst) due to which ovaries fail to release eggs leading to infertility in concerned population. Major causes behind insulin resistance are believed to be Bad Dietary Habits, Sedentary Lifestyle, Genetic History and Stress. In the current scenario, Indian females are reported to be among the world's most depressed population according to World Health Organisation and it has been found that Polycystic Ovarian Syndrome (PCOS) population are more likely to have anxiety or depressive disorders when compared to those in the general population. [4]. Along with it, food cravings found in the population simply reflects a desire for pleasure, relief and self-nurturing. It has been reported in earlier study that Stress related eating is more common in women than men [5]. Hence, it is necessary to reveal the association between psychological distress and food preferences among the concerned group.

### Hypothesis

- Ho I: There is no significant association between Groups (case & control) & Food Preferences.
- Ha: There is a significant association between Groups (case & control) & Food Preferences.
- Ho II: There is no significant association between Groups (case & control) & Psychological Distress levels.

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### Methodology

The present research study was approved by Department of Food, Nutrition & Public Health, Ethelind College of Home Science, SHUATS, Allahabad, U.P, and India. It was a cross-sectional, descriptive, age matched case-control study. The survey was started in January 2016 and completed in January 2018. The study was carried out in Private Clinics, Hospitals, University Campus, Girls Hostel, Girls College at Allahabad city, U.P, India. Purposive Sampling has been used as a sampling technique on the basis of Rotterdam criteria to get Polycystic Ovarian Syndrome patients, after that age based stratification was done to get 150 subjects as Cases and 150

general population as Control, who belongs to 18-48 years of age group. Patients suffering from serious metabolic & psychological disease had been excluded from the study. All participants were enrolled after obtaining informed consent or assent to participate in the study. A self-made questionnaire with items related to pieces of information about Food Preferences was used for data collection. Psychological Distress levels were assessed using the P.G.I Health Questionnaire N1. Statistical analyses were performed using SPSS Ver. 20.0. Chi Square test was used to test the association between variables. A p-value less than 0.05 was considered as statistically significant.

### Result & Discussion

**Table 1:** Distribution of Respondents on the Basis of Their Food Preferences

(PART - A)

Variable	Parameter	Case	Control	P Value
Type Of Diet	Vegetarian	44	60	P < .05 (S)
	Non-vegetarian	90	52	
	Ovovegetarian	16	38	
Biggest Meal Of The Day	Breakfast	14	26	P > .05 (NS)
	Lunch	70	66	
	Dinner	66	58	
Source of meal	Home	122	120	P > .05 (NS)
	Hostel mess	24	29	
	Office canteen	4	1	
Food cravings	Sweet foods	47	58	P < .05 (S)
	Salty foods	87	68	
	Salty food at past & Sweet food at present	14	13	
Junk food consumption	Sweet food at past & Salty food at present	2	11	P > .05 (NS)
	Daily	5	9	
	Often	63	70	
	Occasionally	80	71	
Craving for non-edible substances (pica)	Never	2	0	P < .05 (S)
	Chalk	15	11	
	Clay	42	12	
	Ice	15	10	
	Pencil lead	1	0	
	None	70	117	

(PART - B)

Variable	Parameter	Case	Control	P Value
Milk	Daily	132	126	P > .05 (Ns)
	Often	8	12	
	Occasionally	2	6	
	Never	8	6	
Meat	Daily	9	5	P < .05 (S)
	Often	64	34	
	Occasionally	33	51	
	Never	44	60	
Cereal	Daily	150	150	Constant
Pulses	Daily	127	132	P > .05 (Ns)
	Often	13	10	
	Occasionally	9	8	
	Never	1	0	
Vegetable	Daily	150	150	Constant
Fruits	Daily	49	47	P > .05 (Ns)
	Often	55	45	
	Occasionally	36	49	
	Never	10	9	
Fat	Daily	150	150	Constant
Sugar	Daily	137	144	P > .05 (Ns)
	Often	1	0	
	Occasionally	2	0	
	Never	10	6	

**Result Ho I:** There is a significant association found between Groups and their four Food Preferences (Type of Diet, Food cravings, Pica stuffs intake, Meat intake) while there is no significant association found with rest of the Food Preferences (about ten variables). Hence, we can say that there is no significant association found between Groups (cases & control) and Food Preferences. Therefore, null hypothesis is accepted and alternate hypothesis is rejected. Thus, it can be concluded that most of the food preferences of Cases & Controls were found almost similar.

