Original Article

Prevalence of Glucose Tolerance Test abnormalities in South Indian Sub-fertile PCOS women

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Abstract

Objective: To study the prevalence of Glucose Tolerance Test abnormalities in PCOS women attending the infertility clinic in a tertiary care hospital.

Methods: 149 PCOS women who attended the infertility clinic between September 2007 –August 2009, were subjected to Oral Glucose Tolerance Test (GTT) with 75 grams glucose load after ruling out other causes of anovulation. Blood sugar values were categorized as normal, impaired or Type 2 Diabetes Mellitus by WHO 1999 criteria.

Results: 149 women were enrolled in the study , 125 women (83.8%) had normal GTT; Impaired GTT was seen in 21 women 21/149 (14.09%),3 women were Type 2 DM with the prevalence of 2.017% (03/149). There was no difference between the two groups in terms of age, BMI, family history of DM, cycle irregularity, hyper androgenic features such as acne or hirsutism.

Conclusion: The prevalence of abnormal GTT in the population studied was 17%. As there are no specific indicators to differentiate the women at risk of abnormal glycaemic status, it is wiser not to limit screening to any subset population of PCOS.

Key Words: PCOS, GTT abnormalities, metabolic syndrome

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Introduction

Polycystic ovarian syndrome (PCOS) is the commonest cause of anovulation and subfertily[1]. Women with PCOS have higher risk of metabolic syndrome and metabolic derangements like diabetes in the long term[2]. As most women present to a fertility specialist in their reproductive years, it is important to know the prevalence of pre diabetes and diabetes in this population to direct counseling at changing life styles which helps in decreasing the severity or delaying the onset of diabetes mellitus and cardiovascular complications[3]. WHO in 2008 estimated the prevalence of elevated fasting glucose /those on treatment to be between 10-12.4% in Indian population[4].

Methodology

Aim :To estimate the prevalence of GTT abnormalities in PCOS women attending the fertility clinic.

Study design: Retrospective cohort study.

Setting: Reproductive medicine unit outpatient clinic in a tertiary care teaching hospital.

Study population: Women attending the outpatient department for fertility concern.

Inclusion criteria: Women diagnosed as PCOS according to Rotterdam criteria[5]. Rotterdam criteria being 1.oligo/anovulation 2.clinical or biochemical hyper androgenism(clinical hyper androgenism defined by Ferriman Gallway scoring system and a score of more than 6-8 is considered as clinical hyper androgenism) 3.Ultrasound features of polycystic pattern in one or both ovaries. (polycystic pattern is defined as more than 12 follicles of less than 10 mm diameter and ovarian volume of ≥ 10cm)[5].

Exclusion criteria

Women with other causes of anovulation like

1. Thyroid, prolactin abnormalities
2. Premature ovarian failure.

Others

3. Women diagnosed to be a diabetic.
4. Women on metformin.

Women were categorized as PCOS based on Rotterdam Criteria. Thyroid and prolactin levels were done to rule out other causes of oligo/anovulation. Women eligible for the study were subjected to a 75 grams glucose challenge with overnight fasting. Sampling of venous blood and urine were done at fasting state and 60 minutes and 120 minutes of glucose challenge. Dipstix method was used to assess glycosuria and Hexokinase method for venous plasma glucose estimation.

Women were categorized as euglycaemic, impaired GTT or Diabetes mellitus according to WHO criteria (1999) [4&6] (Table 1).

Table 1-Reference Range: WHO 1999 (Venous plasma)

Classification	Fasting values	2hrs
Normal	<6mmol/L (80 - 110 mg/dL)	<7.8mmol/L (<140mg/dL)
Diabetes mellitus	>7mmol/L and/or (>126 mg/dL))	>11 mmol/L (≥ 200 mg/dL)
Impaired GTT	>6.1 mmol <7 mmol/L (111—125 mg/dL)	7.8-11mmol/L (140 - 200 mg/dL)

Statistical analysis

Descriptive analysis of explanatory variables like age, menstrual cycle, body mass index, family history, acne, hirsutism and hypothyroidism and outcome parameters were done. The statistical significance of the differences and 95% CI were assessed by using x^2 test, Mann Whitney U test and Kruskal Wallis Test as appropriate. IBM SPSS statistics, version 21 was used for the analysis[7].

Results

Two year case records and reports between the period September 2007 - August 2009 were searched and relevant data were entered and analyzed. One hundred and forty nine women were eligible for data analysis. 63.09% of women were less than 30 years of age (Table -2), 47.30% were in normal Body Mass Index group (Table-3). Family history of diabetes was present in 42.28% of population studied, 65.10% had minimal hirsuitism and 16.78% had associated hypothyroidism.

Table 2: Age distribution

Age	Count	%
20-25	23	15.44
25-30	71	47.65
30-35	42	28.19
35-40	13	8.72

Table 3 : BMI distribution

BMI	Count	%
18-25	70	47.30
26-29	43	29.05
30-35	31	20.95
> 35	4	2.70

125 women (83.8%) had normal GTT, impaired GTT was seen in 14.09% of women (21/149), whereas 2.01% of the study population (3/149) had Type 2 Diabetes. (Table-4)

Table 4 : GTT results in the study group

GTT	No.	%
Normal	125	83.89
Impaired GTT	21	14.09
Type 2 DM	3	2.01

Most of the women with impaired GTT(85.61%)were in the age group more than 25 yrs, but nearly half of them(42.86%) were of normal BMI. Whereas, all the type 2 DM were in overweight or obese category. Family history of diabetes was present only in 38.1% of women with impaired GTT and 33.33% of type 2 DM. There was no significant difference in distribution of variables viz. age, BMI, presence of family history of DM, features of clinical hyperandrogenism between women with normal GTT and those with impaired GTT (Table-5).

