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METABOLIC SYNDROME AND ITS RISK FACTORS IN PREECLAMPTIC WOMAN: A COMPARATIVE STUDY FROM TERTIARY CARE HOSPITAL PAKISTAN.

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ABSTRACT… Objectives: To determine the frequency of metabolic syndrome in pregnant patients with preeclampsia as compared to normal pregnancies. **Setting:** Gynae and Obstetrics Department Liaquat University of Medical and Health Sciences Jamshoro. **Period:** Six months, from 29 march 2015 to 29 September 2015. **Study Design:** Comparative cross sectional Study. **Materials and Methods:** One hundred and twenty antenatal and laboring women were included in this study in which sixty were preeclamptic women (case) and 60 normal women taken as control Groups. A Predesigned questionnaire was used to record anthropometric measurements, relevant history and clinical examination. Blood specimen was taken for analysis. **Results:** Rate of metabolic syndrome was four times (approximate of 3.4) more likely in preeclamptic groups as compare to normal women (control) [OR=3.5; 95%CI: 1.56 to 7.87]. **Conclusion:** In this study prevalence of metabolic syndrome was high in preeclamptic pregnant women as compare to normal. These cases have high risk for cardiovascular and metabolic diseases in later life. Interventions could be done to prevent these complications.

Key words: Cardiovascular Disorders, Metabolic Syndrome, Preeclampsia.

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INTRODUCTION

Metabolic syndrome (MS) is defined as presence of at least three features: (i) BP ≥130/85 mmHg or treated hypertension (ii) serum TG ≥ 150 mg/dL (iii) HDL cholesterol of <40 mg/dL in males and <50 mg/dL among females (iv) fasting blood sugar ≥100 mg/dL or previously type 2 DM (v) central obesity, WC >90 cm among males and >80cm among females.[1] Metabolic syndrome has an positive association with preeclampsia and eclampsia[2,3,4,5] Preeclampsia and cardiovascular events has significantly role in metabolic syndrome, stroke and maternal morbidity and mortality.[6,7,8] The Literature observed metabolic syndrome in preeclamptic women as 4.1%.[9] Pregnancy with MS can lead to worsened hyperglycemia and hypertension which may have serious consequences for the growing baby and mother.[10] Although lot of work has been done to stress the link between preeclampsia, metabolic syndrome and cardiovascular diseases, but majority of it is contributed from the western part of world. The data published from our part of world is very scarce. The prevalence of obesity and insulin resistance is becoming a problem of developing countries[11], hence the risk for development of metabolic syndrome may increases in the coming future. The rationale of current study was to detect population with metabolic syndrome with an objective to evaluate the metabolic syndrome (MS) in pregnant patients with preeclampsia as compared to normal pregnancies.

PATIENTS AND METHODS

The comparative cross sectional study of six months (from 29 March 2015 to 29 September 2015) was conducted in the department of Gynecology & Obstetrics LUMHS. The inclusion criteria of the study were (I) Cases: pregnant women irrespective of parity between 19-40 years of age with preeclampsia between 28-40 weeks of gestation as assessed by early scan and (II) Controls: pregnant women irrespective of parity between 19-40 years of age with normal blood

pressure (systolic 100-135) diastolic (60-85) between 28-40 weeks of gestation as assessed by early scan while the exclusion criteria of the study were (a) preeclampsia with multiple gestation (b) women with preexisting hypertension and cardiovascular disorders. Patients admitted through emergency room and antenatal clinic of Gynecology and Obstetrics department fulfilling inclusion criteria were included as cases while the 60 pregnant healthy women with uncomplicated pregnancy were selected by non probability consecutive sampling as controls. A pre designed proforma was used to collect information regarding, anthropometric measurements in terms of height, weight and BMI, abdominal obesity and blood specimen analysis was filled for cases and controls after thorough history, examination and relevant investigations. The potential source of bias like selection or observation was controlled by meeting the inclusion and exclusion criteria and standardization of measurement techniques. The confounding variables were controlled by restriction and stratification. A verbal informed consent was taken from the cases and controls after explaining the innocuous nature of the investigations being conducted.

The data analyzed in SPSS and the continuous variables age, gestational age, height, weight, BMI and parity expressed as mean and standard deviation while categorical variables like metabolic syndrome (outcome variable), tobacco use, exercise oral contraceptive use and family history (confounding variables) was presented as percentages. Differences among population were analyzed by chi-square and t-test. Restriction to inclusion and exclusion criteria and stratification was done with regard to confounding factors to see their effect on outcome variable.

RESULTS

One hundred and twenty antenatal and labouring women were included in this study in which sixty were preeclamptic women (case) and 60 normal women taken as control Groups. Age distribution of the women in both groups was almost same majority 42% and 55% were 26-30 years. The average age, gestational age, parity, height of the women were not significant between groups while weight and BMI of the women were significant between groups as presented in Table-I.

