METABOLIC SYNDROME IN PREGNANT FEMALES PRESENTING IN A TERTIARY CARE HOSPITAL AND ITS IMPACT ON PRE-TERM DELIVERY

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ABSTRACT

Objective: To find the association of preterm delivery with metabolic syndrome in females presenting in a tertiary care hospital.

Study Design: Cohort study.

Place and Duration of Study: Department of Obstetrics & Gynecology, Combined Military Hospital Kharian, from May 2020 to Oct 2020.

Methodology: A total of 150 females fulfilling inclusion criteria were enrolled in the study which were divided into two equal groups 'A' and 'B'. Group 'A' was with metabolic syndrome and group 'B' without it. These females were followed in OPD till active labor, assessed and followed till delivery of fetus. If delivery occurred before 37 weeks, then preterm delivery was labeled. All this information was recorded on a pre-designed proforma.

Results: The risk for preterm delivery was 2.18 times higher in group 'A' as compared to group 'B'. (Relative Risk = 2.18, CI (95%) 1.1529 - 4.12).

Conclusion: There is a strong association of preterm delivery with metabolic syndrome in females.

Keywords: Cardiometabolic risk factors, Hypertension, Insulin resistance, Metabolic syndrome, Obesity, Preterm delivery.

INTRODUCTION

The ultimate scope and goal of normally functioning female reproductive system is considered to be fertility and human race perpetuation. This goal cannot be achieved without energy homeostasis as they are closely linked to each other. A female`s physiology is subjected to significant alterations due to very important events throughout the life marked by puberty, pregnancy and menopause. These events markedly effect and alter not only the phenomenon of energy homeostasis but also the levels of gonadal steroids. These metabolic alterations ultimately lead to increased body fat as well as insulin resistance and these changes are considered an important component of a disorder named as metabolic syndrome[1].

Metabolic syndrome is characterized by the presence of significant metabolic risk factors[2]. It is important to identify this syndrome because it is associated with serious sequel like a 5-fold and 2-fold increased risk of diabetes and cardiovascular diseases respectively over 5–10 years period[3]. Due to these facts, this syndrome has now been recognized as a growing global health issue[4]. In an obstetric population preterm delivery is highly influenced by presence of metabolic abnormalities[5]. Preterm birth is associated with features of the metabolic syndrome later in life[6].

National Heart, Lung, and Blood Institute and the American Heart Association revised the guidelines in order to diagnose the metabolic syndrome[7]. Current criterion necessitates the presence of at least 3 of the following 5 conditions: Known diabetic on treatment or fasting blood sugar level of ≥100 mg/dL at presentation, known hypertensive on treatment or blood pressure ≥130/85 mm Hg at presentation, known patient of hypertriglyceridemia on treatment or triglycerides ≥150 mg/dL at presentation, receiving drug therapy for reduced HDL-C or HDL-C levels of <40 mg/dL in men or <50 mg/dL in women at presentation and obesity characterized by either waist circumference of ≥88 cm (35 inches) in women or body mass index BMI >30 kg/m^2.

These biochemical markers are helpful not only to diagnose but also predict the clinical outcomes. Metabolic syndrome, now being a global health issue, has been recognized as a highly prevalent problem in many countries of the world. Although its prevalence is almost same both in men (24%) and women (22%) but several features are unique to women with this disorder in reproductive age like pregnancy, polycystic ovarian syndrome and use of oral contraceptives[8]. Moreover, its prevalence is also following a rising trend in women of child bearing age[9]. In postmeno-

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pausal women, association between metabolic syndrome and breast cancer has also been recognized.

In the diagnostic workup of metabolic syndrome, a detailed family history is of paramount importance as role of genes has been accepted in its causation although to date no specific gene or group of genes has been identified consistently which suggests that environmental factors may also have a role[10].

The rationale of this study was to find out the association of preterm delivery with metabolic syndrome in females presenting in a tertiary care hospital. Literature showed that there are significantly higher chances of preterm delivery in pregnant females with metabolic syndrome as compared to normal females. However controversial results have been obtained from literature and the reported magnitudes are outdated. Moreover, there was no local data available in this regard, which can help us in determining the extent of problem in local population. So, we wanted to conduct this study in local population to get local updated evidence and guide the pregnant females regarding preterm delivery if they have metabolic syndrome and give the special care and prevention strategy for preterm delivery in females having metabolic syndrome. This will help a great deal to improve our daily practices and prevent females from adverse pregnancy outcomes associated with preterm delivery.