Descriptive analysis of the variables affecting outcome did not show any difference between the three categories.

Discussion

Impaired glucose tolerance and diabetes increases the long term morbidity and it indirectly influences the expenditure on health, loss of working hours and the money spent on health care by the state. Early diagnosis and defining risk factors are essential. As the prevalence is likely to vary between people of different ethnicity, it is vital to assess the prevalence in each population.

The impaired GTT was seen in 14.09% and type2 DM in 2.01% in our population. This concurs with a study on PCOS subjects of similar ethnicity done in Tamil Nadu[8]. In this the reported incidence of impaired GTT was 11.7% and DM was seen in 5.8%.The above mentioned study defined age more than 25 yrs and central obesity as high risk factors for metabolic syndrome Our study did not show any significant difference between the groups with GTT abnormalities and normal GTT, considering age and BMI distribution, presence of family history of type2 DM and presence or absence of clinical hyper androgenism.

GTT is considered invasive, time consuming and causes inconvenience to patients compared to the estimation of fasting, post prandial blood glucose and HbA1C assessment. This issue was addressed by a prospective controlled study done on 252 Turkish PCOS women[9] where GTT was found to be a better method to assess Glucose intolerance compared to HbA1C as the HbA1C cut off of 5.6% missed the glucose intolerance in 50% of the PCOS subjects. It is important to note that the prevalence showed was similar. The study population had IGT in 14.3% and Type2 DM in 2%. Contrary to our data age, BMI were significantly higher in PCOS women with GTT impairment.

Though the South Asian population is considered to have increased preponderance to impaired glucose metabolism (ESHRE/ASRM[10]) here the prevalence in our population was much lower than the American study. In the American study by Legro et al[11] on different American ethnic population, the prevalence of IGT was 31.1% of IGT and 7.5% of DM. This is high compared to our group. But the mean BMI of 29.9±8.1 to 35.9+-8 was much higher in the American group.

The obvious limitation of our study was the small sample size.

Table 5 : Analysis of variables

		GTT						Kruskal Wallis Test	
		Normal		Impaired		Type 2-Diabetes			
		Count	%	Count	%	Count	%	Chi-Square Value	Sig.
Age	20-25	19	15.20	3	14.29	1	33.33	4.419	.110
	25-30	63	50.40	6	28.57	2	66.67		
	30-35	33	26.40	9	42.86	0	.00		
	35-40	10	8.00	3	14.29	0	.00		
BMI	18-24	61	49.19	9	42.86	0	.00	3.667	.160
	25-29	35	28.23	7	33.33	1	33.33		
	30-35	25	20.16	4	19.05	2	66.67		
	> 35	3	2.42	1	4.76	0	.00		
Menstural Cycle	Regular	59	47.20	8	38.10	0	.00	3.083	.214
	Irregular	66	52.80	13	61.90	3	100.00		
Family history	Yes	54	43.20	8	38.10	1	33.33	.290	.865
	No	71	56.80	13	61.90	2	66.67		
Acne	Yes	12	9.60	0	.00	1	33.33	4.379	.112
	No	113	90.40	21	100.00	2	66.67		
Hirsutism	Yes	80	64.00	14	66.67	3	100.00	1.686	.430
	No	45	36.00	7	33.33	0	.00		
Galactorrhea	No	119	95.20	20	95.24	3	100.00	.150	.928
	Yes	6	4.80	1	4.76	0	.00		
Hypothyroid	Yes	17	13.60	6	28.57	2	66.67	8.287	.016
	No	108	86.40	15	71.43	1	33.33		

Conclusion

PCOS is known to be associated with metabolic derangements which have far reaching consequences in life. Our study revealed a prevalence of GTT abnormality of 16% in PCOS women of reproductive age group. Though the prevalence is less compared to the other studies done in Sri Lanka, Asia and America[12-15], considering the population in India, our absolute number of women with impaired glucose tolerance and type2 DM is expected to be high. As there are no variables in our study to restrict screening to particular group of PCOS women, it is recommended that every PCOS women be offered GTT to rule out abnormal glucose metabolism in them.

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Authors declare no conflict of interest.

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Carb Is Better, When Eaten Later!

Obese individuals with type 2 diabetes should maintain their blood sugar levels as close to normal as possible, after a meal, in order to forestall the development of complications. This is definitely dependent on what they eat. But what is not clear is whether it is also related to the order in which the various nutrients are consumed. In a new study reported in Diabetes Care, the researchers have tried to answer this. The study was carried out on obese diabetics of both sexes. It was found that when the participants ate vegetables and proteins before eating carbohydrates, their blood sugar levels were about 29 percent lower 30 minutes after starting the meal than when they ate carbohydrates first. The same pattern was noted after 60 and 120 minutes. Apparently, vegetables and proteins render carbohydrates less glycemic by delaying their absorption. The study suggests that diabetics need not completely avoid carbohydrates; but they have to remember to eat it after the salads and proteins (http://care.diabetesjournals.org/content/38/7/e98.full)

- Dr. K. Ramesh Rao