

CLINICAL STUDY

Correlation between women's sub-health and reproductive diseases with pregnancies and labors

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conditions, these women were categorized into three groups: postpartum healthy group, sub-healthy group, and reproductive disease group. Data were double-entered using EpiData and then analyzed by SPSS.

RESULTS: Pregnancy and labor were correlated with postpartum sub-health conditions. The number of pregnancies was negatively correlated with women's postnatal health but was positively correlated with the incidence of postpartum reproductive diseases.

CONCLUSION: The number of pregnancies and labors is probably an important factor leading to sub-health conditions and the occurrence of reproductive diseases in women. Avoiding or reducing unwanted pregnancies and labors, enhancing the awareness of health among childbearing-age women are effective measures for preventing sub-health conditions.

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Key words: Sub-health; Reproductive disease; Pregnancy; Labor; Correlation; Medicine, Chinese traditional

Abstract

OBJECTIVE: To investigate whether female sub-health conditions and reproductive diseases are associated with pregnancies and labors.

METHODS: A cross-sectional survey was performed by using a structured questionnaire. A total of 1343 women aged 35 years or younger in six urban areas of Chengdu were included in the study. According to the Screening Criteria of sub-health

INTRODUCTION

Reproductive health refers to a sound physiological, psychological, and social adaptive status of women in all reproductive phases and processes during their lifetime, not just the absence of diseases or disorders.¹ The number of unintended pregnancies is continuing to increase. The incidence of secondary reproductive diseases

es, such as menstrual irregularities, infertility, endometriosis, and pelvic inflammation, has also tended to annually increase.² Therefore, the impact of maternal history on women's physical and mental health has drawn an increasing amount of attention. Modern medical experts recognize that abortion is one of the major harmful factors to women's reproductive health.³ This may immediately result in menstrual disorders. According to a survey of 1026 women who were all younger than 35 years and had a history of pregnancy and labor, the risk for menstrual disorders increased with the number of pregnancies and labors.⁴

The concept of sub-health was proposed in the 1980s. Sub-health is an intermediate state between a healthy condition and an ill condition. The Chinese scholar Yuxue Wang⁵ named this state as "sub-health conditions" in the 1990s. In recent years, sub-health conditions have tended to become more common in many countries. A global survey conducted by the World Health Organization showed that approximately 75% of people appeared to be in a sub-health condition, and the incidence of sub-health in women is twice as high as that in men.^{6,7}

Because the etiology and pathogenesis of sub-health are still unclear, many sub-healthy people unconsciously suffer from diseases or even sudden death. Therefore, we aimed to evaluate the association of sub-health conditions and reproductive diseases with the number of pregnancies by investigating 1343 women of child-bearing potential at the age of 35 years or younger.

METHODS

Participants

Cluster sampling was performed in people of Changshouyuan Community, Qintailu Community, Wangjiang Community, Chongzhou, Shibantan, and Xinfan, Chengdu, according to the regional population distribution and economic status.

Diagnostic criteria

Diagnostic criteria of reproductive health: (a) the term "reproductive health" refers to women's reproductive function at all stages of life, as well as the good state of their body, mentality, and aspects of social life, rather than just the absence of disease or discomfort.⁸ (b) Women who have reproductive ability can have a safe pregnancy and labor, and the newborn can survive and be healthy. (c) Women can adjust their own fertility, but not affect their health, and have safe sex. (d) Reproductive health contains four elements, including family planning, maternal health, infant health, and safe sex. Diagnostic criteria of reproductive sub-health: sub-health condition is defined by the World Health Organization as a state between health and disease when all necessary physical and chemical indexes are tested negative by medical equipments, things seem

normal but the person experiences all kind of discomfort and even pain.⁹ Indications for sub-health conditions are as follows:

(a) People repeatedly experience discomfort or a considerable decline in ability that lasts longer than 3 months. The symptoms include tiredness, muscle and joint aches, dizziness, headaches, heart palpitations, chest tightness, sleep disorders, loss of appetite, stomach duct and abdominal discomfort, loose stools, constipation, and sexual functional decline. In addition, sub-healthy group may be depressed, upset, anxious, irritable, fearful, timid, experience a decline in memory, be unable to concentrate, have a lack of energy, and become unresponsive. They cannot work or study hard and cannot keep a good interpersonal relationship, family relationship or social relationship, but can maintain normal work and life. (b) No major organic disease or mental diseases. (c) Despite there is diagnosis of nonorganic disease, no medical treatment is needed and the non-physical disease has no causal relationship with the discomfort state or the adaptiveness decrease. Based on these three points mentioned above and the idea¹⁰ of a "sub-health screening table" by filtering information on the reproductive health of pregnant women, the sub-health condition of postpartum women can be determined.

