

Investigation of sub-health status of neonates in Heping street region (Beijing) and analysis on related risk factors

Chen Jie¹, Shi Mai², Li Qiuju³, Ye Fang¹, Liu Fang¹, Fan Qinying¹, Zhang Yong¹ and Wang Lin¹

¹Prevention and Health Section, China-Japan Friendship Hospital, Beijing,

²Nutritional Department, China- Japan Friendship Hospital, Beijing

³Beijing Chaoyang District Maternal and Child Health Care Hospital, Beijing,

Abstract: To investigate sub-health status of neonates in Heping Street Region and related risk factors. Then, 7436 maternal women admitted to hospital in Heping Street Region, Beijing were enrolled from October 2013 to September 2015, including 293 women, who gave birth to sub-health neonates. Questionnaire survey was conducted to collect maternal age, education degree, experiences and income, occupation, life habit, condition in pregnancy, condition in perinatal period, adverse reaction in pregnancy, etc. Finally, 281 effective questionnaires were regained with effective regain rate of 95.90%. Compared with the occurrence rate of sub-health neonates between local population and floating population, correlation analysis and multi-factor Logistic regression analysis were conducted on the influence factors of sub-health neonates. The occurrence rate of sub-health neonates among floating population is higher than that among local population (1.10% (59/2641) V.S. 4.88% (234/4795)) with significant difference ($P < 0.05$). Correlation analysis showed that the differences in mother's age, family income, education degree, harmful factors in contact environment, prenatal care, history of adverse pregnancy, unhealthy metal factor, gestational diabetes, diseases history in pregnancy, drug history in pregnancy, sexually transmitted disease, pregnancy hypertension, premature rupture of fetal membranes, and circular of umbilical cord performed statistical significance ($P < 0.05$). Moreover, mother's age, premature rupture of fetal membranes, disease history in pregnancy, drug history in pregnancy and pregnancy hypertension are the influence factors for the risk of sub-health neonates, while high family income and healthcare in pregnancy are protective factors from the risk of sub-health neonates. All of these differences showed statistical significance ($P < 0.05$). The occurrence of sub-health neonates among floating population is higher than that among local population. Mother's age, premature rupture of fetal membranes, disease history in pregnancy, drug history in pregnancy, and pregnancy hypertension are major risk factors of sub-health neonates. Therefore, these results help us to take corresponding measures to improve the quality of newly-born population.

Keywords: Neonate, sub-health, risk factors.

INTRODUCTION

When baby is born, sub-healthy status may occur for health condition of maternal woman and asphyxia, underweight, diseases, immunodeficiency and other high-risk factors in retarded birth. Without timely attention, it is possible to have disability, incapacitation, and death (Lu and Li, 2013; Khlood *et al.*, 1999; Perera *et al.*, 2005; Tang *et al.*, 2006; Wu *et al.*, 2015) for such neonates who may grow unhealthily in prognosis. Therefore, close attention should be paid to sub-healthy neonates by analyzing related influence factors as precaution measure to improve the birth quality. Clinical investigation on related risk factors for sub-healthy neonates shows that the conditions has a certain relationship with mother's age, disease history in pregnancy, drug history in pregnancy, and adverse pregnancy (Xu *et al.*, 2014). This work investigated sub-healthy neonates born in Heping Street Region from October 2013 to September 2015 and analyzed the related risk factors of sub-healthy. The report is as follows.

*Corresponding author: e-mail: chenjiezr@126.com

Data and methods

General data

Maternal women admitted to obstetrical department and prevention and health section of China-Japan Friendship Hospital in Heping Street Region from October 2013 to September 2015 were selected. All the documents related to this study were reviewed and approved by the ethic committee of our hospital. All of these women gave birth to 7436 neonates, including 3916 boys and 3520 girls, among which 293 neonates were sub-healthy. Moreover, 2641 women were from local population and 4795 from floating population. Inclusion criteria: (1) maternal women agreed to participate in this investigation after delivery; (2) maternal women could give accurate answer with clear awareness. Diagnosis criteria for sub-healthy neonates: Fetus had asphyxia, premature birth, retarded birth, and underweight accompanying with HIV or other sexually transmitted diseases and neonate diseases in pregnancy and delivery.

Method

All the neonates with sub-health were paired with normal neonates in 1:1 for control investigation in strict

accordance with sex, month age, and area. 293 questionnaires were released to pairs in total, including 281 effective withdrawn questionnaires with effective rate of 95.00%. Questionnaires should be issued to all researches for uniform training to explain the contents of questionnaire in detail. People to be investigated were mothers of neonates and the contents of questionnaire include mother's age, education degree, experience and income, occupation, life habit, condition in pregnancy, condition in perinatal period and adverse reaction in pregnancy.

