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妊娠期贫血患者血常规、网织红细胞多参数及贫血类型 与孕期的关系研究*

吴秀继¹ 王华茹² 关虹¹ 温义华¹ 王永卿¹

(1 中南大学湘雅医学院附属海口医院检验科 海南 海口 570208; 2 海南省人民医院健康管理中心 海南 海口 570000)

摘要 目的:探讨妊娠期贫血患者血常规、网织红细胞多参数、贫血类型与孕期的关系。**方法:**纳入我院 2018 年 9 月~2019 年 9 月收治的妊娠期贫血患者 110 例,按孕期分成孕早期组($n=32$)、孕中期组($n=35$)、孕晚期组($n=43$),均检测血常规[血红蛋白(Hb)、红细胞平均体积(MCV)、外周血红细胞计数(RBC)、红细胞比容(HCT)、平均红细胞血红蛋白浓度(MCHC)]、网织红细胞参数[网织红细胞绝对值(RET#)、低荧光强度网织红细胞百分率(LFR%)、网织红细胞百分率(RET%)、中荧光强度网织红细胞百分率(MFR%)、高荧光强度网织红细胞百分率(HFR%)]。分析各参数与孕期相关性,比较三组贫血类型。**结果:**孕早期组 Hb、RBC、HCT、MCHC、LFR%较孕中期组、孕晚期组增高,其中孕中期组较孕晚期组增高($P<0.05$),孕早期组 RET#、RET%、MFR%、HFR%较孕中期组、孕晚期组降低,且孕中期组较孕晚期组降低($P<0.05$),孕晚期组 MCV 高于孕早期组、孕中期组($P<0.05$)。Pearson 线性相关分析提示,Hb、RBC、HCT、MCHC、LFR%与孕期呈负相关($P<0.05$),RET#、RET%、MFR%、HFR%与孕期呈正相关($P<0.05$)。孕早期组、孕中期组小细胞贫血占比高于孕晚期组,大细胞贫血占比低于孕晚期组($P<0.05$)。**结论:**妊娠期贫血患者随着孕周的延长,Hb、RBC、HCT、MCHC、LFR%下降,而 RET#、RET%、MFR%、HFR%增高,孕晚期以大细胞贫血为主,早、中期以小细胞贫血为主,加强上述指标的检测对妊娠期贫血患者诊断和治疗具有一定的临床意义。

关键词:妊娠期贫血;网织红细胞多参数;血常规;贫血类型;孕期

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Study on the Relationship between Blood Routine, Multiple Parameters of Reticulocytes, Anemia Types and Pregnancy in Patients with Anemia during Pregnancy*

WU Xiu-ji¹, WANG Hua-ru², GUAN Hong¹, WEN Yi-hua¹, WANG Yong-qing¹

(1 Department of Clinical Laboratory, Haikou Hospital Affiliated to Xiangya Medical College of Central South University, Haikou, Hainan, 570208, China; 2 Health Management Center, Hainan Provincial People's Hospital, Haikou, Hainan, 570000, China)

ABSTRACT Objective: To explore the relationship between blood routine, multiple parameters of reticulocytes, anemia types and pregnancy in patients with anemia during pregnancy. **Methods:** Include 110 patients with anemia during pregnancy admitted to our hospital from September 2018 to September 2019, and were divided into first trimester group ($n=32$), second trimester group ($n=35$) and third trimester group ($n=43$) according to pregnancy. All subjects were tested for blood routine [hemoglobin (Hb), mean corpuscular volume (MCV), red blood cell (RBC), hematocrit (HCT), mean corpuscular hemoglobin concentration (MCHC)], net red blood cell parameters [reticulocyte absolute value (RET#), low fluorescence intensity reticulocyte percentage (LFR%), reticulocyte ratio (RET%), moderate fluorescent intensity reticulocyte percentage (MFR%), height fluorescent intensity reticulocyte percentage (HFR%)]. The correlation between the parameters and pregnancy was analyzed, and the anemia types of the three groups were compared. **Results:** Hb, RBC, HCT, MCHC and LFR% in the first trimester group were higher than those in the second trimester group and third trimester group, and the second trimester group was higher than the third trimester group ($P<0.05$). RET#, RET%, MFR% and HFR% in the first trimester group were lower than those in the second trimester group and third trimester group, and the second trimester group was lower than the third trimester group ($P<0.05$). MCV in third trimester group was higher than that in first trimester group and second trimester group ($P<0.05$). Pearson linear analysis showed that Hb, RBC, HCT, MCHC, LFR% were negatively correlated with pregnancy ($P<0.05$), RET#, RET%, MFR%, HFR% were positively correlated with pregnancy ($P<0.05$). The proportion of small cell anemia in the first trimester group and second trimester group was higher than that in the third trimester group, and the proportion of large cell anemia was lower in the third trimester group ($P<0.05$). **Conclusion:** Hb, RBC, HCT, MCHC and LFR% are decreased with the prolongation of gestational weeks, while RET#, RET%, MFR% and HFR% are increased. Large cell anemia is predominant in the third trimester, and small cell anemia is predominant in the first and second trimester. Strengthening the detection of the above indicators has certain clinical

