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SYNERGISTIC EFFECTS OF MATERNAL PRENATAL RISK FACTORS IN A SAMPLE OF INFANTILE MACROSOMIA IN BAGHDAD.

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Abstract:

The term infantile or prenatal macrosomia is still a context of medical interest till now. Main causes of macrosomia might be concluded as: diabetic mother prolonged pregnancy, maternal hypertension and male sex infant, race and genetic factors, multiparous pregnant, old prenatal age particularly at old marital age and extraordinary prenatal mother body mass index, indeed mother obesity is regarded as one of the chief risk factor. Also previous delivery of macrosomic fetus, in addition to some foetal genetic causes like Weaver syndrome, Sotos syndrome, Beckwith – Weiderman syndrome and Fragile X syndrome.

Patients and Methods:

This retrospective cohort study comprised carefully chosen 200 Iraqi mothers at 3rd trimester of pregnancy and their neonates, who were attended the department of Gynaecology and Obstetrics, of Al- Khadras' Private hospital, Baghdad, Iraq, between 1st of January 2022 to 1st of January 2024; to receive prenatal care with finale type of delivery, whether it was preferred to be vaginal or caesarean delivery, according to the obstetrician specialist decision, also, the department of neonatology was involved in this study. .

In the ongoing study; any fetus was delivered with a birth weight of more than 4 kg was regarded as macrosomic infant, hence, in this study, the 1st group (Group I) was encompassed all gravid mothers who had macrosomic infants during that period, i.e. who had delivered fetuses having more than 4 kg birth weight, and that group was compared to other group (Group II) which included other 200 pregnant women who were chosen as those mothers with no apparent risk factors and delivered infants, within that period, having birth weight of 2.5 – 4 kg, which was regarded as the normal birth weight in the ongoing our study, so group II was regarded as the control group.

Aim of study:

The current study was the first in Iraqi samples to evaluate the mutual effects of various risk factors leading to macrosomia and to recognize the utmost causes of macrosomia in Iraqi society which create risk of macrosomia and to decide type of labor as well as opportunity of any risk to newborn outcome, so that it might be avoided as much as possible.

Results:

The results of our present work showed that maternal diabetes whether it was gestational or non-gestational was the highest causative medical factor for macrosomia, the current study was the first in Iraqi samples to evaluate the mutual effects of various risk factors leading to macrosomia. The reciprocated effects of maternal diabetes added to other risk factors were having augmented frequencies of neonatal macrosomia, if it was existing with one or more of these maternal risk factors especially high maternal weight, advanced maternal age, gestational or non- gestational hypertension, obesity, multiparity and prolonged pregnancy, so might have synergistic consequences on the risk of getting infantile macrosomia. The number of macrosomic fetuses was increasingly amplified with more added varieties of those risk factors.

Conclusions:

The presence of utmost cause of macrosomia namely "maternal diabetes" plus existence of other risk factors seemed to have synergistic effects leading to increased incidence of neonatal macrosomia.

Keywords: macrosomia; pregnancy; fetal growth; birth overweight; large for gestational age, maternal diabetes and maternal risk factors.

Introduction:

The term infantile macrosomia is still a context of medical interest till now (1, 2, 3 & 4). Antenatal recognition of accelerated fetal overweight which can lead to macrosomia in pregnant mothers; is imperative in antenatal counseling and delivery management (5). Estimation of birth weight by sonographic study is the utmost generally used tool to calculate fetal overweight and macrosomia (6 & 7). Nevertheless, the accuracy of sonographic estimate of fetal overweight for their prognostic outcomes is restricted. Furthermore, till now, in some occasions, fetal weight sonographic estimate might be unavailable beforehand decision of sort of delivery (7). Thus it could end in a failure to recognize forthcoming macrosomia, principally in pregnant mothers having diabetes mellitus, wherever the antenatal health care provider miscalculates the fetal overweight rate. Hence, there is a need for another tools to detect fetal overweight acceleration leading to macrosomia to aware the antenatal health care providers to the latent risk (6, 7, 8 & 9). Main causes of fetal overweight acceleration leading to macrosomia might be concluded as: diabetic mother prolonged pregnancy, maternal hypertension, multiparous pregnant, male sex infant, race and genetic factors, old prenatal age particularly at old marital age and extraordinary prenatal mother body mass index, in deed mother obesity is regarded as one of the chief risk factor. Also preceding macrosomic fetus, in addition to some foetal genetic causes like Weaver syndrome, Sotos syndrome, Beckwith – Weiderman syndrome and Fragile X syndrome (7, 8 & 9).