**Table 2:** Distribution of Respondents on The Basis of Their Psychological Distress Levels

Variable	Parameters	Frequency(N)		P VALUE
		Case	Control	
Psychological Distress Levels	Mild Neurotic	10	68	$P < .05 (S)$
	Moderate Neurotic	39	58	
	Severe Neurotic	99	24	

**Result Ho II:** There is a significant association found between Groups and their Psychological Distress Levels. PCOS subjects (Case) were found more Psychologically Distressed than Controls. Chi Square test value is  $X^2 (2) = 92.572$ ,  $P < .05$ . Hence, null hypothesis is rejected and alternate hypothesis is accepted.

### Discussion

Majority of cases were found to be non-vegetarians while majority of controls were found vegetarians. This finding is in concordant with previous finding of Chavarro *et al.*, 2007 [6] who reported that increased risk of ovarian infertility to be associated with protein intakes from animal sources, carbohydrate with high GI [6]. Both the groups preferred lunch to be the biggest meal of the day followed by dinner. Both the groups preferred homemade food although majority of cases & control belongs to college going girls & working ladies. However, hostellers preferred hostel mess that runs in University Campus (SHUATS), while working ladies preferred office canteen also. Cases preferred salty food even more than the controls, however, majority of controls also preferred salty food over sweet foods, but less than the cases. Most of the cases also preferred sweet foods but less than the controls. However, both the groups admits that they had salt craving more in childhood days but they developed cravings for sweet foods as they grow up. In present study, it has been found that salt intake of cases was more than the controls since childhood days or we can say that majority of cases didn't like sugary foods. However, they prefer savoury carbohydrate (e.g burger, pizza, potato chips, samosa, etc.) even more than any sugary foods. This finding is in contrast with Agnes *et al.*, 2015 [7] who reported that the majority of participants craved sweet carbohydrates, with 50.7% of the sample, the most common craving of which was chocolate with 74.1% of the participants in the sweet carbohydrate craving group selecting chocolate as the food which they crave the most often [7]. Along with it, majority of earlier research findings is in support with the fact that PCOS sufferers craves for sugar more in comparison to normal population due to insulin resistance, that is supposed to be a biggest cause behind manifestation of PCOS. Both the groups had almost similar pattern in junk food consumption, majority of them preferred junk food occasionally however, these are followed by the population who preferred junk food oftenly. Even two cases had no junk food consumption, while nine controls preferred junk food on daily basis even more

than the cases. Cases were reported to have more craving for non-edible substances like clay, chalk, ice, pencil lead, etc. even more than the controls. This abnormal behaviour of eating non-nutritive substances called as 'PICA'. Milk consumption was found to be more among cases rather than controls. However, no significant difference has been reported. Majority of the cases preferred milk daily in the form of plain milk and beverage while majority of controls preferred milk in the form of beverage only. Majority of cases preferred non-veg foods oftenly while majority of the controls preferred vegetarian foods over non-veg foods. About 16 cases & 38 controls were found to be ovo-vegetarian. Both the groups consumed Chicken, Egg & Fish as the most preferred non-veg food. Along with it, 47 cases also preferred mutton with rest of the non-veg foods oftenly while mutton consumption has not been reported among controls. Cereal consumption were reported to be same in both the groups. Rice consumption was found to be more in cases rather than controls although major population in both the groups preferred roti over rice. One case preferred breakfast cereal like dalia, oats, muesli over roti & rice every day for few months. She occasionally preferred roti or rice in her meal. Cases had less consumption of pulses rather than controls, although majority of cases & controls preferred mixed dhal over redgram dhal. One case had no pulse consumption. Vegetable Consumption was found to be same among both the groups however, cases preferred all vegetables (green leafy vegetables, potato & seasonal vegetables) in a daily meal and about 6 cases preferred only green leafy vegetables & seasonal vegetables even more than controls while majority of controls preferred potato & seasonal vegetables on daily basis. Majority of cases had fruit consumption even more than controls, but no significant difference has been reported. However, both the groups preferred whole fruit over fruit juices and milk shakes. Fat consumption was found to be same among both the groups, although cases preferred butter & ghee along with cooking oil even more than controls. This finding is in concordant with Douglas *et al.* 2006 [8] who reported higher intakes of saturated fat, and GI diet and lower intakes of fiber in PCOS sufferers rather than controls [8]. Majority of cases & controls preferred sugar on daily basis, although cases had less consumption of sugar in comparison to controls. Even ten cases had no sugar consumption on daily basis & two cases preferred sugar free over sugar every day. Both the groups preferred sugar in the form of beverage and sweets or cookies on daily basis.

