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# Patterns and Determinants of Preconception Health Behaviors in Iranian Women

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## Abstract

**Background:** Preconception health behaviors (PCHBs) include couples' planning for pregnancy and changing their lifestyle to have a greater chance of fertility and desirable pregnancy outcomes. Although starting preconception care has been considered in Iran for nearly a decade, it has not received enough attention. For this reason, there is a dearth of studies in this area.
**Objectives:** The aim of this study was to investigate the patterns and determinants of PCHBs in women referred to healthcare centers in Mashhad, Iran.
**Methods:** In this cross-sectional study, 480 married women who had decided to become pregnant were selected from five different health centers in Mashhad through a multistage cluster sampling method. The data collection tool was a self-structured, valid, reliable questionnaire consisting of the three following parts: women's demographic data, questions about knowledge and attitudes about PCHBs, and a checklist of PCHBs that were being performed. Data analysis was carried out using SPSS v16.5 with descriptive and inferential statistics, including the Pearson correlation, Chi square, and Kruskal-Wallis tests. A P value $< 0.05$ was considered statistically significant.
**Results:** It was found that 77.7% of women had attended preconception care (PCC) programs. About 31.7% and 68.3% of women carried out preconception and interconception care, respectively. About 39.8% of women used a folic acid supplement in the correct way. Only 6.9% of women engaged in regular physical activities. Approximately 33.1% of women had dental care; 9.8% received genetic counseling; and 33.3% carried out blood testing. There were significant relationships between attending PCC programs and using a folic acid supplement, engaging in physical activities, having blood tests, and receiving dental care and genetic counseling ($P < 0.0001$). There were positive correlations between knowledge score and acid folic consumption ($r = -0.181$, $P = 0.001$), physical activity ($r = 0.184$, $P = 0.001$), and fruit consumption ($r = 0.126$, $P = 0.001$), respectively.
**Conclusions:** Although the majority of women had PCC records and received advice from healthcare professionals to carry out PCHBs, most of them did not adhere to the PCHB guideline recommendations. It is therefore suggested that strategies should be adopted to establish PCC services in the healthcare system and encourage clients to adhere to the PCHB guideline recommended by the ministry of health.

*Keywords:* Preconception Care, Interconception Care, Health Behavior, Women's Health, Folic Acid



## 1. Background

In the preconception period, a woman's health can not only contribute to improvement in pregnancy-related outcomes but also to her own long-term health and that of her children (1, 2). Preconception health behaviors (PCHBs) include couples' planning for pregnancy and changing lifestyle to have a greater chance of fertility and desirable pregnancy outcomes (3). PCHBs include planning for the reproductive period, stopping addictive/illegal drug use (including alcohol and tobacco), engaging in physical activities, maintaining a healthy diet, consulting with the physician about the consumption of prescribed medications, using multivitamins and folic acid supplements, updating vaccinations, controlling diseases like diabetes mellitus, avoiding contact with harmful environmental toxins, and investigating the family history of diseases (4). In fact, preconception care (PCC) includes the interventions that are carried out to determine and change the biomedical, behavioral, and social risks considered threats to women's health and pregnancy outcomes through prevention and control (3).

The maternal and child health outcomes, such as maternal and newborn/ infant mortality rate, preterm labor, and low birth weight, are extremely important issues; moreover, they are considered indicators of the overall health status in the community (5). Despite improvement in access to prenatal care, the incidence of congenital anomalies, preterm birth, and maternal mortality have not decreased in many countries, and this indicates that prenatal care alone is not enough to improve pregnancy outcomes. Thus, interventions need to be carried out during the preconception period as well (6). Some factors, such as smoking (7), alcohol use, maternal underweight and overweight, and chronic diseases like diabetes (8, 9), may increase the risk of adverse pregnancy outcomes not only during pregnancy but also before fertilization. Thus, prepregnancy is a critical period for the prevention of adverse pregnancy outcomes. Studies have shown that taking folic acid prevents fetal neural tube defects (10).

The risk of unplanned pregnancy increases the importance of adherence to PCHBs. Unplanned pregnancy can lead to abortion, preterm birth, and other adverse pregnancy outcomes (11). Women who have unplanned pregnancy often start delayed prenatal care at the end of the first trimester, while many of the biological, psychological, social and environmental risk factors have previously imposed their negative effects on the fetus in the organogenesis stage at day 17 - 56 pregnancy, when the woman may not be even aware of her pregnancy (12, 13). Indeed, after becoming aware of their pregnancy, mothers try to reduce risk factors by engaging in healthy behaviors; however, by this time, it is too late to improve pregnancy outcomes (3).