Patients and Methods:

This retrospective cohort study involved samples which were carefully chosen consisted of 200 Iraqi mothers at 3rd trimester of pregnancy “with their neonates”, who were attended the department of Gynaecology and Obstetrics, of Al- Khadraa' Private hospital, Baghdad, Iraq, at the period between 1st of January 2022 to 1st of January 2024; to receive prenatal care with finale type of delivery, whether it was preferred to be vaginal or caesarean delivery, according to the obstetrician specialist decision, also,

the department of neonatology was involved in this study to get benefit of their opinions.

Aim of study was to recognize the utmost causes of macrosomia in Iraqi society including the apparent medical and obstetrical or other threatening factors which might have a tendency to create risk of macrosomia as well as opportunity of any risky consequences to newborn, in order to be avoided as much as possible.

In the ongoing study; any fetus who was delivered with a birth weight of more than 4 kg was regarded as macrosomic infant, hence, in this study, the 1st group (Group I) was encompassed all gravid mothers who had macrosomic infants during that period, i.e. who had delivered fetuses having more than 4 kg birth weight, and that group was compared to other group (Group II) which included other 200 pregnant women who were chosen to be mothers with no apparent risk factors and delivered infants, within that period, having birth weight of 2.5 – 4 kg, which was regarded as the normal birth weight, so it was regarded as the control group.

Results:

The maternal risk factors of having macrosomic neonates within our ongoing study were divided as 5 sub-groups, depending on the number of the maternal risk factors co-existed at the same pregnancy. To simplify the layout of data we put a specific letter referring to each maternal risk factor as shown in table 1.

Table 1: Specific letter referring to each maternal risk factor

Name of maternal risk factor	The letter referring to maternal risk factor
Diabetes (gestational or non- gestational)	A
Maternal weight	B
Multiparous	C
Maternal age (≥35 years)	D
Previous macrosomic fetus(s)	E
Hypertension (gestational or non- gestational)	F
Long pregnancy (≥40 weeks)	G
Male fetus	H
Rare syndromes	I
Big and tall one or both parents	J

Idiopathic macrosomia	K
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The present study involved one and more risk factor of the prenatal macrosomia was named according to number of risk factor involved in each case; (single, double, Triple, Quadruple, Quintuple)

The table 2. And Fig.1 showed the distribution of sample study according to type of risk factor according to the sample size, the analysis of data reveled the Quintuple risk factor was the most frequent percentage (23.50%) while the Quadruple type was the low frequency (16.00%) in this study

Table 2: Distribution of sample study according to Type of Risk factor

Type of Risk factor	Number	Percentage (%)
Single	39	19.50 %
Double	40	20.00 %
Triple	42	21.00 %
Quadruple	32	16.00 %
Quintuple	47	23.50 %
Total	200	100%
P-value	---	0.0493 *
* (P≤0.05).		

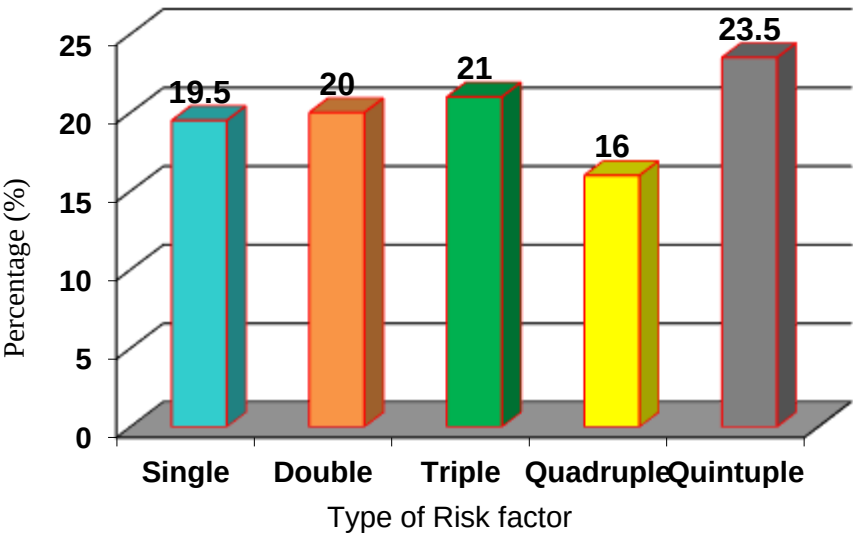


Figure 1: Distribution of sample study according to Type of Risk factor

The results of the present work showed that maternal diabetes whether it was gestational or non- gestational was the highest causative medical factor for macrosomia in all type of risk factors and also within their distribution; we mean the diabetes as a single risk factor was 3.5% in total data while it was 7% as quintuple risk factor although not significant statistically and this may belong to different sample size between groups; as shown in table.3

Table 3: Distribution of sample study according to Risk factor /dateless percentage

