

孕妇血清生物素水平与胎儿生长及早产的相关性分析

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摘要: **目的** 探究孕妇血清生物素水平与胎儿生长及早产的相关性。**方法** 选取铜川市人民医院自2019年1月~10月收治的90例孕妇为观察组。另选取同期该院体检健康且未怀孕女性90例作为对照组。观察组根据妊娠时期的不同分为早、中、晚期妊娠。观察组根据妊娠结局的不同分为足月儿组、早产儿组和小于胎龄儿 (Substantial gainful activity, SGA) 组, 比较足月儿组、早产儿组和SGA组的平均年龄、身体质量指数 (Body Mass Index, BMI) 和初产。通过酶联免疫吸附法 (ELISA) 检测外周血血清和脐带血血清中生物素的水平, 采用 Pearson 相关分析探究生物素水平与胎儿生长及早产的相关性。**结果** 妊娠孕妇血清中生物素水平在妊娠初期至晚期保持较低水平, 且显著低于对照组 ($F=14.39$, $P<0.001$)。足月儿组脐带血血清中生物素水平高于早产儿组和SGA组, 其组间差异具有统计学意义 ($F=70.387$, $P<0.001$)。足月儿组外周血血清中生物素水平高于早产儿组和SGA组, 其组间差异不具有统计学意义 ($F=1.294$, $P=0.279$)。足月儿组、早产儿组和SGA组脐带血血清中生物素水平高于外周血, 其差异均具有统计学意义 ($t=4.214\sim 12.188$, 均 $P<0.001$)。Pearson 相关分析结果显示血清中生物素水平与胎儿胎龄呈正相关关系 ($r=0.32$, $P=0.01$)。**结论** 怀孕期间孕妇可适当补充生物素以预防胎儿生长的异常。

关键词: 孕妇; 生物素; 胎儿胎龄

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Analysis of Correlation between Serum Biotin Level and Fetal Growth and Premature Delivery in Pregnant Women

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Abstract: Objective To explore the correlation between serum biotin level and fetal growth and premature delivery in pregnant women. **Methods** A total of 90 pregnant women admitted to the Tongchuan People's Hospital from January to October 2019 were included in the observation group. In addition, 90 healthy and non-pregnant women in the hospital were selected as the control group. The observation group was divided into early, middle and third trimesters according to different gestation periods. According to different pregnancy outcomes, the observation group was divided into the term infants group, the premature infants group and the SGA group, and the mean age, Body Mass Index (BMI) and the first delivery of the term infants, the premature infants group and the SGA group were compared. Biotin levels in peripheral blood serum and cord blood serum were detected by enzyme-linked immunosorbent assay (ELISA), and Pearson correlation analysis was used to explore the correlation between biotin levels and fetal growth and premature delivery. **Results** The serum biotin level of pregnant women remained low from the first trimester of pregnancy and was significantly lower than that of the control group ($F=14.39$, $P<0.001$). The serum biotin level in the full-term infant group was higher than that in the premature infant group and the SGA group, and the difference between the two groups was statistically significant ($F=70.387$, $P<0.001$). The serum biotin level in the peripheral blood of the term infant group was higher than that of the premature infant group and SGA group, and the difference between the two groups was not statistically significant ($F=1.294$, $P=0.279$). Biotin levels in cord blood were higher in the term infant group, premature infant group and SGA group than in peripheral blood, and the difference were statistically significant ($t=4.214\sim 12.188$, all $P<0.001$). Pearson correlation analysis showed that serum biotin level was positively correlated with fetal gestational age ($r=0.32$, $P=0.01$). **Conclusion** During pregnancy, pregnant women may take appropriate biotin supplements to prevent abnormal fetal growth.

Keywords: pregnant woman; biotin; fetal gestational age

生物素又称维生素 B7, 是一种水溶性含硫微生物。生物素广泛存在于天然食物中, 食物中的生

物素是蛋白结合状态, 需经生物素酶作用生成游离的 biotin 从而发挥作用^[1-2]。生物素缺乏导致相关羧

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化酶活性降低,线粒体能量合成障碍,引起代谢性酸中毒及一系列神经、皮肤系统损害^[3-4],严重时致死。有研究报道指出,生物素在怀孕和哺乳期间发生了显著变化,并且在怀孕和哺乳期间生物素的摄入量明显增加^[5]。本研究拟分析孕妇血清生物素水平与胎儿生长及早产的相关性,以期阐明生物素浓度与孕妇妊娠结局间的关系。

1 材料与方法

1.1 研究对象 选取铜川市人民医院自2019年1~10月收治的90例孕妇为观察组。另选取同期我院体检健康且未怀孕女性90例作为对照组。观察组平均年龄为 21.41 ± 4.96 岁,身体质量指数(body mass index,BMI) $22.8 \pm 3.3 \text{ kg/m}^2$,对照组平均年龄为 20.61 ± 5.15 岁,BMI $21.9 \pm 3.7 \text{ kg/m}^2$ 。观察组根据妊娠时期的不同分为早、中、晚期妊娠。观察组还可根据入组孕妇妊娠结局的不同分为足月儿组($n=25$),早产儿组($n=39$)和SGA组($n=26$),比较足月儿组、早产儿组和SGA组的平均年龄、身体质量指数和初产,结果见表1。本研究经由我院伦理委员会批准,受试者自愿加入且均签署知情同意书。

表1 足月儿组、早产儿组和SGA组临床指标的比较($\bar{x} \pm s, n(\%)$)

