

To study O'Sullivan results in relation to baseline variables

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Abstract

Introduction: Aim of study is to test O'Sullivan test for screening of GDM as per "National guidelines for diagnosis and management of GDM" and to study the association between high risk factors and occurrence of abnormal O'Sullivan results.

Materials and Methods: 75 gm of oral glucose ingestion by pregnant women at the time of registration irrespective of fasting status (O'Sullivan test) and measuring blood sugar level after 2 hours.

Results: Total 500 subjects were divided into various groups with respect to their baseline variables e.g. Age group, parity, BMI, history of adverse event in previous pregnancy, mean arterial pressure, family history of DM., 57.15% subjects with age >30 years, 46.3% multipara, 4.9% with BMI >30, 14.4% with adverse event in previous pregnancy, 7.3% with MAP >90 mmHg and 2.5% subjects with family history of DM had abnormal O'Sullivan test results and high risk factors were present in only 4.8% subjects with normal O'Sullivan results as compared to 30.5% subjects with abnormal O'Sullivan results.

Conclusion: More abnormal O'Sullivan results were found in pregnant women age >30 years, BMI >30, positive history of adverse event in previous pregnancy, MAP > 90 mmHg, and Presence of family history of DM. Universal screening of all pregnant women is justified regardless of high risk factors.

Keywords: GDM, O'Sullivan test, MAP, BMI.

Introduction

Gestational diabetes mellitus (GDM) is defined as "Glucose Intolerance with onset or first recognition during pregnancy". There is inadequate secretion of insulin or ineffectiveness of insulin action leading to abnormal metabolism of carbohydrate, fat, and protein.¹ Undiagnosed GDM or inadequately treated GDM can lead to significant maternal and fetal complications. For mother, gestational diabetes increases the risk of pre-eclampsia, cesarean delivery. In the fetus or neonate the disorder is associated with higher rates of perinatal mortality, macrosomia, birth trauma hyperbilirubinemia, and neonatal hypoglycaemia.² Women with GDM and their offsprings are at increased risk of developing type 2 diabetes in later life. Gestational diabetes mellitus affects 7% of all pregnancies resulting in >2,00,000 cases per year in USA depending on population sample and diagnostic criteria. The prevalence may range from 1-14%. In India, rates of GDM are estimated to be 10- 14.3% which is much higher than in west. O'Sullivan test is used for universal screening for GDM recommended by Government of India.^{1,3,4} The present study is to test O'Sullivan test for screening of GDM and to study the association between high risk factors and occurrence of abnormal O'Sullivan results.

Materials and Methods

500 pregnant women attending antenatal OPD irrespective of their gestational age were enrolled in our study. Known diabetic pregnant women and pregnant women with history of gestational diabetes mellitus

(GDM) in previous pregnancy were excluded. After a routine history taking and examination (general, vitals, systemic and obstetric) as per our antenatal clinic protocol, counseling regarding need for screening for GDM was done and consent was obtained for enrollment in the study. 75gms glucose was dissolved in 300mL water and administered orally over 5 minutes for O'Sullivan test irrespective of the fasting status (as per National guidelines for diagnosis and management of gestational diabetes mellitus of Government of India, December 2014). A standardized calibrated glucometer was used to measure blood glucose two hours after oral glucose ingestion. If vomiting occurred within 30 minutes of oral glucose intake, the test was repeated the next day; while if vomiting occurred after 30 minutes, the test was continued. Subjects with O'Sullivan level \geq 140 mg% were subjected to 100 gm 3 hour oral glucose tolerance (OGTT) test.

Results

We categorized our subjects into "Low risk" and "High risk group". The enrolled subjects were considered "high risk" if one or more of the following were present:

1. Age \geq 30 years
2. Mean Arterial Pressure > 90 mm Hg at booking
3. Body Mass Index > 30
4. Diabetes Mellitus in first degree relatives
5. Previous stillbirth, abortion, intrauterine fetal death
6. Past history of pre-eclampsia

In our study subjects with O'Sullivan test results value more than 140 mg/dl was labelled as "abnormal" while others with O'Sullivan test results value less than 140 mg/dl were considered as normal.

The subjects with normal O'Sullivan test results are follow up regularly according to normal ANC protocol, while subjects with abnormal O'Sullivan test results requires other investigation like Oral glucose tolerance test (OGTT) to confirm the diagnosis along with normal ANC care.

