

*Original Article***Reviewing the effectiveness of pre-pregnancy counseling protocol on pregnancy and labor indices**

*Shahla Shahidi**, *Pejman Aghdak***, *Ziba Farajzadegan****, *Minoo Izadi*****,
*Manijeh Mohammadi******, *Mojgan Nikkhah Fard******

Abstract

BACKGROUND: Pre-pregnancy care is considered as the services assessing and reducing the pregnancy risks through providing medical care and mental support. Therefore, a pre-pregnancy counseling protocol was prepared based on a series of guidelines. This study aimed to determine the effect of the protocol on pregnancy and labor indices.

METHODS: This was a four-phase field study conducted in four randomly selected urban and rural health centers in Shahreza. In the first phase, the information including pregnancy and labor indices was extracted. The participants were all the women who had a delivery in the year before the study (census). In the second and third phases (3 and 6 months after implementing the protocol in the case centers), the process of implementing the protocol was assessed. In the fourth phase (a year later), pregnancy and labor indices were determined in case and control centers (on all the women who had labor in the year before) again and the results were compared in case and control groups as well as before and after implementing the protocol. Data was collected by reviewing documentations and using data collection forms. It was then analyzed by descriptive and analytical statistics using SPSS₁₃.

RESULTS: The obtained results indicated the positive effects of pre-pregnancy cares on cesarean indices, percentage of underlying diseases, pregnancy over the age of 35, and pregnancy intervals of less than 3 years. In addition, the protocol had been implemented correctly in 8.2% of the cases in the second phase, and in 30.2% of the cases in the third phase.

CONCLUSIONS: The positive effects of pre-pregnancy cares on some of the indices raised the necessity of seriously considering and integrating this program in the routine women's health care programs. Considering that less than one-third of the staff members of the case centers had completely conducted the pre-pregnancy cares, monitoring the staff's performance is essential for improving the effectiveness of the care.

KEY WORDS: Pre-pregnancy counseling, pregnancy indices, labor indices, reproductive age.

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Having a healthy infant is the ambition of most families in all communities. Besides, reducing infant mortality is a national health goal among most nations. Although not all the pregnancy problems are preventable, identifying the risks and conduct-

ing appropriate measures can increase the number of healthy infants.¹

Pre-pregnancy care is a series of services, mainly based on preventive medicine, that assess the risks for becoming pregnant and tries to improve women's health through providing

* MSc, Vice Chancellery of Health and Medical Education Research Center, Isfahan University of Medical Sciences, Isfahan, Iran.

** MD, MPH, Department of Family Health and Population, Vice Chancellery for Health, Isfahan University of Medical Sciences, Isfahan, Iran.

*** MD, Associate Professor of Community Medicine, Department of Community and Preventive Medicine, Isfahan University of Medical Sciences, Isfahan, Iran.

**** BS, Department of Family Health and Population, Vice Chancellery for Health, Isfahan University of Medical Sciences, Isfahan, Iran.

***** MD, Isfahan University of Medical Sciences, Isfahan, Iran.

***** BS, Department of Family Health and Population, Vice Chancellery for Health, Isfahan University of Medical Sciences, Isfahan, Iran.

Correspondence to: Shahla Shahidi, MSc.

Email: shahidi@mui.ac.ir

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trainings and conducting diagnostic, therapeutic and pharmacological interventions. The aim of these services is to provide a non-risky pregnancy as well as maintaining mother and fetus health.²⁻⁶

Despite the importance of pre-pregnancy counseling, no compiled program had ever existed in this regard in the health care system of Iran until 2001. It was then that the issue was discussed as a part of necessary care services for women when designing and implementing the integrated maternal health pilot project. However, national results showed that the coverage of these services in the province of Isfahan has been very low (22.8%).⁷

A study in the United States showed that 42% of unwanted pregnancies had led to abortion and 14% to fetal death.⁸ In the Netherlands, 459 pregnant women who referred to pre-pregnancy care clinics were studied and it was indicated that approximately 65% of the mothers had at least one risk factor.⁹ According to previous surveys, unwanted pregnancies or those associated with maternal chronic diseases, like obesity or depression, or with short inter-pregnancy intervals, were linked with more complications and had higher risks for the mother and infant. Therefore, all women should have pre-pregnancy planning and benefit from care services for early detection and diagnosis of pregnancy-related risk factors.³