Regarding parity status of the women 37(30.8%) were nulliparous, 29(24.2%) primiparous, 41(34.2%) multiparous and 13(10.8%) were grand multiparous. Majority 34(56.6%) of case and 32(53.3%) control women were un-booked.

Comparison of different parameters of metabolic syndrome between cases and controls is presented in Table-II.

According to operational definition rate of metabolic syndrome was four times (approximate of 3.4) more likely in preeclamptic groups as compare to normal women (control) [OR=3.5; 95%CI: 1.56 to 7.87] as presented in Table-III.

Stratification analysis showed that metabolic syndrome was 2 time more likely in cases than controls for the age below and equal to 25 and 26 to 30 years of age women but not significant while it was significantly high in above 30 years of age women.

Metabolic syndrome was also not significant for nullipara, primipara and grand multipara while it was 30 times more likely in cases than control. Similarly metabolic syndrome were observed between groups with respect to smoking status, history of oral contraceptive use, dietary habits, history of hypertension, family history of PIH / preeclampsia and Family History of Cardiovascular Disorder as presented in Table-IV.

DISCUSSION

The incidence of pre-eclampsia is 2–8% and it can contribute to significant amount of maternal and neonatal disability and death.[12,13] The recurrence rates of preeclampsia reported from different parts of the globe is13-65%.[14] It has been suggested by recent reports that preeclampsia acts as a risk factor for metabolic syndrome and it predispose patients to cardiovascular disease and stroke.[15,16] The statistics for preeclampsia has variation within world, in present study frequency of metabolic syndrome in preeclamptic women was 46.7%.

Variables	Case n=60		Control n=60		P-Values
	Mean	SD	Mean	SD	
Age (Years)	29.07	5.19	27.63	3.60	0.08
Gestational Age (Weeks)	35.43	3.31	36.32	2.54	0.10
Parity	2.25	2.79	1.97	1.98	0.53
Height (cm)	155.73	8.44	154.63	4.84	0.38
Weight (kg)	65.03	12.59	60.37	2.93	0.006
BMI (kg/m^2)	27.15	6.71	25.37	1.31	0.046

Table-I. Demographic and anthropometric characteristics
***Chi-square test applied for each variable**

Variables	Case n=60	Control n=60	P-Values	OR	95%CI
Abdominal Obesity (BMI≥30kg/m^2)	24(40%)	1(1.7%)	0.0005*	39.33	5.1 to 303.36
Elevated Fasting Glucose (>100mg)	11(18.3%)	13(21.7%)	0.64	0.81	0.33 to 1.99
Elevated Triglycerides (>150mg/dl)	49(81.7%)	53(88.3%)	0.31	0.58	0.21 to 1.64
Decrease HDL (<50mg/dl)	18(30%)	32(53.3%)	0.01*	0.37	0.17 to 0.79

Table-II. Parameters of metabolic syndrome
***Chi-Square test applied for each variable**

Metabolic Syndrome	Case n=120	Control n=120	Total	P-Value	OR (95%CI)
Yes	28(46.7%)	12(20%)	40(33.3%)	0.002	3.50 (1.56 to 7.87)
No	32(53.3%)	48(80%)	80(66.7%)		

Table-III. Frequency of metabolic syndrome among pregnant patients with preeclampsia and normal pregnancy
***Chi-Square= 9.6 OR=Odd Ratio; CI: Confidence Interval**

The rate of metabolic syndrome was four times (approximate of 3.4) more in preeclamptic groups as compare to normal women (control) [OR=3.5; 95%CI: 1.56 to 7.87]. Our results are similar to different studies reported from literature,[17,18,19] but inconsistent with the results reported from Chinese women where they reported significantly lower rate of metabolic syndrome (7.1%).[20] In present study we have observed association among metabolic syndrome and preeclampsia. Several former literature has shown positive association as far as patho-physiology is concerned.[21,22] Obesity makes women susceptible to preeclampsia[23] the women with increased BMI and Preeclampsia are more prone for metabolic syndrome. Many studies show that overweight cause insulin resistance along with cardiovascular complications.[24-25] Former study[26] reported positive association among obesity and preeclampsia. When BMI is the highest the risk of severe preeclampsia is increased. There is directly proportional relationship between severity of preeclampsia and obesity[27]consistent with finding of present result. We indicated the significant relationship of raised BMI with preeclampsia and metabolic syndrome.

