Can routine laboratory parameters predict adverse pregnancy outcomes in intrahepatic cholestasis of pregnancy?

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Objective

Intrahepatic cholestasis of pregnancy (ICP) is a disease associated with high-perinatal morbidity and mortality rates. The aim of our study was to evaluate the platelet function in intrahepatic cholestasis of pregnancy (ICP) and to investigate whether any hematological changes readily detectable by simple complete blood count as well as liver function tests, fasting and postprandial total serum bile acid (SBA) levels have diagnostic values for the prediction of adverse pregnancy outcomes.

Methods

A prospective, case control study was carried out including 217 pregnant women. 117 women with ICP and 100 age- and BMI-matched healthy pregnant controls were recruited. Anthropometric variables, biochemical parameters, complete blood count indices, fasting and postprandial total SBA levels were determined. The main outcome measures investigated were preterm delivery, APGAR scores and neonatal unit admission. A multivariate logistic regression model was used to identify the independent risk factors of adverse pregnancy outcomes.

Results

Compared with controls, women with ICP had significantly higher mean platelet volume (MPV), platelet distribution width (PDW), aspartate aminotransferase (AST), alanine aminotransferase (ALT), γ-glutamyl transpeptidase (GGT), and total bilirubin values (P<0. 001). On the other hand, statistically significant lower values of prothrombin time (P=0. 002) and INR (P<0. 001) values were determined in ICP group when compared with controls. The median birthweight of the neonates were 3050g and 3210g, in ICP and control group, respectively (P<0. 001). The neonatal unit admission rates were 3% and 18. 8% respectively for control group and ICP group (P<0. 001). There was statistically significant difference among 1- and 5-minute APGAR scores of the neonates, between groups with lower values in ICP group (P<0. 001) (Table). Preeclampsia was developed in 4 (3. 4%) out of 117 patients in ICP group. There were statistically significant differences between ICP patients with or without accompanying preeclampsia, among baseline fasting total SBA levels (median 98 μmol/L vs. 30 μmol/L, respectively; P=0. 036), AST levels (median 141 U/L vs. 62 U/L, respectively; P=0. 024), ALT levels (median 204 U/L vs. 83 U/L, respectively; P=0. 011) and total serum bilirubin levels (median 1. 16 mg/dl vs. 0. 7 mg/dl, respectively; P=0. 041). Multivariate logistic regression analysis was then used to determine if a relationship between these adverse pregnancy outcomes and the laboratory parameters was present or not. Analysis with logistic regression revealed that the probability of preterm delivery did not increase until MPV levels exceeded 11. 2 fL (OR: 2. 54 %95 CI 1. 11-5. 83, P=0. 028) and total bilirubin levels exceeded 0. 6 mg/dl (OR: 3. 31 %95 CI 1. 31-8. 36, P=0. 01). Considering the low APGAR scores and neonatal unit admission, only increased postprandial total SBA levels of ≥ 51 μmol/L were found to be predictive significantly (OR: 3. 55 %95 CI 1. 29-9. 77, P=0. 01 and OR: 3. 62 %95 CI 1. 08-12. 13 P=0. 037, respectively).

Conclusion

Our study suggests that increased MPV and total bilirubin levels are associated with preterm delivery, also increased postprandial total SBA levels are predictive for low APGAR scores and neonatal unit admission in ICP patients.

Table. Baseline characteristics, laboratory parameters and pregnancy outcomes of ICP and healthy pregnancies.

Characteristic	Controls (n=100)	ICP (n=117)	*P* value
Age (year)	27 (18-42)	28 (18-44)	0.1
BMI (kg/m$^{2)}$	29.0±3.6	28.8±4.1	0.7
Gravida (n)	2 (1-5)	1 (0-6)	0.16
WBC(/mm$^{3)}$	9.650 (6.100-17.300)	10.000 (5.700-19.500)	0.99
Hb (gr/dl)	12.5±1.2	12.2±1.3	0.058
RDW (%)	14.1(11.5-19.1)	14 (11.9-20.3)	0.054
Platelet (/mm$^{3)}$	221.500±56.400	229.700±7400	0.36
MPV (femptolitre-fL)	10.2±1.0	11.0±1.3	<0.001*
PDW	13.1±2.3	14.7±2.8	<0.001*
Prothrombin time (sc)	11.7 (11-13.3)	11.5 (10.1-20.1)	0.002*
INR	0.98±0.04	0.92±0.08	<0.001*
AST (U/L)	16.8 (9.5-34.2)	64 (15-355)	<0.001*
ALT (U/L)	11.7 (5.5-23.5)	88 (10-557)	<0.001*
GGT (U/L)	9 (5.4-14.3)	27 (5-80)	<0.001*
Total bilirubin (mg/dL)	0.47 (0.19-0.73)	0.7 (0.17-2.31)	<0.001*
Birthweight	3210 (2530-4330)	3050 (890-4040)	<0.001*
Neonatal unit admission	3 (%3)	22 (%18.8)	<0.001*
APGAR 1 min	7	7 (3-7)	<0.001*
APGAR 5 min	9	9 (6-9)	<0.001*
Preterm delivery	0	45 (38.5%)	<0.001*

**P*< 0.05 is statistically significant , BMI: body mass index, WBC; White Blood Cells account, Hb; hemoglobin, RDW; red cell distribution width, MPV; mean platelete volume, PDW; platelet distribution width, INR;International normalization rate, AST; aspartate aminotransferase, ALT: alanine aminotransferase