Diagnostic standards of reproductive disease

(a) In this research, reproductive diseases include emmeniopathy, infertility, endometriosis, pelvic inflammatory disease, etc. (b) Diagnostic standards of the diseases mentioned above reference to Chinese medicine clinical research of new drugs guiding principles (issued by the Ministry of Health of China in 2002) for menoxenia clinical research guidelines and the relative contents in "Gynecology of Traditional Chinese Medicine (TCM)" published by Shanghai Science and Technology Press.

Inclusion criteria

Criteria for healthy reproductive conditions postpartum were as follows: (a) fertile women who were younger than 35 years old, and had a history of pregnancy and delivery; (b) women who agreed to the investigation of their own accord and signed an informed consent form; (c) women who conformed to the standards of reproductive health.

Criteria for postpartum sub-health conditions were as follows: (a) fertile women were younger than 35 years old with a history of pregnancy and delivery; (b) uncomfortable symptoms postpartum lasting for more than 3 months; (c) women whose condition was defined as sub-healthy; (d) women with more than 22 points as measured with a sub-health screening scale; and (e) women who voluntarily participated in the study and signed an informed consent form.

Criteria for postpartum reproductive disease were as follows: (a) fertile women who were younger than 35

years old with a history of pregnancy and delivery; (b) women who had had a reproductive system disease as determined by the above-mentioned criteria; and (c) women who voluntarily participated in the study and signed an informed consent form.

Exclusion criteria

Participants were excluded if they: (a) were unable/unwilling to give informed consent for participation in the survey; (b) had severe primary cardiovascular, hepatic, renal, or hemopoietic diseases, psychiatric disorders, or language deficits; (c) had a confirmed diagnosis of reproductive disease before parturition (including menstrual disorders, pelvic inflammatory disease, and endometriosis); (d) had reproductive disease resulting from other disorders; and (e) had menstrual irregularities due to aging.

Schedule of the survey

The survey involved: (a) a consent form; (b) general data including age, height and weight, profession, education, etc. (c) research data including symptoms, age of menarche, the number of days of the menstrual period, the length of the menstrual cycle, age at first sexual intercourse, methods of contraception, the number of pregnancies and births, methods of pregnancy and birth; (d) the time of the survey; (e) the name of the investigator; (f) investigation number.

The survey reference to: (a) Chinese medicine clinical research of new drugs guiding principles,¹¹(b) symptoms of TCM",¹² (c) "deficiency syndrome differentiation of TCM reference standards",¹³ and combine screening sub-health scale set by Wang *et al*¹⁰ to modify and improve previous questionnaire.

With the literature study and the specific conditions in this survey, we modify the questionnaire. And combine with the advice of respondents, the questionnaire is revised again. Then we test the reliability and validity of the questionnaire and finally set up it.

Survey methods

The study protocol was approved by the Ethics Committee of Chengdu University of TCM. A retrospective survey was performed to investigate whether the participants experienced reproductive health-related symptoms after parturition. The participants were divided into 3 groups: postpartum healthy group, postpartum sub-healthy group, and postpartum reproductive disease group. Face-to-face questionnaire surveys were conducted by gynecological graduate students. During the interviews, efforts were made to create a relaxing and harmonic atmosphere and protect the privacy of the participants, to relieve concerns and avoid any tendency of the participants to make false statements. With respect to various potential biases during the survey and analysis, selection bias and information bias were controlled as much as possible to maximally ensure the validity of the results. After the completion

of each interview, the interviewer would carefully check whether all questions had been answered.

Data analysis

Data were double-entered using EpiData software (ver 3.1, Jens M. Lauritsen, Michael Bruus and Mark Myatt, Odense, Denmark) and analyzed by SPSS 13.0 (Chicago, SPSS Inc., IL, USA). The χ^2 test was used for comparisons. All tests were two tailed with a statistical significance level of $P < 0.05$.

RESULTS

Of the 1343 potentially eligible participants, 1018 were included in the analysis. A total of 325 participants were excluded because of a confirmed diagnosis of reproductive diseases, including menstrual irregularities, pelvic inflammation, and endometriosis. There were 358 participants in the postpartum healthy group, 371 in the postpartum sub-healthy group and 289 in the postpartum reproductive disease group. The age of the participants ranged from 18 to 35 years, with a mean of 29.892 years. The participants' height ranged from 140 to 173 cm, with a mean of 157.38 cm. The participants' weight ranged from 38 to 80 kg, with a mean of 52.18 kg.

In this study, a Wald test was used to explore the factors that might affect female reproductive health. The three statuses (health, sub-health, and reproductive disease) were considered as dependent variables, and influential factors including age, height, weight, occupation, educational level, physical constitution and other factors were analyzed in order to reveal the major factors affecting postpartum health status. Table 1 shows the result of the Wald test.

Table 1 shows that the Wald value of "Number of pregnancies and labors" is the highest among all factors, which means that the number of pregnancies and labors is the most important factor affecting postpartum health condition.