Based on a national study conducted in 2005, although antenatal care coverage is 97.7% in the province of Isfahan, only 8% and 1.8% of the services provided by the public and private sectors, respectively, are include the full content of the care services. Besides, 4.1% of women under 18 and 6% of those over 35 became pregnant from which 15.9% were unwanted pregnancies.⁷ In more than 80% of maternal death cases during 2005-2009, the pregnant mother had one of the pregnancy risk factors.¹⁰

Integrated Monitoring and Evaluation Survey (IMES) indicated approximately 88.3% of pregnant women to have at least one risk factor and to require intensive care.⁷ However, some risk factors including pregnancy under the age of 18 or over 35, pregnancy associated

with different diseases (hypertension, diabetes and etc.), and the fourth pregnancy and more, can be eliminated with education about the appropriate age for pregnancy and pre-pregnancy cares.⁵ Although other risk factors are not preventable or removable, in some cases such as suffering from different diseases, conducting pre-pregnancy measures and providing necessary educations can minimize the complications during the pregnancy period.^{4, 5}

According to a previous research, women who had received pre-pregnancy care had a longer gestational duration and were in a better condition in terms of Apgar score, premature delivery and birth weight compared with the control group.¹¹ Moreover, referring to the pre-pregnancy counseling clinics has been indicated to positively affect maternal and fetal risks in the subsequent pregnancies.¹²

In a study on diabetic women, pre-pregnancy counseling has been reported to reduce congenital abnormalities and defects, and control the blood glucose in the first trimester (lower glycosylated hemoglobin levels).¹³ Likewise, other studies confirmed the effects of identifying and educating pre-pregnancy risk factors as well as previous conducted cares on pregnancy output.^{14, 15}

The aforesaid cases on the one hand indicated the importance of pre-pregnancy counseling and on the other hand indicated the issues which can be prevented through counseling and proper pre-pregnancy educations.

The main points in pre-pregnancy cares are health improvement, assessing the risk factors, implementing medical measures, and mental supports.^{5, 16} Therefore, a pre-pregnancy protocol (instructions of how to implement the cares) should be prepared considering the provided recommendations and guidelines in this regard.^{16, 17} The present study aimed to review the effects of pre-pregnancy care protocol on pregnancy and labor indices.

Methods

This was an interventional field trial conducted during 2005 to 2007 in Shahreza (one of the affiliations of Isfahan University of Medical

Sciences). Since no pre-pregnancy-related educational and administrative activities had ever been done in Shahreza, and also considering the low migration rate which results in the homogeneity of the population, this city was chosen for the study. The study population included 15 to 49-year-old married women who were under the coverage of one of the selected family planning centers during the study. Women with tubectomy or having husbands with vasectomy for over a year were excluded.

This grant study received was designed in four phases. In the first phase, underlying information including pregnancy and labor indices, i.e. the indices which could be changed and intervened through the pre-pregnancy care, were identified. The studied indices included pregnancy under 18 years old, pregnancy over 35 years old, interpregnancy intervals of less than three years, fourth or more pregnancies, pregnancy with an underlying disease, anemia (hemoglobin < 10), abnormal body mass index (BMI) (< 19 or > 29) and percentage of unwanted pregnancy.

Random sampling was used to select one urban and one rural family planning centers were selected as case centers out of 8 urban and 3 rural centers in Shahreza. Thereafter, the control centers were selected matching the characteristics of the case centers (in terms of covered population, age groups, economical, cultural and social status). The subjects were selected using the census method, i.e. all women with the inclusion criteria who had a labor or a pregnancy the year before starting the study were included. Afterwards, pregnancy and labor indices of the year before the study were extracted by the staff of the case and control centers. The project manager held a two-hour educational session about how to fill the data collection form. Then the records of the women who have been under coverage of their centers in the year before their pregnancy and labor were extracted and entered in the corresponding forms. The form included demographic data (the features of the center, subjects' age and education) and the information related to pregnancy and labor indices.

Data collection included four phases of reviewing documentations. Content validity of the data collection form had been confirmed through literature review and obtaining experts' comments.

The data of the first phase were analyzed by descriptive statistics, independent t-test, chi-square, and Mann-Whitney tests using SPSS¹³.

In the second and third phases of the study, the protocol was performed for all included women and then 3 and 6 months after the protocol implementation process, it was assessed.

In these phases, first, all the staff members of the family health centers were educated by the project manager (for 4 hours). In these educational sessions, the importance and quality of pre-pregnancy care, the protocol of providing the care and the quality of registering the care were given in the educational forms. It was decided to fill the pre-pregnancy forms for all the included women with appropriate spacing intervals (or interpregnancy interval) who were under the coverage of a health center.