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作者简介:吴秀继(1984-),女,本科,副主任技师,研究方向:临床血液检验学,E-mail:wuxiuji19840823@163.com

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significance for the diagnosis and treatment of gestational anemia.

Key words: Anemia during pregnancy; Multiple parameters of reticulocytes; Blood routine; Anemia types; Pregnancy

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前言

妊娠期贫血是女性妊娠过程中常见的一种并发症,其发生通常是多种因素作用的结果,如缺铁、叶酸缺乏、生理性“稀释血症”等^[1,2]。研究表明,妊娠期贫血可导致孕妇与胎儿出现应激反应,有利于促肾上腺皮质激素释放激素合成,导致B细胞、T细胞增殖改变,削弱中性粒细胞、巨噬细胞活性,降低其杀菌能力,增加胎膜早破、早产等事件的发生风险^[3]。因此,临床需求有效指标对妊娠期贫血进行筛查与评估,便于尽早预测妊娠结局,采取措施减少不良事件的发生。有学者发现,孕期贫血与孕妇铁摄入、吸收含量不足密切相关,而铁元素摄入不足可导致血红蛋白(Hemoglobin, Hb)、红细胞等水平下降^[4],这表明血常规检测对妊娠期贫血的评估有一定价值。此外,研究认为,网织红细胞对评估骨髓红系造血能力有重要作用,它可反映骨

髓增生功能,且能对贫血类型进行鉴别,但关于其与孕期的关系尚未完全明确^[5]。近年来,有学者发现,妊娠期贫血患者的贫血类型呈现出多样化特征,但未发现确切规律^[6]。基于此,本研究纳入110例妊娠期贫血患者进行研究,分析不同孕期妊娠期贫血患者血常规、网织红细胞多参数、贫血类型的变化,为该病诊疗提供依据,报告如下。

1 资料与方法

1.1 一般资料

纳入我院2018年9月~2019年9月收治的妊娠期贫血患者110例,根据孕期分成孕早期组(n=32)、孕中期组(n=35)、孕晚期组(n=43)。研究方案获伦理委员会批准,三组基线资料比较无差异($P>0.05$),见表1。

表1 三组基线资料比较

Table 1 Comparison of baseline data among three groups

Groups	Age(years old)	Types		Pre pregnancy body mass index(kg/m ²)
		Primipara	Multipara	
First trimester group(n=32)	27.35±4.36	14	18	22.39±2.07
Second trimester group(n=35)	28.04±5.11	15	20	23.01±1.86
Third trimester group(n=43)	27.94±4.07	19	24	22.95±2.57
F/ χ^2	0.230	0.014		0.799
P	0.795	0.993		0.452

1.2 诊断标准

(1)妊娠分期标准^[7]:孕早期:妊娠时间≤12周;孕中期:妊娠时间为13~27周;孕晚期:妊娠时间为28周至临产前。(2)妊娠期贫血^[8]:孕期Hb低于110g/L即确诊,其中90g/L≤Hb<110g/L为轻度贫血,Hb范围在60≤Hb<90g/L间为中度贫血,Hb范围在30≤Hb<60g/L间为重度贫血。