Among the 1018 participants, the number of pregnancies and births ranged from one to four or more than four. A χ^2 test was performed to evaluate the relationship between the number of pregnancies and labors along with postpartum reproductive health while the result is shown in Table 2.

Table 2 tells that the correlative coefficient of postpartum reproductive health status with the number of pregnancies and labors is -0.951, which showed a notable statistical significance among groups ($P < 0.01$). It means postpartum reproductive diseases status has significant negative correlations with the times of pregnancies and labors.

Similarly, a χ^2 test was also performed to evaluate the correlation between the number of pregnancies and labors along with postpartum reproductive disease while the result is shown in Table 3.

Table 1 Factors correlated with conditions of postpartum health

Factor	Wald statistics		
	Postpartum health condition	Postpartum sub-health condition	Postpartum reproductive diseases condition
Age	2.666	5.644	0.711
Occupation	0.325	0.096	0.948
Educational level	0.196	0.535	1.674
Physical	0.026	0.000	0.052
Height	6.665	3.265	0.634
Weight	12.016	13.252	0.088
Menarche	2.198	2.060	0.000
Peroid	4.246	0.413	8.295
Cycle	0.004	0.016	0.036
Virginity	1.724	2.382	0.055
Contraception methods	0.678	1.651	4.644
Number of pregnancies and labors	25.282	24.516	51.121

Table 2 Relationship between the number of pregnancies and labors along with postpartum reproductive health

Number of pregnancies and labors (times)	Postpartum reproductive health condition [n (%)]		Correlation coefficient		P value	
	Yes	No	Yes	No	Yes	No
1	182 (45.96)	214 (54.04)				
2	102 (32.18)	215 (67.82)				
3	59 (33.15)	119 (66.85)	- 0.951	0.951	0.000	0.000
4	10 (16.95)	49 (83.05)				
>4	5 (13.16)	33 (86.84)				

Table 3 Relationship between the number of pregnancies and labors along with postpartum reproductive disease

Number of pregnancies and labors (times)	Postpartum reproductive diseases condition [n (%)]		Correlation coefficient		P value	
	Yes	No	Yes	No	Yes	No
1	6 917.42	32 782.58				
2	9 336.19	16 463.81				
3	7 536.06	13 363.94	0.972	- 0.972	0.000	0.000
4	2 949.15	3050.85				
>4	2 360.53	1539.47				

Table 3 shows that the correlative coefficient of postpartum reproductive diseases status with the number of pregnancies and labors is 0.972. The statistic difference was significant ($P < 0.01$), which means postpartum reproductive diseases status has significant positive correlations with the times of pregnancies and labors.

DISCUSSION

This study confirmed other findings that postpartum sub-health was an intermediate state between reproductive health and illness.¹⁴ Our study showed that an increase in parity and gravidity was pivotal to further

changes in the body from a sub-health condition to a disease state. We found that the number of pregnancies and labors was an important factor affecting postpartum health. From the perspective of tertiary prevention in modern preventive medicine, proper interventions at postpartum for women who have sub-health conditions may be beneficial for primary prevention (etiological prevention) and secondary prevention (pre-clinical prevention) of reproductive diseases. In terms of TCM, the kidney stores essence and governs reproduction. The more number of pregnancies and labors may damage kidney. The essence and *Qi* stored in the kidney are the basis for *Zang-Fu* activity, which is closely associated with all life activities and

the aging process. The effect of pregnancy and labor on women's health is mainly manifested as many conditions, such as abortion, can cause the renal impairment. This inevitably damages the uterus, weakens the kidney, *Qi* and blood, thereby resulting in reproductive diseases. Therefore, TCM preventive therapy should be applied to improve physical conditions after pregnancy or labor to prevent sub-health conditions. In our study, we found that reproductive diseases were significantly negatively correlated with the number of pregnancies and labors. Therefore, for women already in a sub-health condition, interventions should be administered to protect them from developing reproductive diseases. We also observed that postpartum reproductive diseases were significantly positively correlated with the number of pregnancies and labors. Therefore, appropriate measures, including avoiding unintended pregnancy, improving the awareness of female reproductive health, and promoting post-abortion services, should be taken. Those measures could prevent postpartum sub-health conditions and reproductive diseases. In conclusion, postpartum reproductive diseases are positively correlated with pregnancy and labor. The relationship between pregnancy and postpartum sub-health conditions shows a curvilinear correlation. With an increase in pregnancy and labor, the incidence of sub-health conditions after parturition gradually increases. When the number of pregnancies and labors further increases (2-3 pregnancies and labors), the incidence of a healthy reproductive state postpartum continuously decreases and the incidence of reproductive disease after parturition further increases, while the incidence of sub-health conditions after parturition tends to decline.

This study also has some limitations. It lacked comprehensive data from other regions and was a retrospective design. In addition, our study did not distinguish between the number of abortions and the number of labors occurred. Further large-scale prospective studies on female reproductive sub-health are required.

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