Five steps were conducted in order to provide care: A. Interview and establishing a file; B. Clinical examination; C. Tests or complementary review; D. Education and Counseling; and E. Immunization and nutritional supplementations. The goal was to provide optimal pregnancy conditions available for women with appropriate birth spacing to get pregnant.

Three and six months after implementing the protocol, two executive designers reviewed the provided pre-pregnancy care services, and filled the data collection form No. 2 by referring to the case centers and studying the files of the women covered by family planning services.

The form asked about implementation or non-implementation of pre-pregnant care as well as proper and full implementation of the five aforementioned steps.

A pre-pregnancy pamphlet, which was taught to the relevant staff by the experts before implementation of the protocol, and a pamphlet in the field of pre-pregnancy care, which was given to women with appropriate interpregnancy intervals were used to offer the educational content.

The data of the second and third phases were also analyzed by chi-square test using SPSS₁₃.

Finally, in the fourth phase, one year after implementation of the protocol, pregnancy and labor indices were again assessed in the case and control centers. The results before and after the protocol was implemented were compared in both groups.

Data collection and calculating methods were similar to the first phase and all the birth giver mothers (census) in the previous year (i.e. the year the intervention had been done) were identified and form No. 1 was filled using their household file.

The data of the fourth phase were also analyzed by descriptive statistics as well as paired t, independent t, Mann-Whitney U, chi-square and McNemar tests (to compare the proportions before and after implementation of the protocol in each group), and Z test (to compare the changes before and after in the two groups).

Results

In the first phase of the project, the total number of 468 women aging 15 to 49 years old who had pregnancy and labor during the past year were studied from whom 231 women (49.4%) were allocated in the case and 237 (50.6%) in the control group. Twenty six women (11.3%) in the case and 29 women (12.2%) in the control group were living in a village.

Mean age in the case and control groups were 28.0 ± 6.22 and 27.14 ± 5.23 , respectively. There was no significant difference between the mean age of the two groups ($p = 0.92$).

According to the results, although the frequency of people with academic educations in the control group was more than the case group (22.1% vs. 15.2%), Mann-Whitney U test did not show the difference to be significant.

In addition, chi-square test showed that the control and case groups had no significant difference in terms of frequency distribution of contraceptive methods.

Comparing pregnancy and labor indices in the case and control groups before implementing the protocol revealed no significant differ-

ences. Although the frequency of a pregnancy interval of less than three years in the control group was more than the case group, the difference was not significant (27.6% vs. 15.9%; $p = 0.016$; $t = 5.79$).

The results of the second and third phases covered 1695 and 1686 women aging 15 to 49 years old under pre-pregnancy cares in the case and control groups, respectively. Although all subjects were provided with data collection forms, due to incompleteness of their files, some parts of the questionnaires could not be answered.

The results showed that relative frequency of correct implementation of protocols in the second and third phases were 8.2% and 30.2%, respectively. Chi-square test indicated this increase to be statistically significant in comparison with the second phase ($p < 0.001$; $\chi^2 = 264.91$).

The frequency of correct implementation of the cares showed no statistical significant difference in separating various family planning methods of the 2nd and 3rd phases ($p = 0.055$).

Finally, in the fourth phase, 48 women were studied from which 237 subjects (49.4%) were in the case centers and 243 subjects (50.6%) in the control group. Villagers constituted 32 subjects (9.7%) and 29 subjects (11.9%) of the case and control groups, respectively.

Mean age of the case and control groups were 27.6 ± 5.6 and 27.4 ± 5.1 years, respectively. Independent t-test did not suggest a significant difference between the mean age of the two groups ($p = 0.952$).

The frequency of the subjects with academic educations after the intervention in the control group was more than the case group (24.7% vs. 13.5%) and Mann-Whitney U test indicated the difference to be statistically significant ($p = 0.003$; mean rank = 24436.0).

Chi-square test showed no significant difference between the control and case groups in terms of frequency distribution of contraceptive methods. Likewise, the pregnancy and labor indices in the two groups after the im-

plementation of the protocol did not significantly differ. The only significant difference observed was related to cesarean frequency index which was lower in the case group in comparison with the control group (45.6% vs. 56.0%; $p < 0.001$; $t = 20.84$).

