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MATERNAL CHARACTERISTICS ASSOCIATED WITH THE FETAL MACROSOMY DIAGNOSIS IN A HOSPITAL III-1 OF THE CAPITAL OF PERU

CARACTERÍSTICAS MATERNAS ASOCIADAS AL DIAGNÓSTICO DE MACROSOMIA FETAL EN UN HOSPITAL III-1 DE LA CAPITAL DE PERÚ

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ABSTRACT

Objective: To identify the maternal characteristics associated with the diagnosis of fetal macrosomia at Sergio E. Bernales Hospital from January to December 2018. **Methods:** An observational, analytical, retrospective, case-control study was carried out. The population studied was pregnant women with a diagnosis of fetal macrosomia treated in the gynecoobstetrics service of Sergio E. Bernales Hospital from January to December 2018. Through a data collection sheet, the information from the medical records was extracted; the data was then processed according to the IBM SPSS Statistics v25 program. **Results:** Of 532 patients studied, 133 cases and 399 controls were obtained. Maternal age varies between 14 and 45 years (average age of 27.01). A statistically significant association was found between fetal macrosomia and the following variables: post-term pregnancy (OR = 13.613 95% CI 2.901-63.891), gestational diabetes (OR 5.7 IC95% 2.5 -12.7), excessive weight gain (OR 1.833 95% CI 1.154-2,911), sex of the newborn (OR 1.83 95% CI 1.2-2.7) and age of the mother (OR 1.7 95% CI 1.0-2.9). When performing the multivariate analysis, no association was found with the variables age of the mother (P = 0.228, OR 1.510 95% CI 0.773-2.950) and BMI (P = 0.331, OR 0.740 95% CI 0.403-1.358), so they were considered confusing variables. **Conclusion:** The maternal characteristics associated with the diagnosis of fetal macrosomia are post-term delivery, gestational diabetes, excessive weight gain and sex of the newborn.

Key words: Fetal macrosomia; Gestational diabetes; weight gain during pregnancy, maternal age, postnatal pregnancy (source: MeSH NLM).

RESUMEN

Objetivo: Identificar cuáles son las características maternas asociadas al diagnóstico de macrosomía fetal en el Hospital Sergio E. Bernales de enero a diciembre del 2018. **Métodos:** Se realizó un estudio de tipo observacional, analítico, retrospectivo, de casos y controles. La población estudiada fueron las gestantes con el diagnostico de macrosomía fetal atendidas en el servicio de ginecoobstetricia del Hospital Sergio E. Bernales enero a diciembre del 2018. A través de una ficha de recolección de datos, se extrajo la información de las historias clínicas, las cuales después fueron procesadas según el programa de IBM SPSS Statistics v25. **Resultados:** De 532 pacientes estudiados se obtuvieron 133 casos y 399 controles. La edad materna varía entre 14 y 45 años (edad media de 27,01). Se encontró asociación estadísticamente significativa entre macrosomía fetal y las siguientes variables: embarazo postérmino (OR=13,613 IC95% 2,901-63,891), diabetes gestacional (OR 5,7 IC95%2,5 -12,7), ganancia de peso excesiva (OR 1,833 IC95%1,154-2,911), sexo del recién nacido (OR 1,83 IC95%1,2-2,7) y edad de la madre (OR 1,7 IC95%1,0-2,9). Al realizar el análisis multivariado no se encontró asociación con las variables edad de la madre (P =0,228, OR 1,510 IC95%0,773- 2,950) e IMC (P=0,331, OR 0,740 IC95%0,403-1,358), por lo que se consideraron variables confusoras. **Conclusión:** Las características maternas asociadas al diagnóstico de macrosomía fetal son parto postérmino, diabetes gestacional, ganancia de peso excesiva y sexo del recién nacido.

Palabras clave: Macrosomía fetal; Diabetes gestacional; Ganancia de peso durante el embarazo; Edad materna; Emnbarazo postermino (fuente: DeCS BIREME).

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INTRODUCTION

Fetal macrosomia is defined as a birth weight of 4,000 g or more or, in some settings, a weight greater than 4,500 g; although clinical behaviors should be taken from 4,000g[1,2]. Fetal macrosomia is known to be associated with several maternal and perinatal complications, including infection, postpartum hemorrhage, prolonged labor, high-grade perineal tears, cesarean delivery, anesthetic accidents and thromboembolic events[3]. According to the American College of Obstetricians and Gynecology (ACOG), macroeconomic fetuses are at increased risk of perinatal asphyxia, meconium aspiration, clavicle fracture, brachial plexus injury and shoulder dystocia[4].

Although its prevalence varies among different races and ethnic groups, it affects approximately 6-10% of all newborns[1,3]. A study carried out by the World Health Organization in 2014 and 2015 reports that in the South American region, 7.6% of all newborns were born macrosomic[5]. Likewise, a study published in Peru in 2017 found that the global prevalence of macrosomia was 5.3%, which is a relatively lower percentage than that found worldwide, however, it carries with it many morbid conditions already explained previously.