The present study reveals that there is no significant difference has been found between the case & control as far as their Food Preferences are concerned. However, significant difference has been reported in Psychological Distress Levels among the concerned Group. It has been reported by (Macht *et al.*, 2000) [9] who reported that women with PCOS had significantly higher levels of psychological distress than general population and it has been reported also that negative emotions such as anger, fear and sadness are associated with irregular eating patterns and eating as a distraction, to relax or feel better [9]. Hence, it seems necessary to find the relationship between food preferences and psychological distress level. Stress induced eating has been also witnessed among the Cases in earlier studies. Junk food consumption of PCOS population has been found to be quite similar with general population of similar age group. Stress is associated with cravings for high fat and high carbohydrate foods particularly among women. (Benton *et al.*, 2002) [5] Likewise in another study by Epel *et al.*, 2001 [10], it

has been reported that psychophysiological response to stress may influence subsequent eating behavior. Over time, these alterations could impact both weight and health <sup>[10]</sup>. Chronic stress leads to adrenal fatigue which presumed to be one of the biggest reasons behind testosterone overproduction. Testosterone overproduction is the main culprit behind polycystic ovarian syndrome. Low endorphin levels make us crave fatty foods and or sweet foods that might be the reason behind they prefer carbohydrate (high glycaemic food) and fat rich diet over green leafy vegetables and fibrous foods as tryptophan levels are responsible behind raising feel good hormone 'endorphins' inside the body & Tryptophan levels rises with intake of carbohydrate rich foods, Fatty foods also enhance endorphins <sup>[11]</sup>. Along with it, dairy consumption was reported more in the concerned group which also increases insulin like growth factor inside body which mimic insulin in its action and enhancing testosterone levels that makes the condition even more worse. Although IGF-1 is present in other forms of animal protein, it doesn't seem to have as much impact as dairy does on our IGF-1 levels. <sup>[12]</sup> Fruit consumption has been witnessed more in the concerned group, however there was no fruit malabsorption syndrome has been reported. Non-veg consumption was found more in the concerned group rather than Controls. Pulses consumption were reported less among the Cases. Even majority of the cases didn't like to have pulses on daily basis. In Cereals, rice consumption were found more than chapatti among the Cases. They prefer lunch followed by dinner to be the biggest meal instead of breakfast. Likewise, sugar consumption were reported more in no. of obese patients who were found more insulin resistant or reached nearby borderline. In current scenario, dietary pattern and food preferences of subjects has been found quite similar, due to similar kind of lifestyle influenced by globalization, study or job pressure, cultural norms, etc. Although, no significant difference has been found in Food preferences of cases and controls in our study. Faulty dietary habits or micronutrient deficiency since childhood days might be a prominent reason responsible behind manifestation of PCOS. However, possibility of PCOS manifestation cannot be denied among controls in future having similar kind of food preferences & lifestyle.

### Conclusion

It has been much discussed in previous studies that faulty food preferences & abnormal eating pattern might be one of the prime reasons responsible behind health deterioration of PCOS sufferers. Along with it, food preferences & eating pattern are often linked to mood disorders, obsessive-compulsive behaviour & depression as per earlier studies. Depression, Anxiety and Mood Swings are common symptoms seen among PCOS sufferers. In the present study, it has been revealed that most of the food preferences of Cases and Controls were almost same except Type of Diet, Food Cravings, Meat intake, PICA stuffs intake while PCOS subjects were found more Psychologically Distressed than controls. Thus, it can be concluded that there is no significant association found between Food Preferences and Psychological Distress levels as far as present study is concerned.

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