Survey and analysis on birth quality influence factors of 300 cases of newborns

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Summary

Purpose: Little research has been conducted to specifically identify the correlations of birth quality influence factors of newborns and hemoglobin of gravidae and puerperal with birth weight of newborns. To investigate the correlations of birth quality influence factors of newborns and hemoglobin of gravidae and puerperal with birth weight of newborns in order to provide a scientific basis for promoting health of gravidae and their newborns. *Materials and Methods:* Three hundred cases of gravidae and puerpera treated in the present hospital were randomly selected, and questionnaire survey method was used to survey their basic situations. Also, hemoglobin values in different pregnancy stages were detected. According to birth weight of newborns, gravidae were divided into several groups to compare antepartum hemoglobin levels of various groups of gravidae. In addition, logistic regression analysis was carried out for birth quality influence factors of newborns. *Results:* Logistic regression analysis result showed that birth quality influence factors of newborns included age, nutrition situation and pregnancy healthcare education of gravidae and puerpera. In addition, birth weight of newborns was positively related to antepartum hemoglobin level of gravidae (r = 0.746, $p < 0.01$). *Conclusions:* It was feasible for promoting smooth delivery of gravidae and puerpera, reducing incidence rate of mother and baby complications and effectively enhancing health situations of newborns to strengthen health monitoring of gravidae and conduct health education intervention.

Key words: Birth quality; Health education intervention; Influence factor; Newborn.

Introduction

Birth population quality is the basis for human healthy development, and it is the necessary condition of ensuring population quality [1]. Birth quality of newborns not only affects their own health status, but also will cause long-term and far-reaching influences to their future growth and development [2]. If birth quality of newborns cannot be effectively controlled, low birth quality population will become a huge social burden and seriously influence and restrict the sustainable development of society, economy, population, and other aspects in China. Therefore, it is a problem to be urgently solved to research the current situation of birth quality of newborns on population level under modern conditions and investigate the method of enhancing birth quality of newborns.

Birth quality of newborns is decided mainly by two factors: pregnancy week and fetal growth rate in uterus [3]. Pregnancy week decides birth weight, while fetal growth rate in uterus is possibly related to demographic characteristics, previous abnormal pregnancy history and other medical risk factors of gravidae [4]. Some studies [5] found that for gravidae with hemoglobin increase, incidence rate of low birth weight newborn apparently increased. Multiple factors can influence birth quality of newborns [6-8]. Some literatures [9,10] reported that if puerpera age was older

and personality is more introversive, the possibility of pregnancy complications, gestational bacterial or viral infection, placenta abnormality, and the possibility of low birth quality of newborns increased. In addition, some literatures reported [4] that delivery mode and the time number of delivery could also influence birth quality of newborns, but the conclusions [11,12] were inconsistent.

This study carried out investigations of birth situations for 300 cases of newborns and basic situations, pregnancy nutrition and health care situations of puerperal in the present hospital and obtained influence factors of birth quality of newborns through logistic regression analysis; One-way ANOVA and LSD-t test were used to investigate the correlation between hemoglobin of gravidae and puerperal with birth weight of newborns. It lays the scientific foundation for improving health level of newborns in this region and preventing birth defects of newborns.

Materials and Methods

Objects

From January to December 2011, 300 cases of gravidae and puerperal treated in the present hospital were randomly selected. This study was conducted in accordance with the Declaration of Helsinki and with approval from the Ethics Committee of Jinan Central Hospital. Written informed consent was also obtained from all participants. The ages were between 21 and 39 years , and the mean age was 27.32±6.57 years. Also, these gravidae had balanced ratios regarding the aspects of occupation and living standard, and they had no chronic disease and pregnancy complication. Investigated contents included basic information, disease history of, diet and life situations, etc.

Table 1. — *Quantification situations of birth quality influence factors of newborns.*

Factor code	Factor name	Quantification scheme
Y	birth quality of newborns	1 = giant baby 2 = normal 3 = low birth weight
X1	age	1 ≤ 24years old 2 = 25 to 30years old 3 = 31 to 35 4 = 35 to 39 years old
X2	Education degree	1 = illiteracy 2 = elementary school 3 = junior middle school
		4 = High school or technical secondary school 5 = college for professional training or higher
X3	Monthly household income	1 ≤ 200Yuan 2 = 200 to 400 Yuan 3 = 400 to 600 Yuan 4 = 600 to 1000 Yuan
		5 = over 1,000 Yuan
X4	Pregnancy stage	1 = 1 to 12 weeks 2 = 13 to 27 weeks 3 = 28 weeks to antepartum
X5	drug administration history	0 = none 1 = yes
X6	Nutrition situation	1 = malnutrition 1 = normal nutrition 3 = excess nutrition (overweight, obesity)
X7	Health care education	0 = none 1 = yes
X8	Smoke	0 = never smoke 1 = smoke ago, no smoking now 2 = smoke
X9	Drink	0 = never drink 1 = drink ago, no drinking now 2 = drink

Note: The underlined item represented the dummy variable control.