临床指标	足月儿组($n=25$)	早产儿组($n=39$)	SGA组($n=26$)	F/χ^2 值	P 值
年龄(岁)	31.3 ± 2.8	32.8 ± 5.8	32.1 ± 6.0	0.63	0.53
基线BMI(kg/m^2)	20.6 ± 1.3	21.0 ± 2.6	20.9 ± 2.1	0.27	0.77
初产[n(%)]	12(48.0)	19(48.7)	13(50.0)	0.02	0.99

2.2 早、中、晚期妊娠和对照组女性血清中生物素水平的比较 早期、中期、晚期妊娠女性血清中生物素水平依次为 145.4 ± 36.6 , 150.30 ± 47.1 , $218.5 \pm 67.4 \text{ ng/L}$,对照组女性血清中生物素水平为 $292.8 \pm 42.6 \text{ ng/L}$ 。妊娠孕妇血清中生物素水平在妊娠初期至晚期妊娠保持较低水平,且显著低于对照组,差异有统计学意义($P < 0.001$, $F=14.39$)。

2.3 足月儿组、早产儿组和SGA组脐带血血清和外周血血清中生物素水平的比较 足月儿组脐带血血清中生物素水平($405.1 \pm 84.0 \text{ ng/L}$)高于早产儿组($299.2 \pm 66.8 \text{ ng/L}$)和SGA组($217.8 \pm 44.32 \text{ ng/L}$),其组间差异具有统计学意义($F=70.387$, $P < 0.001$)。足月儿组外周血血清中生物素水平($167.8 \pm 49.2 \text{ ng/L}$)高于早产儿组($162.0 \pm 52.2 \text{ ng/L}$)和SGA组($145.9 \pm 51.1 \text{ ng/L}$),其组间差异无统计学意义($F=1.294$, $P=0.279$)。足月儿组、早产儿组和SGA组脐带血血清中生物素水平高于外周血,其差异均具有统计学意义($t=12.188, 4.214$ 和 5.421 ,均 $P < 0.001$)。

2.4 血清中生物素水平与胎儿生长及早产的相关性 见图1。血清中生物素水平与胎儿生长及早产呈正

1.2 仪器与试剂 MB-530型酶标仪购于芬兰雷勃公司,生物素酶联免疫吸附法(ELISA)试剂盒购自美国R&D公司,Allegra X-15R台式冷冻离心机(Beckman Coulter)。

1.3 方法 受试者于清晨空腹采集外周血血清和脐带血各2 ml, $3\ 000 \text{ r/min}$ 离心5 min,取上清液置于 -80°C 冰箱中留存。采用ELISA法测定受试者血清中生物素的浓度,严格按照说明书进行操作。

1.4 统计学分析 运用SPSS17.0统计学软件进行数据分析,计量资料结果以均数 \pm 标准差($\bar{x} \pm s$)表示,满足正态性分布及方差齐性的计量资料以 $\bar{x} \pm s$ 表示,行 t 检验,计数资料以 $n(\%)$ 表示,行 χ^2 检验。相关性采用Pearson相关分析。 $P < 0.05$ 为差异具有统计学意义。

2 结果

2.1 足月儿组、早产儿组和SGA组临床指标的比较 见表1。足月儿组、早产儿组和SGA组的临床指标比较差异均无统计学意义(均 $P > 0.05$),具有可比性。

相关关系($r = 0.32$, $P = 0.01$)。

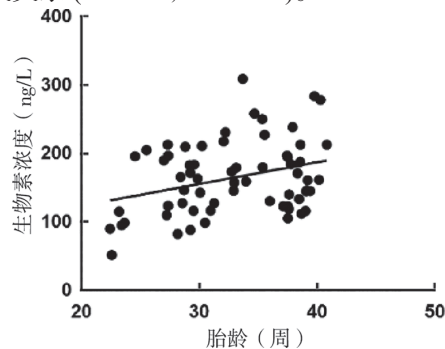


图1 血清中生物素水平与胎儿生长及早产的相关性

3 讨论

生物素是一种水溶性的含硫维生素,和B族维生素一样大部分可从食物中获取,少数需在肠道中细菌体内合成。生物素在动物肝脏、蛋黄、酵母和鲜奶中含量较高,而在粮食、肉类和水果中含量很少。生物素缺乏可导致一系列的神经与皮肤系统损害、代谢性酸中毒和有机酸尿症等,严重时致死。另外有报道指出生物素在DNA合成中是重要的活性物质,参与细胞的再生和修复。生物素缺乏还可引起细胞免疫和体液免疫功能的下降,患者常并发

念珠菌和细菌感染等^[6]。

本研究结果显示,孕妇从妊娠早期到晚期血清中生物素的水平一直处于较低水平,且低于对照组未孕女性,这可能是由于孕妇向胎儿传输的缘故^[7-10]。足月儿组血清中生物素的水平高于早产儿组和SGA组,早产儿组血清中生物素的水平高于SGA组,提示低生物素水平是早产的特征。表明早产的孕妇本身就有轻微的生物素缺乏,但与足月妊娠的孕妇相比,子宫和胎儿的生物素缺乏更严重。体外生物素缺乏时不仅降低CD4⁺T细胞分化至CD4⁺CD25⁺Foxp3⁺调节性T细胞亚群,但增加向Th1和Th17分化产生促炎细胞因子如白介素17、干扰素、肿瘤坏死因子 α ^[11]。母胎界面从抗炎状态过渡到促炎症状态与微生物介导的早产相关。Pearson相关分析显示血清中生物素水平与胎儿胎龄呈正相关关系($r = 0.32$, $P = 0.01$),生物素水平越高,胎儿胎龄越大,这可进一步验证上述结论。

综上所述,怀孕期间孕妇可适当补充生物素以预防胎儿生长的异常,妊娠期间生物素缺乏可能是早产和SGA分娩的风险因素。

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