All subjects were closely followed-up during the antenatal period to detect development of Pre-eclampsia, polyhydramnios, fetal growth abnormalities and to assess fetal wellbeing. Subjects requiring delivery before 36 weeks of gestation were provided antenatal steroids as per Government of India (GOI) guidelines.

The results of O'Sullivan's tests are presented below:

Table 1: Result of O'Sullivan's test

O'Sullivan Test Result	No. of Participants (n=500)
Abnormal	82 (16.4%)
Normal	418 (83.6%)

Table 2: Baseline variables with respect to O' Sullivan results

Variables	Normal O'Sullivan test (n=418)	Abnormal O'Sullivan test (n=82)	p-value
Age group (n=500) (years)			
<20 (n=128)	110(85.94%)	18(14.06%)	0.41
21-25(n=255)	212(83.14%)	43(16.86%)	
26-30(n=110)	93(84.55%)	17(15.45%)	
>30(n=7)	3(42.85%)	4(57.15%)	
Parity (n=500)			
Nullipara(n=137)	124(90.51%)	13(9.49%)	<0.01
Primipara(n=196)	165(84.18%)	31(15.82%)	
Multipara(n=167)	129(77.25%)	38(22.75%)	
BMI(n=500) (kg/m²)			
<18(n=15)	13(86.67%)	2(13.33%)	0.01
18-25(n=406)	349(85.96%)	57(14.04%)	
25-30(n=73)	54(74.0%)	19(26.0%)	
>30(n=6)	2(33.33%)	4(66.67%)	
History of adverse event in previous pregnancy (n=363)			
Absent(n=348)	289(83.05%)	59(16.95%)	<0.01
Present(n=15)	5(33.33%)	10(66.67%)	
Abortion(n=4)	1(25%)	3(75%)	
IUFD(n=2)	1(50%)	1(50%)	
Preeclampsia(n=)	2(33.33%)	4(66.67%)	
Macrosomia(n=2)	1(33.33%)	2(66.67%)	
Mean Arterial Pressure at enrolment (n=500)(mmHg)			
70-80(n=467)	401(85.87%)	66(14.13%)	
81-90(n=21)	11(52.38%)	10(47.62%)	
Family history of DM (n=500)			
Present(n=4)	2(50%)	2(50%)	0.1
Absent(n=496)	416(83.87%)	80(16.13%)	

1. Abnormal O'Sullivan results were noted in 14-16% subjects in the age group of 18-30 years versus 57.15% subjects above 30 years of age. This

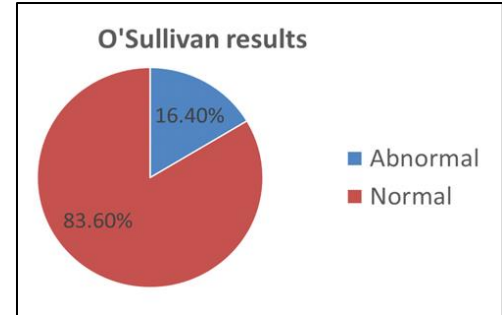


Fig. 1

Out of total 500 subjects 82 (16.4%) had abnormal O'Sullivan test results while 418 (83.6%) subjects had normal O'Sullivan test results.

Discussion

Baseline variable with respect to O'Sullivan results are presented below:

difference was seen to be statistically significant (p value-0.01).