Table 2. — *Logistic regression analysis of factors that influence newborn health level.*

Variable	β	SE	Wald	*p*	OR	OR 95%CI
X_1	2.541	0.282	92.163	0.000	13.720	1.378 ~ 2.621
X_6	3.217	0.361	123.908	0.000	17.106	4.023 ~ 6.267
X_7	2.724	0.291	101.324	0.000	14.430	2.613 ~ 3.014
Constant	− 3.689	0.346	125.578	0.000	0.082	

Table 3. — *Relationship of hemoglobin level and birth quality in 300 cases of pregnant women.*

Group	Case	Hemoglobin level ($\bar{x} \pm s$, g/l)	F	*p*
< 2,500 g	18	106.19 ± 9.04 ▲	18.93	0.000
2,500 ~ 3,000 g	128	108.75 ± 12.82*		
3,000 ~ 3,500 g	132	113.32 ± 12.65•		
> 3,500 g	24	116.21 ± 8.74		

Note: ▲ vs 3000 ~ 3500 g, t = 5.61, *p* < 0.05, vs > 3500 g, t = 6.25, *p* < 0.05; * vs 3,000 ~ 3,500 g, t = 5.18, *p* < 0.05, vs > 3,500 g, t = 8.02, *p* < 0.05; • vs > 3,500 g, t = 4.01, *p* < 0.05

Health education contents

In case of each pregnancy test, pregnancy health education was carried out for gravidae by means of direct and simple language. In the interim, a good doctor-patient relationship was established, and health education advisory services were provided. Pregnancy health education mainly aimed at various factors of influencing birth quality. In addition, positive and effective preventive measures were taken to reduce gravidae complications.

Quality control

According to the purpose and significance of this survey and characteristics of birth quality influence factors of newborns [4], the questionnaire was scientifically designed. At the same time, it was necessary to pay attention to the means, quality, and confidentiality of the questionnaire survey.

Statistical analysis

SPSS18.0 software package was used to conduct descriptive analysis for data, including normality test, t test, analysis of variance, and logistic regression analysis. In addition, one-way ANOVA was used for comparison among multiple groups, and LSD-t test was used for comparison between two groups (α = 0.05 as significance level).

Results

Logistic regression analysis result of birth quality influence factors of newborns

For analyzing the correlations of several factors with birth quality of newborns, the analyzed factors were first quantified, and specific quantification scheme is shown in Table 1. After various analysis factors were included into logistic regression equation, the results showed that birth quality influence factors of newborns were: age, nutrition situation, and pregnancy healthcare education of gravidae and puerpera. Specific data are shown in Table 2.

Correlation of birth quality of newborns with hemoglobin level in gravidae body

According to situations of birth weight of newborns, gravidae were divided into several groups. Table 3 compares antepartum hemoglobin levels of various groups of gravidae. For the correlation of birth weight of newborns with antepartum hemoglobin level of gravidae, it was obtained that r = 0.746, and this correlation coefficient had a statistical significance (*p* < 0.05).

Discussion

Birth quality of newborns is one of the key factors of affecting population quality, and it has become an increasingly main indicator of measuring the healthcare development level of newborns in a region [1]. There are a variety of factors influencing birth quality of newborns, including: society, economy, environment, population, and other factors [13-18]. For possible influencing factors of birth quality of newborns analyzed in this study, after logistic regression analysis, it was found that in these factors, influence factors included: age, nutrition situation, and pregnancy healthcare education of gravidae and puerperal, suggesting that the latter factors was greatly related to birth quality of newborns.

Some studies [5] found that for gravidae with hemoglobin increase, the incidence rate of low birth weight newborn apparently increased. Some gravidae in pregnancy stage have no adequate blood volume increase, which causes pachemia and hemoglobin increase and thus causes gestational hypertension and antepartum eclampsia and influences nutrient exchange between placenta and fetus. Therefore, fetal growth and development are restricted [19-21]. In this survey, it was found that hemoglobin level of gravidae in the group with birth weight less than 2,500 g was significantly less than that of the group with birth weight from 3,000 to 3500g and the group with birth weight over 3,500g. Hemoglobin level of gravidae in the group with birth weight from 2,500 to 3,000 g was significantly less than that of the group with birth weight from 3,000 to 3,500 g and the group with birth weight over 3,500 g. Also, hemoglobin level of gravidae in the group with birth weight from 3,000 to 3,500 g was significantly more than that of the group with birth weight over 3,500 g. Correlation analysis showed that birth weight of newborns was positively related to antepartum hemoglobin level of gravidae ($r = 0.746$, $p < 0.01$). It is suggested that birth weight of newborns and antepartum hemoglobin level of gravidae have a certain correlation, indicating that decrease of hemoglobin level of gravidae will increase the risk of occurrence of low birth weight newborns.