Single risk factor percentage	Double risk factors percentage	Triple risk factors percentage	Quadruple risk factors percentage	Quintuple Risk factors percentage	P-value
3.5% (A)	4.5% (A+B)	5.5% (A+C+E)	7.5% (A+B+F+E)	7% (A+B+C+D+F)	0.374 NS
1.5% (B)	3 % (B+E)	2 % (A+B+G)	2 % (B+C+F+E)	2.5 % (A+B+C+D+J)	0.895 NS
1.5 % (C)	2.5 % (C+J)	2 % (C+H+E)	1.5 % (A+C+D+F)	1.5 % (A+B+C+D+F)	0.766 NS
1.5 % (D)	2 % (A+D)	2 % (A+D+F)	1% (A+D+H+G)	1.5% (A+B+C+D+H)	0.849 NS
3 % (E)	2.5 % (A+F)	3.5%(A+E+C)	2% (A+E+H+D)	3.5 % (A+B+C+D+E)	0.891 NS
1.5 % (F)	1.5 % (A+F)	1.5%(A+H+G)	0.5 % (F+D+H+C)	2.5 % (A+B+C+D+F)	0.652 NS
2 % (G)	1 % (A+G)	1.5 % (A+H+G)	0.5 % (D+E+H+G)	1.5 % (A+B+C+D+G)	0.794 NS
1.5 % (H)	1 % (A+H)	1 % (A+H+G)	1 % (A+H+G+J)	2.5 % (A+B+C+G+H)	0.768 NS

Nil (I)	Nil	Nil	Nil	Nil	NS
1.5 % (J)	2 % (A+J)	2 % (A+J+F)	1 % (A+B+D+E)	1.5 % (A+B+C+E+J)	0.849 NS
2 % (K)	Nil	Nil	Nil	Nil	0.452 NS

The current study was the first in Iraqi samples to evaluate the mutual effects of various risk factors leading to macrosomia. The reciprocated effects of maternal diabetes added to other risk factors were having augmented frequencies of neonatal macrosomia, if it was existing with one or more of these maternal risk factors especially high maternal weight, advanced maternal age, gestational or non- gestational hypertension, obesity, multiparity and prolonged pregnancy, and seemed to have synergistic consequences on the risk of getting infantile macrosomia. The number of macrosomic fetuses was increasingly amplified with more added varieties of those risk

Discussion:

Macrosomia is still a context of medical importance till now (10 & 11). It is well known that large birth-weight namely macrosomia can brought great incidences of maternal and/or fetal morbidity and mortality (12 &13), so, our ongoing study was performed aiming to reduce the rate of these medical maternal and fetal dangerous circumstances.

In the current study; any newborn within birth weight of 2.5 – 4 kg, was regarded as of normal birth weight, whilst any newborn with a birth weight of more than 4 kg was regarded as macrosomic infant (1, 8 & 10).

According to our ongoing study it was obvious that the utmost motherly factor causing macrosomia was the maternal diabetes, whether alone or co-existed with other factors, and this result was going with the results of previous studies (2, 8, 14 &15).

Maternal over weight was also being a significant factor to deliver macrosomic infants in the current study, which was regarded in agreement with preceding researches (16 &17).

Multiparous mothers seemed to have high incidences to deliver fetuses having neonatal macrosomia in this study, which was similar to the findings of past researches (18 &19).

Mother age was also being an important risk factor for infant macrosomia in the current work, which was similar to previous works on the same background (20 & 21). Previous fetus with macrosomia, is well known as one essential cause to get another such fetus and this fact is alike with our findings (21 & 22).

Maternal hypertension is a known risk factor of infantile macrosomia which went with our results (23).

Our findings revealed that prolonged pregnancy was one of the imperative risk factors of getting macrosomic newborn, which was just resemble other researchers finding (24).

Male fetus had high incidence for getting high birth weight much more than that of female in the current study findings, similar to that of other studies (25 & 26).

In the ongoing study there was births of fetal macrosomia due to large body and/or tall one or both parents, so this could go with similar researches (27, 28 & 29).

We did not find large birth weight due to any of the rare syndrome, nevertheless, we find few cases with no apparent risk reasons, i.e. idiopathic macrosomia, which may be unusually found in some cases (30, 31 & 23).

Conclusion:

To the paramount of our information, the current study was the first in Iraqi samples to evaluate the mutual effects of various risk factors leading to macrosomia. The presence of maternal diabetes (whether it was gestational or non-gestational diabetes) plus existence of other risk factors seemed to have synergistic effects leading to increased incidence of neonatal macrosomia, particularly with high maternal weight “obesity”, advanced maternal age, maternal gestational or non-gestational hypertension, multiparity, prolonged pregnancy as well as tall and big boy of both or one of the parents may had a synergistic consequences on the casual prevalence of getting infantile macrosomia.

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