METHODOLOGY

It was a cohort study conducted at department of Obstetrics & Gynecology, Combined Military Hospital Kharian, from May to Oct 2020. Approval from institutional ethical committee was obtained. Sample size of 150 cases; 75 in each group is calculated with 80% power of test, 5% level of significance and taking expected percentage of preterm delivery i.e. 27.3% in females with metabolic syndrome and 11.3% in females without metabolic syndrome. A total of 150 cases were included in the study through non probability consecutive sampling with 75 patients in each group. Group 'A' was with metabolic syndrome and group 'B' was without it. Females of age 18-40 years, parity <4 and gestational age >28 weeks (according to LMP) were included in the study. Pregnancy with any medical disorder such as documented cardiac issue, renal problem (creatinine >1.2mg/dl) or anemia (Hb <10mg/dl) were not included in the study. Multiple gestation confirmed by ultrasound was also excluded from study. After obtaining written informed consent, detailed history was taken followed by clinical examination including vital signs. Demographic information, gestational age, parity and BMI were recorded. Afterwards patients were divided into two equal groups 'A' and 'B'. Patients were then kept on regular follow up in OPD till development of active labour. They were advised to present in case active labour starts i.e. PV leaking, labour pain >2 in 10 minutes. They were assessed and followed till delivery of fetus. If delivery occurred before 37 weeks, then preterm delivery was labelled. All this information was recorded on a specially designed proforma.

Data was entered and analyzed through SPSS-21. The quantitative data like age, BMI, gestational age at presentation and gestational age at delivery were presented as mean and Standard Deviation. Parity was presented as frequency and percentage. Relative Risk (RR) was calculated by using 2x2 contingency table to measure association between preterm delivery and metabolic syndrome. RR>1 was considered as significant.

RESULTS

In group 'A', the mean age of the patient was 28.90 ± 5.29 years whereas in group 'B' the mean age was 28.45 ± 5.16 years. In group 'A', there were 33 (44%) para 1, 24 (32%) para 2 and 18 (24%) para 3 women while in group 'B' there were 26 (34.7%) para 1, 26 (34.7%) para 2 and 23 (30.7%) para 3 women. In group 'A' 27 (36%) patients had normal BMI, 30 (40%) were overweight and 18 (25%) were obese. In group 'B', the figures were found to be 30 (40%), 26 (34.7%) and 19 (25.3%) respectively. In group 'A', the mean gestational age was 32.82 ± 1.98 weeks whereas in group 'B' the mean gestational age was 33.41 ± 1.53 weeks (table-I).

In group 'A', the risk for preterm delivery was 2.18 times higher than in group 'B'. (RR = 2.18 CI (95%) 1.1529 - 4.12) (table-II).

The risk for preterm delivery in the age group of 20-26 years was 1.53 times higher in group 'A' as compared to group 'B', in the age group of 27-33 years risk was 6.47 times higher in group 'A' as compared to group 'B' and in the age group of 34-40 years risk was 1.69 times higher in group 'A' as compared to group 'B'. The relative risk for preterm delivery in the gestational age group of 28-30 weeks was 0.083 which showed that there was no difference in risk between two groups. In the gestational age group of 31-33 weeks this risk was 1.2 times higher in group 'A" as compared to group 'B'. whereas in the gestational age group of 34-36 weeks risk was 1.75 times higher in group 'A' as compared to group 'B'. The risk for preterm delivery among para 1 was 2.39 times higher in

group 'A' as compared to group 'B', in para 2 women this risk was 4.94 times higher in group 'A' as compared to group 'B' whereas in multiparous women risk was 2.29 times higher in group 'A' as compared to group 'B'. The risk for preterm delivery among normal BMI women was 2.20 times higher in group 'A' as compared to group 'B', in overweight women this risk was 1.48 times higher in group 'A' as compared to group 'B" whereas in obese women risk was 4.81 times higher in group 'A' as compared to group 'B' (table-III).

Table-I: Demographics of females in both groups.

	Metabolic Syndrome	
	Exposed	**Unexposed**
n	75	75
Mean	28.90 ± 5.29	28.45 ± 5.16
Parity		
1	33 (44%)	26 (34.7%)
2	24 (32%)	26 (34.7%)
Body Mass Index		
Normal	27 (36%)	30 (40%)
Overweight	30 (40%)	26 (34.7%)
Obese	18 (24%)	19 (25.3%)
Gestational Age	32.82 ± 1.98	33.41 ± 1.53

Table-II: Association of preterm delivery with metabolic syndrome.

		Metabolic Syndrome		Total
		Exposed	**Unexposed**	
Preterm Delivery	Yes	24 (32%)	11 (14.7%)	35
	No	51 (68%)	64 (85.3%)	115
Total		75	75	150

Table-III: Association of preterm delivery with metabolic syndrome stratified for confounders.