1.3 纳入与排除标准

纳入标准:(1)符合上述关于妊娠期贫血的诊断标准^[7];(2)单胎妊娠;(3)肝、肾功能均正常;(4)精神状态、认知功能良好,能配合研究;(5)临床资料齐全;(6)签署知情同意书。排除标准:(1)妊娠前已有贫血病史者;(2)造血功能异常或患其他血液系统病者;(3)伴有其他妊娠合并症者,如妊娠高血压、妊娠糖尿病等;(4)既往有较长时间酗酒史、吸烟史者;(5)心、脑等脏器严重损害者;(6)恶性肿瘤者。

1.4 方法

所有受检者均于门诊产检结束后,采集4mL外周静脉血,行抗凝处理,经深圳迈瑞BC-20全自动血细胞分析仪测定血常规指标[Hb、红细胞平均体积(Mean corpuscular volume, MCV)、外周血红细胞计数(Red blood cell, RBC)、红细胞比容(Hematocrit, HCT)、平均红细胞血红蛋白浓度(Mean corpuscular

hemoglobin concentration, MCHC)]、网织红细胞多参数[网织红细胞绝对值(Reticulocyte absolute value, RET#)、低荧光强度网织红细胞百分率(Low fluorescence intensity reticulocyte percentage, LFR%)、网织红细胞百分率(Reticulocyte ratio, RET%)、中荧光强度网织红细胞百分率(Moderate fluorescent intensity reticulocyte percentage, MFR%)、高荧光强度网织红细胞百分率(High fluorescent intensity reticulocyte percentage, HFR%)]。严格按照说明书完成操作,将血细胞分析仪开启,将Laboman6.0系统打开,取出质控品,在2~8℃条件下放置10~15min,然后置于质控架,行质控处理,待通过质控后,上机检测,最后统计各指标检测结果。

1.5 观察指标

比较孕早期组、孕中期组、孕晚期组的血常规与网织红细胞多参数,并比较三组贫血类型,本次统计的贫血类型为小细胞贫血、大细胞贫血。贫血类型评价^[9]:Hb低于110g/L,MCV低于82.6fl即为小细胞贫血,Hb低于110g/L,MCV高于或等于82.6fl即为大细胞贫血。

1.6 统计学处理

采用SPSS21.0软件行数据分析,计数资料用率(%)表示,行 χ^2 检验。计量资料用($\bar{x} \pm s$)表示,两两比较行t检验,三组间

比较行方差分析。经 Pearson 线性相关分析血常规、网织红细胞多参数与患者孕期的相关性。 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 三组血常规指标比较

孕早期组 Hb、RBC、HCT、MCHC 均显著高于孕中期组、孕晚期组,且孕中期组上述指标高于孕晚期组($P<0.05$),孕晚期组 MCV 高于孕早期组、孕中期组($P<0.05$),见表 2。

表 2 三组血常规指标比较($\bar{x}\pm s$)

Table 2 Comparison of blood routine indexes among three groups($\bar{x}\pm s$)

Groups	Hb(g/L)	MCV(fl)	RBC($\times 10^{12}/L$)	HCT(%)	MCHC(g/L)
First trimester group (n=32)	102.64 $\pm$ 6.57	80.78 $\pm$ 9.62	3.91 $\pm$ 0.35	33.02 $\pm$ 2.15	312.49 $\pm$ 40.61
Second trimester group (n=35)	97.34 $\pm$ 5.71 [°]	80.24 $\pm$ 8.53	3.09 $\pm$ 0.32 [°]	31.20 $\pm$ 2.23 [°]	289.18 $\pm$ 33.72 [°]
Third trimester group (n=43)	90.46 $\pm$ 5.12 ^{° °}	91.56 $\pm$ 8.99 ^{° °}	2.65 $\pm$ 0.26 ^{° °}	29.27 $\pm$ 2.01 [°]	271.95 $\pm$ 30.06 ^{° °}
F	42.065	5.650	155.210	28.922	12.629
P	0.000	0.000	0.000	0.000	0.000

Note: compared with first trimester group, [°] $P<0.05$; compared with second trimester group, [°] $P<0.05$.