Observation index

The occurrence rates of sub-healthy neonate were compared between local population and floating population, and correlation analysis and multi-factor Logistic regression analysis were conducted on influence factors of sub-healthy neonates.

STATISTICAL ANALYSIS

Data was processed with SPSS 18.0 software package; measurement data was represented by mean \pm standard deviation ($\bar{X} \pm s$) and tested by t test; enumeration data was tested by χ^2 test and r test for correlation analysis; relevant influence factors were analyzed by multi-factor Logistic regression analysis. $P < 0.05$ means difference with statistical significance.

RESULTS

Comparison for occurrence rate of neonatal sub-health

According to investigation, the occurrence rate of sub-healthy neonates among floating population is significantly higher than that among local population with significant difference ($P < 0.05$). See more details in table 1.

Correlation analysis on influence factors of sub-healthy neonates

Correlation analysis on influence factors of sub-healthy neonates shows that mother's age, family income, education degree, harmful factors in contact environment, antenatal care, history of adverse pregnancy, adverse mental factors, gestational diabetes, disease history in pregnancy, drug history in pregnancy, sexually transmitted disease, pregnancy hypertension, premature rupture of fetal membranes, and circular of umbilical cord all have significant difference ($P < 0.05$). See more details in table 2.

Multi-factor regression analysis on relevant factors of sub-healthy neonates

Multi-factor and non-conditional Logistic regression analysis was conducted with the sub-health of neonates as dependent variable, mother's age, education degree, family income, disease history in pregnancy, drug history

in pregnancy, history of adverse pregnancy, adverse mental factors, circular of umbilical cord, pregnancy hypertension, harmful factors in contact environment, premature rupture of fetal membranes, sexually transmitted disease and healthcare in pregnancy as independent variables. The results show that risk factors of neonatal sub-health, including mother's age, premature rupture of fetal membranes, disease history in pregnancy, drug history in pregnancy, premature rupture of fetal membranes, and pregnancy hypertension, as well as protective factors, including high family income and healthcare in pregnancy all have difference with statistical significance ($P < 0.05$). See more details in table 3.

DISCUSSION

The sub-health of neonates is affected by both congenital factors and acquired factors. In social medicine, there are wider pathogenic factors, including heredity, life behavior, health care, environment, nutrition and microbial infection. Moreover, with increasingly severe environment pollution and complex pollutant varieties, the interaction among all risk factors increases. In short, sub-healthy birth should be solved by not only medical methods, but also comprehensive interdisciplinary interference to improve the birth quality (Li *et al.*, 2013; Zuo *et al.*, 2015; Itai *et al.*, 2012). In China, the premature delivery, the occurrence rate of hypophrenia and disability of neonates tend to be increase for the birth asphyxia, and retarded birth to adversely affect the birth quality. Some researches show that the sub-health of neonates has correlation with various factors (Cheng, 2015; Zhou *et al.*, 2011). This work investigated sub-healthy neonates in Heping Street Area.

By analyzing the relevant factors of neonatal sub-health, targeted interference can be conducted to promote the improvement of population quality. In this work, results show that the occurrence rate of neonatal sub-health among floating population is 4.88%, while that among local population is 1.10%. It is speculated that the higher rate among floating population has certain relationship to economic level, antenatal care, etc. Some researches show that with the change of environment and air quality at present, the increasing harmful substance in environment may also cause the sub-health of neonates (Chattam *et al.*, 2006). The correlation analysis and multi-factor analysis in this work show that influence factors, including mother's age, family income, education degree, harmful factors in contact environment, healthcare in pregnancy, history of adverse pregnancy, adverse mental factor, gestational diabetes, disease history in pregnancy, drug history in pregnancy, sexually transmitted disease, pregnancy hypertension, premature rupture of fetal membranes and circular of umbilical cord all have close correlation with neonatal sub-health. Moreover, risk factors, including mother's age, premature rupture of fetal

Table 1: Comparison for occurrence rate of neonatal sub-health [n (%)]

Item	Neonate sum	Occurrence rate of sub-healthy neonate
Local population	2641	59(1.10)
Floating population	4795	234(4.88)
χ^2		31.5032
P value		<0.001

Table 2: Correlation Analysis on Influence Factors of Sub-healthy Neonates

Factor	Mother's age	Family income	Education degree	Harmful factors in contact environment	Antenatal care	History of adverse pregnancy	Adverse mental factor
r value	17.794	20.102	8.372	21.642	8.651	12.756	25.341
P value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Gestational diabetes	History of disease in pregnancy	History of drug in pregnancy	Sexually transmitted disease	pregnancy hypertension	premature rupture of fetal membranes	Circular of umbilical cord
r value	9.967	12.569	6.530	12.364	20.184	35.132	26.945
P value	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table 3: Multi-factor Logistic regression analysis on relevant factors of neonatal sub-health