There are likewise a few studies that relate the segments of metabolic disorder as CHO intolerance and ↑TG & ↓ HDL with generation of preeclampsia which leads to metabolic syndrome in pregnant population.[28,29]

In pre-eclamptic pregnancy, dyslipidaemia and insulin resistance are more pronounced than in normal pregnancy.[30,31] Akhavan S et al had proved the role of dyslipidemia in preeclampsia and shown the disturbances in serum lipoproteins in preeclamptic population.[32]

	Metabolic Syndrome	Case n=120	Control n=120	P-Value	OR (95%CI)
Age in Groups					
≤25Years	Yes No Total	6(37.5%) 10(62.5%) 16	5(21.7%) 18(78.3%) 23	0.28	2.16 (0.52 to 0.89)
26 to 30 Years	Yes No Total	10(40%) 15(60%) 25	7(21.2%) 26(78.8%) 33	0.12	2.47 (0.77 to 7.8)
>30 Years	Yes No Total	12(63.2%) 7(36.8%) 19	0(0%) 4(100%) 4	0.02	NA†
Parity					
Nullipara	Yes No Total	3(14.3%) 18(85.7%) 21	2(12.5%) 14(87.5%) 16	0.99	1.16 (0.17 to 7.96)
Primipra	Yes No Total	7(46.7%) 8(53.3%) 15	5(35.7%) 9(64.3%) 14	0.55	1.57 (0.35 to 6.99)
Multi parity	Yes No Total	12(80%) 3(20%) 15	3(11.5%) 23(88.5%) 26	0.0005	30.66 (5.35 to 175.75)
Grand Multiparity	Yes No Total	6(66.7%) 3(33.3%) 9	2(50%) 2(50%) 4	0.99	2.0 (0.18 to 22.05)
History of Smoking					
Smoker	Yes No Total	6(100%) 0(0%) 6	1(25%) 3(75%) 4	0.03	NA†
Non Smoker	Yes No Total	22(40.7%) 32(59.3%) 54	11(19.6%) 45(81.4%) 56	0.022	0.57 (0.34 to 0.95)
History of Oral Contraceptive Use					
Yes	Yes No Total	4(57.1%) 3(42.9%) 7	0(0%) 7(100%) 7	0.07	NA
No	Yes No Total	24(45.3%) 29(54.7%) 53	12(22.6%) 41(77.4%) 53	0.014	1.609 (1.12 to 2.31)
Dietary Habit					
Vegetarian	Yes No Total	2(50%) 2(50%) 4	0(0%) 5(100%) 5	0.16	NA†
Non-Vegetarian	Yes No Total	26(46.4%) 30(53.6%) 56	12(21.8%) 43(78.2%) 55	0.006	1.66 (1.17 to 2.36)
Family History of Hypertension					
Yes	Yes No Total	16(48.5%) 17(51.5%) 33	03(14.3%) 18(85.7%) 21	0.01	5.64 (1.39 to 22.9)
No	Yes No Total	12(44.4%) 15(55.6%) 27	09(23.1%) 30(76.9%) 39	0.06	2.66 (0.92 to 7.7)

Family History of Preeclampsia/ PIH					
Yes	Yes No Total	1(33.3%) 2(66.7%) 3	0(0%) 5(100%) 5	0.37	NA
No	Yes No Total	27(47.4%) 30(52.6%) 57	12(21.8%) 43(78.2%) 55	0.005	1.68 (1.19 to 2.37)
Family History of Cardiovascular Disorder					
Yes	Yes No Total	7(77.8%) 2(22.2%) 9	1(8.3%) 11(91.7%) 12	0.002	38.5 (2.9 to 508.4)
No	Yes No Total	21(41.2%) 30(58.8%) 51	11(22.9%) 37(77.1%) 48	0.052	2.35 (0.98 to 0.56

Table-IV. Comparison of different risk in between the case and control group
***Chi-square test was applied. †Due to zero value in one cell, odd ratio cannot be computed**

Our result was in agreement with above studies, we observed that hypertension and dyslipidemia associated with preeclampsia and MS. However we did not found any significant different in the level of triglycerides between the cases and controls this is consistent with former study.[33] Similar to literature the existence of metabolic syndrome was more frequent among multiparous ladies[34], who were at the age of more 30 and having family history of CVDs. It was also indicated in present study that more of women with metabolic syndrome were smoker and non vegetarian as compared to controls.

CONCLUSION

In current series the incidence of MS observed to be high in preeclamptic pregnant women as compare to normal. These cases are prone to develop cardiovascular and metabolic diseases in later life. Early recognition and appropriate interventions can help to prevent these complications.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Nazima Zain	Study concept, collection of data, formation of draft of manuscript.	
2	Nusrat Nisar	Study concept, Data analysis and interpretation, final preparation of manuscript.	
3	Raheel Sikandar	Study supervision, Final proof reading.	