Age	**Preterm Delivery**	**Metabolic Syndrome**		**RR**	**CI (95%)**
		Exposed (%)	**Unexposed (%)**		
20-26 years	Yes	7 (25)	5 (17.9)	1.533	0.422-5.57
	No	21 (75)	23 (82.1)		
27-33 years	Yes	11 (39.3)	3 (9.1)	6.471	1.582-26.46
	No	17 (60.7)	30 (90.9)		
34-40 years	Yes	6 (31.6)	3 (21.4)	1.692	0.341-8.39
	No	13 (68.4)	11 (78.6)		
Gestational Age					
28-30	Yes	11 (100)	1 (20)	0.083	0.013-0.544
	No	-	4 (80)		
31-33	Yes	13 (41.9)	7 (30.4)	1.2	0.53-5.16
	No	18 (58.1)	16 (69.6)		
34-36	Yes	-	3 (6.4)	1.75	1.44-2.12
	No	33 (100)	44 (93.6)		
Parity					
1	Yes	10 (30.3)	4 (15.4)	2.391	0.65-8.76
	No	23 (69.7)	22 (84.6)		
2	Yes	7 (29.2)	2 (7.7)	4.941	0.91-26.7
	No	17 (70.8)	24 (92.3)		
3	Yes	7 (38.9)	5 (21.7)	2.291	0.58-9.02
	No	11 (61.1)	18 (78.3)		
Body Mass Index					
Normal	Yes	2 (7.4)	-	2.20	1.647-2.93
	No	25 (92.6)	30 (100)		
Over-Weight	Yes	8 (26.7)	3 (11.5)	1.48	0.93-2.37
	No	22 (73.3)	23 (88.5)		
Obesity	Yes	14 (77.8)	8 (42.1)	4.81	1.14-20.24
	No	4 (22.2)	11 (57.9)		

Relative Risk = 2.18 (95% confidence interval: 1.1529 - 4.1289)

DISCUSSION

In physical examination, elevated blood pressure and abdominal obesity/waist circumference are important screening tools. High risk patients should be subjected to lifestyle modifications like changes in diet and regular exercise[11]. Cause of preterm or premature birth (birth of a baby at less than 37 weeks gestational age) is often not known but it remains the most common cause of death among infants worldwide[12]. However, its identified risk factors include hypertension, diabetes, multiple gestation, underweight, obesity, tobacco smoking, vaginal infections, and psychological stress[13].

Metabolic syndrome is an entity with a group of clinical and biochemical disorders. Although its individual features are already well understood but as a syndrome it is now also being recognized widely in clinical settings that has definitely led to adapting a better patient management plan. But, at the same time, the exact underlying pathophysiology of the syndrome is unclear[14]. A study was conducted in 2009 by Chatzi *et al* which concluded that metabolic syndrome can be recognized in pregnant women even before 15th weeks of gestation in women with singleton pregnancies without preeclampsia who gave birth to preterm infants as compared to women with term births[15]. Findings of another study by Grieger *et al* 2018 suggested that metabolic syndrome diagnosed in early pregnancy may be used to broadly identify women at increased risk for pregnancy complications including pre term labour[16].

Gunderson *et al* conducted a study in America, revealed that women who had previous preterm birth were at a higher risk of developing metabolic syndrome even decades after delivery as compared to those with term births. In addition to that, childbearing itself has been linked to a high risk of developing metabolic syndrome[17].

Deranged clinical and metabolic markers in pregnancy like raised lipids, modestly elevated blood pressure and pro-inflammatory markers are highly indicative of preterm delivery. Mudd *et al*, conducted another study in 2009, that females who were found to have these derangements before index pregnancy had

threefold higher risk of preterm delivery and these findings are very much consistent with ours which turned out to be 2.18 times compared to those without metabolic syndrome[18].

Catov *et al* conducted another study in 2016 which proved that deranged metabolic profile is not only present during pregnancy but evidence of this derangement is found even 8 years after preterm delivery[19]. In our study, we did not follow the patients for long so we could not define this feature of metabolic syndrome. Later on, Pariente *et al* conducted the study in 2017, demonstrated the relationship between presence of metabolic syndrome and age of the patient. It was found that most affected group was that of the young women and it is consistent with our findings in which age group of 27-33 years old women was most affected[20].

However, Kuk *et al* in 2010 found the association between obesity and presence of metabolic syndrome and the results were supportive of our findings which also showed that the risk of preterm delivery was 4.81 times higher due to metabolic syndrome in obese women[21].

CONCLUSION

It can be concluded that preterm delivery and metabolic syndrome are indicative of mutual existence as the presence of either of these marks the women at increased risk of the metabolic syndrome or preterm delivery. So, it can be concluded that early recognition of the metabolic derangements indicating metabolic syndrome is of paramount importance to avoid the sequele of preterm delivery and resultantly preventing a major cause of neonatal mortality.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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