2. The age distribution of subjects with normal and abnormal O'Sullivan results was almost similar except subjects above 30 years of age accounted for 0.7% of those with normal O'Sullivan results as compared to 4.9% of those with abnormal O'Sullivan results. This difference was statistically significant (p value-<0.01).
 3. 9.49% nullipara, 15.8% primipara and 22.75% multipara had abnormal O'Sullivan test results.
 4. The difference in abnormal test results between multipara and primipara was statistically significant (p-value<0.01).
 5. 15.9% of our subjects with abnormal O'Sullivan results were nulliparous as compared to 29.7% those with normal O'Sullivan results and this difference was statistically significant(p value-0.02).
 6. Abnormal O'Sullivan test results were seen in 13.3%, 14.04%, 26.0% and 66.7% subjects with BMI less than18,18-25,25-30 and more than 30 respectively.
 7. The probability of abnormal O Sullivan results with BMI>30 was highly statistically significant (p-value <0.001), while that for BMI between 25 to 30 was also significant (p-value-0.01).
 8. Majority of the subjects in both groups (normal and abnormal O'Sullivan results) had average BMI of 18-25. Only 0.5% subjects in normal O'Sullivan group had BMI more than 30 as compared to 4.9% in the abnormal O'Sullivan result group and this difference was statistically significant. (p value <0.01).
 9. 75% subjects with past history of abortion, 50% with past history of IUFD, 66.7% with past history of pre-eclampsia and 66.67% subjects with past history of macrosomia had abnormal O'Sullivan test results.
 10. Overall subjects with history of adverse event in previous pregnancy were noticed to have higher probability of abnormal O'Sullivan result (p value-<0.001) as compared to those without an adverse event in past.
 11. Only 1.7% of subjects with normal O'Sullivan results had history of adverse event in previous pregnancy as compared to 14.4% of those with abnormal O'Sullivan results and this difference was statistically highly significant (p value-<0.01).
 12. 50% subjects with MAP more than 90 mmHg at enrollment had abnormal O'Sullivan test results as compared to 14.13% of those with MAP less than 80 mmHg and this difference was statistically highly significant (p value- <0.001).
 13. Subjects with MAP > 90 mmHg accounted for 7.3% of those with abnormal O'Sullivan results as compared to 1.4% those with normal O'Sullivan results and this difference was statistically not significant (p value- 0.07).
 14. Out of 500 subjects, only 4 subjects had family history of diabetes mellitus of which two (50%) had abnormal O'Sullivan test results.
 15. 50% subjects with family history of DM had abnormal O'Sullivan results as compared to 16% those without family history of DM and this difference was statistically highly significant (p value- <0.001).
 16. Subjects with family history of DM accounted for 2.5% had abnormal O'Sullivan test results as compared to 0.5% of those with normal O'Sullivan test results and this difference was statistically not significant(p value-0.5).
- Age more than 30 years, BMI more than 30, multiparity, adverse event in previous pregnancy Mean Arterial Pressure (MAP) more than 90 mmHg, presence of family history of DM were considered "high risk factors".

Table 3: O'Sullivan results with respect to high risk factors

Risk factors at enrolment (n=500)	O'Sullivan results	
	Normal	Abnormal
Present (n=45)	20 (4.8%)	25 (30.5%)
Absent (n=455)	398 (95.2%)	57 (69.5%)

O'Sullivan results with respect to high risk factors is presented below as Fig. 2:

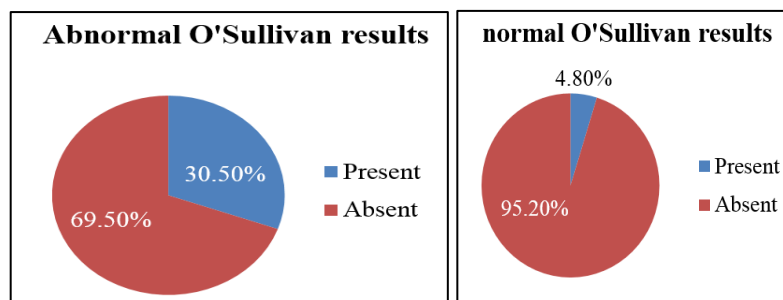


Fig. 2

1. This figure shows that amongst the subjects with normal O'Sullivan test results only 4.8% had high risk factors while 95.2% had no high risk factor during past and present pregnancy.
2. High risk factors were present in only 4.8% subjects with normal O'Sullivan results as compared to 30.5% subjects with abnormal O'Sullivan results which is statistically highly significant. (p value-< 0.001).
3. Amongst the subjects with abnormal O'Sullivan results 30.5% had high risk factor at the time of enrollment while 69.5% subjects had no high risk factors at the time of enrollment, so universal screening for GDM irrespective of high risk factors is justified because if only high risk subjects are screened, then large number of subjects with no risk factors are missed
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Conclusion

1. More abnormal O'Sullivan results were found in pregnant women age >30 years, BMI >30, multipara, Positive history of adverse event in previous pregnancy, MAP > 90 mmHg, and Presence of family history of DM.
2. Universal screening of all pregnant women is justified regardless of high risk factors.

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