Comparing the indices after the intervention between the two groups revealed a significant reduction of cesarean and pregnancies associated with underlying diseases in the case group. In addition, significant reductions in the percentage of pregnancies with intervals of less than 3 years and abnormal BMI were seen in the control group (Table 1).

Based on the results from Z test, there were differences between the case and control

groups with regard to pregnancy over 35, pregnancy interval of less than 3 years, underlying diseases, and cesarean. Thus, the reduction in pregnancies over 35 in the case group was significant after implementing the intervention in comparison with the control group. Pregnancy intervals of less than three years were reduced in both groups with the reduction being more significant in the control group and the difference being statistically significant. Underlying diseases in pregnancy as well as cesarean percentage were reduced in the case group after the intervention. However, they increased in the control group and the difference was statistically significant (Table 2).

Table 1. Comparing the relative frequency of pregnancy and labor indices in the case and control groups, before and after the intervention.

| | Case Group | | | | | | P | Control Group | | | | | | P |
|---|------------|------|-------|------|-------|------|------|---------------|------|-------|------|-------|------|-------|
| | Before | | After | | Total | | | Before | | After | | Total | | |
| | N | % | N | % | N | % | | N | % | N | % | N | % | |
| Pregnancy under 18 | 0 | 0.0 | 4 | 1.7 | 4 | 0.9 | 0.10 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0.93 |
| Pregnancy over 35 | 30 | 13.0 | 20 | 8.4 | 50 | 10.7 | 0.10 | 19 | 8.0 | 20 | 8.2 | 39 | 8.1 | 0.93 |
| The fourth or more pregnancies | 27 | 11.7 | 20 | 8.4 | 47 | 10.0 | 0.24 | 22 | 9.3 | 18 | 7.4 | 40 | 8.3 | 0.45 |
| Pregnancy with less than 3 years interval | 24 | 15.9 | 19 | 14.6 | 43 | 15.3 | 0.76 | 37 | 27.6 | 18 | 16.2 | 55 | 22.4 | 0.03 |
| Pregnancy with underlying diseases | 32 | 13.9 | 18 | 7.6 | 50 | 10.7 | 0.02 | 20 | 8.5 | 28 | 11.5 | 48 | 10.0 | 0.27 |
| Anemia (hemoglobin < 10) | 3 | 1.3 | 1 | 0.4 | 4 | 0.9 | 0.10 | 2 | 0.9 | 2 | 0.8 | 4 | 0.8 | 0.91 |
| Abnormal BMI | 68 | 29.7 | 58 | 0.6 | 126 | 27.1 | 0.56 | 48 | 23.0 | 22 | 9.3 | 70 | 15.7 | 0.001 |
| Unwanted pregnancy | 36 | 15.6 | 49 | 20.7 | 85 | 18.2 | 0.15 | 35 | 14.8 | 61 | 25.1 | 96 | 20.0 | 0.005 |
| Preterm delivery | 8 | 3.5 | 16 | 6.8 | 24 | 5.1 | 0.10 | 17 | 7.2 | 20 | 8.2 | 37 | 7.7 | 0.66 |
| Cesarean | 131 | 57.0 | 108 | 45.6 | 239 | 51.2 | 0.01 | 139 | 58.6 | 161 | 66.3 | 300 | 62.5 | 0.08 |
| Birth weight less than 2500 gr | 9 | 3.9 | 13 | 5.5 | 22 | 4.7 | 0.42 | 18 | 7.6 | 19 | 7.8 | 37 | 7.7 | 0.92 |

Table 2. Comparing the changes of pregnancy and labor indices in the case and control groups, before and after the intervention.

| | Case Group | | Control Group | | P | Z |
|---|------------|-------|---------------|-------|-------|--------|
| | Before | After | Before | After | | |
| Pregnancy under 18 | 0.0 | 1.7 | 0.0 | 0.0 | 0.095 | -1.309 |
| Pregnancy over 35 | 13.0 | 8.4 | 8.0 | 8.2 | 0.013 | 2.217 |
| The fourth or more pregnancies | 11.7 | 8.4 | 9.3 | 7.4 | 0.268 | 0.622 |
| Pregnancy with less than 3 years interval | 15.9 | 14.6 | 27.6 | 16.2 | 0.001 | -2.928 |
| Pregnancy with underlying diseases | 13.9 | 7.6 | 8.5 | 11.5 | 0.001 | 3.123 |
| Anemia (hemoglobin < 10) | 1.3 | 0.4 | 0.9 | 0.8 | 0.217 | 0.802 |
| Abnormal BMI | 29.7 | 24.6 | 23.0 | 9.3 | 0.189 | 0.876 |
| Unwanted pregnancy | 15.6 | 20.7 | 14.8 | 25.1 | 0.084 | 1.379 |
| Preterm delivery | 3.5 | 6.8 | 7.2 | 8.2 | 0.131 | -1.121 |
| Cesarean | 57.0 | 45.6 | 58.6 | 66.3 | 0.001 | 4.595 |
| Birth weight less than 2500 grams | 3.9 | 5.5 | 7.6 | 7.8 | 0.149 | -1.0 |