2.2 三组网织红细胞多参数比较

孕早期组 RET#、RET%、MFR%、HFR%均显著低于孕中期组、孕晚期组,且孕中期组上述指标低于孕晚期组($P<0.05$)。

孕早期组 LFR%高于孕中期组、孕晚期组,且孕中期组高于孕晚期组($P<0.05$),见表 3。

表 3 三组网织红细胞多参数比较($\bar{x}\pm s$)

Table 3 Comparison of multiple parameters of reticulocyte among three groups($\bar{x}\pm s$)

Groups	RET#	LFR (%)	RET(%)	MFR(%)	HFR(%)
First trimester group (n=32)	50.93 $\pm$ 12.51	92.45 $\pm$ 15.73	1.38 $\pm$ 0.46	8.05 $\pm$ 3.31	0.69 $\pm$ 0.32
Second trimester group (n=35)	72.39 $\pm$ 14.74 [°]	84.65 $\pm$ 14.77 [°]	1.90 $\pm$ 0.65 [°]	12.29 $\pm$ 3.23 [°]	1.87 $\pm$ 0.63 [°]
Third trimester group (n=43)	79.56 $\pm$ 10.85 ^{° °}	76.81 $\pm$ 15.20 ^{° °}	2.23 $\pm$ 0.71 ^{° °}	16.82 $\pm$ 4.02 ^{° °}	4.32 $\pm$ 1.75 ^{° °}
F	48.714	9.775	11.027	55.558	96.154
P	0.000	0.000	0.000	0.000	0.000

Note: compared with first trimester group, [°] $P<0.05$; compared with second trimester group, [°] $P<0.05$.

2.3 妊娠期贫血患者血常规、网织红细胞多参数与孕期的相关性

在本次纳入的 110 例妊娠期贫血患者中,平均孕周为(24.83 $\pm$ 8.15)周。经 Pearson 线性相关分析提示,Hb、RBC、HCT、MCHC、LFR%与孕期呈负相关($P<0.05$),RET#、RET%、MFR%、HFR%与孕期呈正相关($P<0.05$),而 MCV 与孕期无相关性($P>0.05$),见表 4。

2.4 三组患者的贫血类型比较

孕早期组、孕中期组小细胞贫血占比分别为 71.88% (23/32)、77.14% (27/35),显著高于孕晚期组的 25.58% (11/43),而孕晚期组的大细胞贫血占比为 74.42% (32/43),显著高于孕早期组、孕中期组的 28.13% (9/32)、22.86% (8/35),差异有统计学意义($\chi^2=25.692$, $P=0.000$)。

3 讨论

贫血在女性妊娠期间较常见,在妊娠达 6 周后,血浆容量

开始增高,在妊娠 20 周后明显加速,在 32~34 周后达峰值,此时,循环中红细胞也增高,但血浆容量增高水平高于 Hb、红细胞增高总量,在这种比例不协调的增长情况下,可导致血液稀释,致 Hb、红细胞含量下降,诱发贫血^[10,11]。研究表明,妊娠期贫血的常见诱因因为铁缺乏,缺铁可减少 Hb 合成量,致局部组织供氧不足,影响妊娠结局^[12]。妊娠期贫血对母婴结局的影响主要由贫血程度决定,重度、极重度贫血可致机体处于严重缺氧状态,引起血流动力学异常,诱发贫血性心脏病,此外,胎儿供血、供氧缺乏,可引起宫内窘迫、低体重儿、生长受限等并发症,严重情况下,甚至导致死产、死胎^[13,14]。严重贫血孕妇还因抵抗力下降,易诱发感染,降低失血耐受性,易出现失血性休克^[15]。为了改善妊娠期贫血患者的妊娠结局,临床需进一步了解该病的特征,分析不同孕期阶段患者病情的变化,为疾病干预提供依据。

研究证实,女性妊娠期间为了确保胎盘血循环正常运转,母体血液内血浆含量明显增高,导致血液内 Hb、RBC、HCT 等

表 4 妊娠期贫血患者血常规、网织红细胞多参数与孕期的相关性

Table 4 Correlation between blood routine, multiple parameters of reticulocytes and pregnancy in patients with anemia during pregnancy

Indexes		Pregnancy	
		r	P
Blood routine	Hb	-0.758	0.000
	MCV	0.420	0.058
	RBC	-0.692	0.000
	HCT	-0.518	0.041
	MCHC	-0.689	0.000
Multiple parameters of reticulocytes	RET#	0.598	0.012
	LFR%	-0.682	0.000
	RET%	0.619	0.000
	MFR%	0.634	0.000
	HFR%	0.785	0.000