Maternal insulin is known to be the main hormone responsible for intrauterine fetal growth. During pregnancy, irregular maternal postprandial blood glucose levels and excessive insulin secretion, especially in the second and third trimesters, can cause fetal macrosomia[7]. The study of hyperglycemia and adverse pregnancy outcome (HAPO) identified a consistent relationship between maternal glucose and birth weight gain[8]. A systematic review by Falavigne et al.[9] reported that treatment of gestational diabetes mellitus (GDM) was effective in reducing rates of macrosomia, pre-eclampsia and shoulder dystocia. Therefore, the risk of fetal macrosomia should be considered during prenatal care for pregnant women with pre-gestational or gestational diabetes mellitus. Other factors are related to the incidence of fetal macrosomia, such as the lipid profile, mainly triglycerides, and HDL cholesterol levels[10,11]. As well as maternal obesity, which is related to higher birth weight. However, most studies exploring these relationships were done in other countries, and these relationships need to be explored in populations such as ours. Therefore, the objective of this study was to identify the maternal characteristics associated with the diagnosis of fetal macrosomia at the Sergio E. Bernales Hospital (HNSEB in Spanish) from January to December 2018.

METHODS

An observational, analytical, retrospective, case-control study was conducted. The population was composed of postpartum women with macrosomic newborns. A case-control formula with 95% confidence level, 80% power and odds ratio of 2.02 was considered for the sample size. The sample size consisted of 133 cases (postpartum with macrosomic infants) and 399 controls (postpartum with non-macrosomic infants). The postpartum women whose medical controls during gestation and delivery were performed at the Hospital Sergio E. Bernales during the study period were included. The exclusion criteria were having medical records with illegible handwriting and incomplete information.

The following variables were considered: mother's age, child's sex, gestational diabetes, pre-pregnancy, post-term pregnancy. To collect the information, the Teaching and Research Support Office of the Sergio Bernales Hospital was asked for the corresponding authorization, subsequently, it was coordinated with the Bureau of Statistics to have access to medical records.

The numbers of clinical records were located in the hospitalization record book of the gynecology service of the Sergio E. Bernales Hospital in 2018. Later, an electronic database was created, in the Microsoft Excel 2016 program, to select us according to the sampling technique. The data collection technique was documentation. A datasheet was designed for the collection.

A sample of 133 cases of newborns with macrosomia was taken from a population of 4,363 postpartum women from January to December 2010 at the Sergio Bernales Hospital. All patients were included in this study and met the inclusion and exclusion criteria.

To look for the association between variables we found the ORs with their respective 95% confidence intervals, using logistic regression, a p-value was considered as significant if it was less than 0.05. The research project was authorized by the Sergio E. Bernales National Hospital and the Ricardo Palma University.

RESULTS

Of the total sample evaluated, it was observed that concerning the age variable, its mean was 27.01 years with a standard deviation of 6.74, with a predominance of the age group in patients under 35 years of age with 83.3%. Also, it can be seen that multiparous pregnant women predominated with 64.8% of the total.

Concerning the sex of the newborn, the female sex predominated with 51.1%, the mean age was 27.01± 6.74 years and the average BMI was 26.23 ± 4.52 Kg/m2. The next variable studied was gestational age, with a predominance of full-term pregnant women (90.0%), Also, it can be seen that in the culmination of gestation variable, predominates cesarean with 50.2%. This and other characteristics can be seen in table 1.

Table 1. Univariate analysis of maternal and neonatal characteristics in HNSEB obstetrics patients.

Variables	Frecuency	Porcentage
Age		
≥ 35 years (years)	78	14.7
< 35 years (no older)	443	83.3
Sex of the new born		
Female	272	51.1
Male	260	48.9
Macrosomia		
No macrosomic	399	75.0
Macrosomic	133	48.9
Newborn weight		
Macrosomic	133	25.0
Low birth weight	29	5.5
normal	370	69.5
Weight gain		
Low	190	35.7
Normal	201	37.8
Excess	141	26.5
Hemoglobin		
Without anemia	354	66.5
Anemia	178	33.5
Gestational Age		
Post term	11	2.1
A termino	479	90.0
Pre-term	42	7.9
Culmination of gestation		
Vaginal birth	265	49.8
Caesarean	267	50.2
Level of education		
Primary	38	7.1
Secondary	394	74.1
Higher of education por	100	18.8

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According to the bivariate analysis, the risk factors associated with fetal macrosomia were maternal age, sex of the newborn, low weight gain, excessive weight gain, post-term pregnancy, pregestational diabetes, and gestational diabetes. The respective OR and p-values can be seen in Table 2.

Table 2. Bivariate analysis of risk factors for macrosomia in HNSEB obstetrics patients.