Conclusion

This study showed that strengthening health monitoring of gravidae and conducting health education, can reduce incidence rate of maternal and fetal complications and effectively enhance health situations of newborns.

References

[1] WHO.: "Meeting of Advisory Group on Maternal Nutrition and Low Birth weight. Geneva". *WHO*, 2002, 12, 4.

[2] Eriksson J.G., Forsén T., Tuomilehto J., Osmond C,. Barker D.J.: "Early growth and coronary heart disease in later life: longitudinal study". *BMJ*, 2001, *322*, 949.

[3] Barker D.J., Martyn C.N., Osmond C., Hales C.N., Fall C.H.: "Growth in utero and serum cholesterol concentrations in adult life". *BMJ*, 1993, *307*, 1524.

[4] Kramer M.S.: "Determinants of low birth weight: methodological assessment and meta-analysis". *Bull. World Health Organ.*, 1987, *65*, 663.

[5] Solves P., Moraga R., Saucedo E., Perales A., Soler M.A., Larrea L, *et al.*: "Comparison between two strategies for umbilical cord blood collection". *Bone Marrow Transplant.*, 2003, *31*, 269.

[6] Hollomon H.A., Dobbins D.R., Scott K.G.: "The effects of biological and social risk factors on special education placement: birth weight and maternal education as an example". *Res. Dev. Disabil.*, 1998, *19*, 281.

[7] Kramer M.S.: "Effects of energy and protein intakes on pregnancy outcome: an overview of the research evidence from controlled clinical trials". *Am. J. Clin. Nutr,* 1993; *58*, 627.

[8] WHO.: "Extracts from the Occupational Hazards Section of the anthology on Women, Health and Environment". *A WHO Publication*, WHO/EHG/94.

[9] Kramer M.S.: "The epidemiology of adverse pregnancy outcomes: an overview". *J. Nutr.*, 2003, *133*, 1592S.

[10] Brown J.E., Murtaugh M.A., Jacobs D.J., Margellos H.C.: "Variation in newborn size according to pregnancy weight change by trimester". *Am. J. Clin. Nutr.*, 2002, *76*, 205.

[11] Heasman L., Clarke L., Stephenson T., Symonds M.E.: "Effect of maternal nutrient restriction in early to mid gestation and thyrotrophin-releasing hormone on lamb survival following Caesarean section delivery near to term". *Can. J. Physiol.* Pharmacol., 2000, *78*: 571.

[12] Basso O., Olsen J., Knudsen L.B., Christensen K.: "Low birth weight and preterm birth after short interpregnancy intervals". *Am. J. Obstet. Gynecol.*, 1998, *178*, 259.

[13] Alam D.S., Van Raaij J.M., Hautvast J.G., Yunus M., Fuchs G.J.: "Energy stress during pregnancy and lactation: consequences for maternal nutrition in rural Bangladesh". *Eur. J. Clin. Nutr.*, 2003, *57*, 151.

[14] Yuan H., Platt R.W., Morin L., Joseph K.S., Kramer M.S.: "Fetal deaths in the United States, 1997 vs 1991". *Am. J. Obstet. Gynecol.*, 2005, *193*, 489.

[15] [No authors listed].: "Pill, IUD users run no increased risk of ectopics, malformation, miscarriage in planned pregnancies". *Fam. Plann. Perspect.*, 1980, *12*, 156.

[16] Keusch G.T.: "Vitamin A supplements—too good not to be true". *N. Engl. J. Med.*, 1990, *323*, 985.

[17] Hemels M.E., Einarson A., Koren G., Lanctot K.L., Einarson T.R.: "Antidepressant use during pregnancy and the rates of spontaneous abortions: a meta-analysis". *Ann. Pharmacother.*, 2005, *39*, 803.

[18] González C., Parra A., Ramírez-Peredo J., García C., Rivera J.C., Macotela Y., *et al.*: "Elevated vasoinhibins may contribute to endothelial cell dysfunction and low birth weight in preeclampsia". *Lab. Invest.*, 2007, *87*, 1009.

[19] Mathews F., Youngman L., Neil A.: "Maternal circulating nutrient concentrations in pregnancy: implications for birth and placental weights of term infants". *Am. J. Clin. Nutr.*, 2004, *79*, 103.

[20] Xiong X., Demianczuk N.N., Buekens P., Saunders L.D.: "Association of preeclampsia with high birth weight for age". *Am. J. Obstet. Gynecol.*, 2000, *183*, 148.

[21] Polley B.A., Wing R.R., Sims C.J.: "Randomized controlled trial to prevent excessive weight gain in pregnant women". *Int. J. Obes. Relat. Metab. Disord.* 2002, *26*, 1494.

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