血常规指标含量出现不同程度改变,诱发贫血^[16,17]。本结果显示,与孕中期组、孕晚期者相比,孕早期者的 Hb、RBC、HCT、MCHC 更高,且中期者较晚期者更高,随着孕期延长,患者的 Hb、RBC、HCT、MCHC 呈下降趋势。其原因可能在于,妊娠早期的营养消耗相对较小,而随着妊娠时间越长,母体与胎儿所需的营养物质越多,导致营养消耗增加,而母体未能及时供给足够的营养物质,导致血液内 Hb、RBC、HCT、MCHC 含量进一步下降^[18]。这也从侧面提示,本次纳入的妊娠早期、中期孕妇贫血程度相对较轻,而妊娠晚期者的贫血程度相对较重。此外,叶酸摄入也对血液内 Hb、RBC、HCT 等指标有影响,孕晚期孕妇因胃酸分泌减少,导致其对食物叶酸吸收量减少,再加上饮食失衡,更加致叶酸摄入减少,最终导致孕晚期 Hb、RBC、HCT、MCHC 进一步下调^[19,20]。

本结果提示,在三组患者中,孕早、中期者的 RET#、RET%、MFR%、HFR%均低于孕晚期者,LFR%高于孕晚期者,且随着孕期延长,患者的 RET#、RET%、MFR%、HFR%呈增高趋势,LFR%呈下降趋势,表明随着孕周的变化,网织红细胞参数也会改变。网织红细胞是评估骨髓红系造血能力的常用指标,在造血系统受到刺激后,能促进网织红细胞生成,致血液内 MFR%、RET%、HFR%等增高,而 LFR%下降^[21]。女性妊娠期间机体各种激素(如雌激素、孕激素等)均发生变化,这能提升骨髓造血能力,促进网织红细胞生成^[22,23]。而孕早期、中期孕妇的激素水平较晚期孕妇相对偏低,且母体血容量增高幅度较孕晚期者更小,故孕早期、中期者的骨髓造血能力较差,网织红细胞生成较少^[24,25],因此,随着孕期延长,妊娠期贫血患者的 RET#、RET%、MFR%、HFR%越高,LFR%越低。

通过分析血常规、网织红细胞参数与孕期的相关性,提示 Hb、RBC、HCT、MCHC、LFR%与孕期呈负相关,RET#、RET%、MFR%、HFR%与孕期呈正相关,这进一步提示,随着孕期的变化,血常规、网织红细胞参数也会发生相应改变。彭碧等^[26]研究显示,随着孕周增加,贫血者的网织红细胞指标明显改变,RET%显著增高。本研究不仅分析了妊娠期贫血患者不同孕期的血常规、网织红细胞参数变化,而且对各指标与患者孕期的

相关性进行观察,更加证实各项指标监测的有效性与价值,但本研究发现 MCV 与孕期无相关性,这可能与纳入病例数较少有关,未来还需增加样本量对此进一步论证。

本结果显示,孕早期、中期者的贫血类型以小细胞贫血为主,而孕晚期以大细胞贫血为主。在女性妊娠过程中,胎儿需要依赖母体获得铁元素,且母体自身也需要足够的铁元素^[27]。在妊娠早期,孕妇通常伴有恶心、呕吐等表现,对食欲影响非常大,导致饮食摄入量减少,从而致铁元素摄入减少,Hb 合成不足,降低 Hb 水平,引起小细胞贫血^[28,29]。孕妇进入孕晚期后,母体以及胎儿对铁元素需求增加,但红细胞持续减少,促进巨幼红细胞形成,继而引起大细胞贫血^[30]。临床需对此引起重视,尽早明确患者的贫血类型,便于给予针对性干预。

综上所述,妊娠期贫血患者的血常规、网织红细胞参数与孕期密切相关,妇产科需加强对这类患者相关指标的监测,尽早明确贫血类型,为治疗提供依据,但本研究也有不足,如样本较少,且未观察妊娠结局,未来将增加样本量进行随访以弥补上述不足。

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