Variable	Macrosomía				OR	95% CI	P-value
	Yes		No				
	N=133	%	N=399	%			
Geriatric pregnancy (≥ 35 years)	27	20.3	51	12.8	1.7	1.0 – 2.9	0.034
Sex of the newborn	80	60.2	180	45.1	1.83	1.2 – 2.7	0.003
Excessive weight gain*	55	51.4	86	36.6	1.833	1.154 – 2.911	0.010
Post-term Pregnancy	9	7.0	2	0.6	13.613	2.901 – 63.891	<0.001
Pregestational diabetes	10	7.5	15	3.8	2.081	0.912 – 4.752	0.076
Gestational diabetes	17	12.8	10	2.5	5.7	2.5 – 12.7	<0.001
BMI ≥ 25 Kg/m2							

*The comparison group were mothers with normal weight gain

In table 3 it can be seen that, when the multivariate analysis is performed, the variables of the sex of the newborn, excessive weight gain, post-term pregnancy, and gestational diabetes were those that had a statistically significant association, while the age of the mother and excess BMI were not statistically significant.

Table 3. Multivariate analysis of maternal factors associated with macrosomia in HNSEB obstetrics service patients.

Variable	OR	95% CI	P-Value
Geriatric pregnancy (≥ 35 years)	1.510	0.773 -2.950	0.228
Sex of the newborn	1.822	1.082 - 3.067	0.024
Excessive weight gain	1.871	1.104 - 3.171	0.020
Post-term Pregnancy	16.043	1.795 - 143.377	0.013
Gestational diabetes	7.620	2.506-23.171	<0.001
BMI greater or equal to 25 Kg/m2	0.740	0.403 - 1.358	0.331

DISCUSSION

Macrosomia is an obstetric complication. Previous reports have shown that macrosomic newborns are at increased risk of developing hypertension, obesity and type 2 diabetes mellitus in adulthood[5]. In a study, conducted by Ismael, in Ica in 2016 he found a prevalence of 5% in fetal macrosomia[12]. In Mexico, an incidence of 5.4% was reported in 2016[13]. While Quiroz[14], in our country, at María Auxiliadora Hospital, found an incidence of 9.83% in the same year. These values are similar to those found in the present study.

Maternal age over 35 years in women who had a son or daughter with fetal macrosomia had about twice the risk of developing fetal macrosomia, statistically significant results only in the bivariate analysis, but not in the multivariate. In a study conducted in Turkey,

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they reported that women over the age of 35 years had 1.5 times higher risk of developing fetal macrosomia, which was also significant; in both studies, the values are very similar[15].

In a study conducted by Cordova with a case-control design at the Naval Medical Center in 2017, it was found that 63% of the macrosomic newborns were male, with an OR of 2.02 and a p-value = 0.027[16]; for us, the male newborn had a similar, slightly better OR, with a statistically significant relationship with fetal macrosomia, indicating that male gender acts as a risk factor for the presentation of fetal macrosomia. Excessive weight gain was found in more than half of women with a child who had fetal macrosomia, with a risk of almost double that of developing this disease; this relationship was maintained when the multivariate analysis was done. These results are consistent with the study conducted at San Jose Hospital in 2017 by Alva, in which this factor had an OR of 1.42 and a significant p-value, which would be a risk factor for macrosomia[17].

Post-term gestational age represented a risk factor for fetal macrosomia in bivariate and multivariate analysis. This result is similar to that found in a study carried out by Leda in the country of Paraguay, where it was found that post-term pregnancy presented an OR of 14.7 times more risk of developing macrosomia with a p less than 0.001, being statistically significant[19]. Also, an excess BMI was a risk factor for fetal macrosomia, which however did not maintain this association in the multivariate analysis. This result contrasts with that found in a study conducted in the neonatal department of San Jose Hospital in 2017 by Alva, who found that BMI was present in 60.7% of cases of fetal macrosomia and had an OR 1.97 times greater risk of developing macrosomia and a statistically significant P value[20]. Another study at Vitarte Hospital conducted between January and July 2018 by Arroyo found an OR of 7.22 times the risk of developing fetal macrosomia, with a statistically significant p[17].

The presence of pregestational diabetes did not represent a risk factor for fetal macrosomia, a result analogous to the study conducted at the Guillermo Diaz de la Vega Regional Hospital during January 2016 and February 2018 by Midward, which found an OR greater than 1 and a p=5,754; corroborating that there is no significant correlation between this maternal pathology and newborn macrosomia[20]. However, the presence of gestational diabetes was a risk factor for fetal macrosomia in the bi and multivariate analysis. This is consistent with the findings of a study carried out at the Naval Medical Center by Verastegui in 2014, which found an OR of 2.5 and a p=0.027, which is statistically significant. This could be explained by the fact that children of diabetic mothers suffer an anabolic effect due to fetal hyperinsulinism[8].

The limitations of the present study are the non-measurement of socio-demographic variables and laboratory values such as fasting glucose, hyperinsulinemia or hypertriglyceridemia. However, the results presented allow us to design interventions to prevent this pathology in our environment.

CONCLUSION

In the population studied, the sex of the newborn, the presence of gestational diabetes, excessive weight gain and post-term pregnancy were risk factors for macrosomia in the newborn.

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