Item	Regression coefficient	Standard error	Wald chi square statistics	OR value	95% CI	P value
Mother's age ≥ 35 years	3.176	0.834	15.814	21.674	3.873~95.471	<0.05
Premature rupture of fetal membranes	1.695	0.513	66.225	8.980	4.063~9.395	<0.05
Disease history in pregnancy	3.687	0.656	27.876	31.095	8.751~113.845	<0.05
Pregnancy hypertension	4.413	0.713	36.770	36.073	10.585~134.694	<0.05
Drug history in pregnancy	3.025	0.584	14.756	12.083	4.263~37.856	<0.05
Family income	-0.632	0.735	14.418	0.763	0.425~0.918	<0.05
Healthcare in pregnancy	-1.213	0.414	17.782	0.694	0.391~0.875	<0.05

membranes, disease history in pregnancy, drug history in pregnancy, premature rupture of fetal membranes and pregnancy hypertension play an important role in neonatal sub-health. Elderly parturient women have recession in engine body and organ, so their neonates may have low weight, neonatal asphyxia and other conditions. In addition, pregnancy hypertension and premature delivery among elderly parturient women may cause a lot of consequences, so mother's age is an independent risk factor affecting the health of neonates. Some researches investigating elderly parturient women show that after women have individual mature, secondary oocyte may stay in metaphase of secondary meiosis after stopping split when ovulation. The process of secondary oocyte split will complete after being fertilized. Therefore, with women's age increasing, the internal and external factors may have larger influence on ovum to make the occurrence rate of chromosome abnormality higher and hormone secretion will lose balance and internal environment be in disorder to cause abnormal development of embryo (Xu, 2015; Zhang, 2014). Because of the promotion of late marriage and late childbirth in recent years, the social pressure increases, and childbearing policy varies. With the change in people's idea on child-bearing, the amount of elderly

parturient women tends to increase. In order to lower the occurrence rate of neonatal sub-health, delivery on the right age should be promoted and elderly parturient women should take antenatal examination in pregnancy to promote smooth delivery. Pregnancy-induced hypertension refers to proteinuria and edema for hypertension. With severe illness condition, this disease may be accompanied with lesion in other systems. Some researches show that pregnancy hypertension may cause neonatal asphyxia and premature delivery, while severe illness condition may threaten the life security of maternal women and neonates (Tovar-Rodríguez *et al.*, 2015; Sun, 2012; Cande and Olga, 2010). Other researches show that premature rupture of fetal membranes is another main cause to premature neonatal pneumonia and neonatal asphyxia and always has large effects on neonatal health (Zhang *et al.*, 2014; Kim *et al.*, 2016; Jasper *et al.*, 2014). This work also proved this opinion that premature rupture of fetal membranes is a risk factor for neonatal sub-health. Infection history and drug history play alternative roles in pregnancy. Virus infection and drug stimulation in pregnancy may cause low weight and other sub-healthy symptoms, while severe conditions may even cause abortion, malformation and stillbirth. In addition, analysis results also show that high family income and healthcare

in pregnancy are protective factors for neonatal health. By analysis, the level can make a certain reaction to class division, education degree and other conditions. With superior family economic condition, maternal woman will pay more attention to the healthcare in pregnancy to relatively reduce the occurrence of other risk factors and protect the childbirth. Among floating population, however, the occurrence rate of neonatal sub-health is much higher because maternal women are lack of knowledge about pregnant healthcare and pregnancy nutrition in low economic level.

This work drew a conclusion that risk factors should be reduced to decrease the occurrence rate of neonatal sub-health by giving birth on the right age, enhancing pre-pregnant and pregnant healthcare, preventing complications in gestation period, rational drug use and timely cooperation in treatment of diseases in pregnancy. Moreover, for maternal women among floating population, production knowledge should be propagated, pregnancy nutrition be noted and pregnancy healthcare be conducted in fixed period.

In conclusion, survey results of neonatal sub-health in Heping Street Region show that the occurrence rate among maternal women in floating population is higher than that in local population, so maternal women in floating population should be listed as key interference object. Among influence factors for neonatal sub-health, mother's age, premature rupture of fetal membranes, disease history in pregnancy, drug history in pregnancy, and pregnancy hypertension are risk factors, while high family income and pregnancy healthcare are protective factors. For risk factors, protective measures should be enhanced and prenatal diagnosis and health care be strengthened to avoid maternal women from not prompt treatment for pregnancy discomfort. Moreover, drug abuse should be reduced in pregnancy and harmful factors in environment be decreased to improve the quality of newly-born population.

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