Discussion

This study was conducted in four phases in order to review the effects of pre-pregnancy programs on pregnancy and labor indices. It also aimed to assess the proper implementation of such programs.

Like numerous previous studies,^{3, 9, 11, 12, 14, 18, 19} the results indicated the effectiveness of these cares on cesarean indices, the percent of pregnancy with underlying diseases, and pregnancies over 35 years of age. De et al. studied 454 women and announced that outpatient clinics with pre-pregnancy cares helped reduce the risk factors. They also suggested that these centers would improve pregnancy results by providing educational recommendations and early diagnosis and treatment of diseases.⁹

Researchers believe that because in pre-pregnancy cares, weight balance and proper diet are taught to mothers, and specific reviews are done for identifying and eliminating the risk factors, the prevalence of some complications such as preterm delivery,⁸ neonatal macrosomia,²⁰ and other cesarean indications

will be reduced. The reduction in risk factors and treating underlying diseases will improve pregnancy outcomes.^{12, 21} Therefore, pre-pregnancy counseling and training of mothers are recommended to reduce the incidence of cesarean.^{18, 21} Similarly, Carson emphasized that pre-pregnancy cares reduce unwanted pregnancies and pregnancies with short intervals and their associated complications.³

In terms of anemia indices, although pregnancy intervals less than 3 years, the fourth and more pregnancies, and abnormal BMI decreased after the intervention, the reductions were not significant. This finding was not in accordance with the results of other studies,^{1, 8, 12, 21} which could be due to unintended mistakes of the laboratory staff and difference in the educational levels of the control group in the fourth phase (i.e. the subjects with higher educational levels were more in the control group in this phase).

Although the incidence of preterm delivery increased in both groups, it was significant neither inside the groups nor between them

which may be due to the limited number of studied individuals.

The results of other studies also showed that different aspects of pre-pregnancy care including asking for patient's history, evaluating the couples, providing health and nutritional recommendation and treating the existing diseases as needed, can lead to improved pregnancy outcomes.^{8,22}

No significant difference was perceived in low birth weight indices between the case and control groups. Since various studies on pre-pregnancy weight and checking the mothers' weight during the pregnancy had been reported effective on infants' weight gain,^{19,23,24} a similar result was expected to be achieved by providing necessary education to the mothers, adjusting their weight, and presenting proper pregnancy nutrition in their pre-pregnancy cares.

Since unlike other studies,^{1,8,21-24} we could not find significant differences in the status of a number of studied indices including pregnancy under the age 18, the fourth and more pregnancies, unwanted pregnancy, anemia, abnormal BMI, preterm delivery, and low birth weight, after implementing the intervention, may be a sign of to the low quality of the provided services. The results of the second and third phases of this project can be the cause of the claim. Although the percentage of correct implementation of the protocol in the third phase was more considerable than the second phase, despite primary educations (3 and 6 months after implementing the protocol), the frequencies in the second and third phases were lower than expected (8.2% and 30.2%, respectively). The pre-pregnancy cares staff members of the case centers had conducted were not complete and the five aforementioned steps were not fully followed. This can

simply explain the lack of significant differences in the two groups after the intervention.

Since this was a field study, despite conducting necessary measures, it was influenced by factors such as unintended mistakes in conducting the instructions and protocols or carelessness in filling the forms due to work congestion which led to incompleteness of some of the required information in the records and mistakes of the staff members in full implementation of pre-pregnancy cares.

Conclusion

Considering the observed effects of pre-pregnancy cares on some of the pregnancy and labor indices, particularly cesarean and underlying diseases which threaten the mothers' health and cause a high percentage of maternal mortality, planning quantitative development of these cares is recommended.

In addition, the observed weakness in correct implementation of the cares implies the need for qualitative improvements through permanent monitoring of the staff members and providing interventional strategies. Finally, further studies for identifying barriers of proper implementation of the cares seem necessary.

The authors declare no conflict of interest in this study.

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