Although the concept of PCC was considered over 20 years ago in developed countries, and it has been proven that PCHBs can affect the health of the fetus and improve pregnancy outcomes, the importance of this issue has been somewhat neglected by health systems and the public sphere (14). In Iran, from 1999 to 2002, the department of family and population health, based in ministry of health and education, created a standard guideline for outpatient maternal care services and providing PCC via governmental health clinics, which was started as pilot in the country in 2003. After the protocol was piloted and revised by a team of healthcare providers and directors of family health, urban health clinics in most cities in Iran began to offer this type of care (15).

Care is provided by a doctor or midwife at health centers; it includes an interview and the completion of a file, including the following information: personal profile; family history, including kinship with the patient's husband; the results of physical exams; past pregnancy history; medical history and any current potential diseases and abnormalities; mental disorders and any history of violence; risky behaviors; addiction; smoking; and alcohol. Other components of PCC for mothers include physical examination, laboratory tests, counseling and training, prescription of medical supplements, and immunization. After identifying high-risk cases, the clients undergo close observation, and all required diagnostic procedures are applied. In addition, since consumption of folic acid supplements is required 3 months before pregnancy to prevent fetal neural tube defects, it is prescribed by physicians and midwives for all women who have been referred to PCC (15).

The results of one study in Iran showed that a total of 79.6% of the participants reported at least one behavioral risk during the preconception period (16). However, as previously mentioned, although PCC was initiated a decade ago, it is still not known in Iran as routine care similar to prenatal care, and it is not adequately accepted. In their study, Bayrami et al. demonstrated that knowledge and practice of health staff in the field of PCC has not reached desirable levels (17). Riazi also found that although approximately 80% of pregnancies are planned, less than 10% of women use folic acid, even when they have a history giving birth to children with neural tube defects (18). In Frey and Files's study, deficiencies in women's knowledge about preconception risk factors that influence maternal and fetal health occur due to doctors' neglect of routine preconception health care (19). In the study by Wu conducted in England, 25% of women correctly used acid folic supplement before pregnancy (20).

This study aims to elucidate the patterns and determinants of a behavior so that facilities and barriers for adhering to that behavior can be determined. The results of this study could be applied to planning programs with a view to improving health services (21).

## 2. Objectives

Given the importance of health behaviors before pregnancy and because few studies have been carried out in Iran based on the PCHBs recommended in the ministry of health guideline, this study was designed to investigate the patterns and determinants of health behaviors before pregnancy in women referred to health centers in Mashhad.

## 3. Methods

### 3.1. Design

This cross-sectional study was conducted in 2014 with the participation of 480 women of reproductive age who decided to become pregnant.

### 3.2. Participants and Setting

The research population consisted of women of reproductive age referred to maternal child health clinics in governmental healthcare centers in Mashhad, Iran. The sample size was calculated using the following formula: +3 based on the results of a prior study in Iran (22). The calculated sample size for the study was 480 people with 90% power and a 99% confidence interval at a significance level of 0.05.

The inclusion criteria were as follows: intention to become pregnant, no infertility issues, and provision of consent to participate in the research. Exclusion criteria included withdrawal from participating in the study at each stage of completing the questionnaire.

### 3.3. Sampling and Data Collection

The participants were selected from five different health centers of Mashhad, Iran through multistage cluster sampling. At first, all five central healthcare centers in Mashhad were listed, and then 30 local health centers under their direction were randomly selected. To recruit women from each center, the list of all eligible women for inclusion in the study were extracted using the continuous care records. They were invited to attend the center to participate in the study. The study questionnaires were completed by the researcher via interview with the subjects.

### 3.4. Data Collection Tool

The data collection tool was a self-structured questionnaire consisting of the three following components: 1, women's demographic data and previous obstetrics and medical history; 2, knowledge and attitudes toward PCHBs; and 3, a PCHB checklist for preconception care and its sub-behaviors (including physical activity, exercising for at least 30 minutes per day or 5 days a week; folic acid intake; dental care; laboratory tests for screening of anemia, diabetes, thyroid; and genetic counseling; and intake of fruits and vegetables) (2) based on recommendations made by Iranian safe motherhood national program (14). The questionnaires were completed by the interviewer (corresponding author) using a closed-ended interview method.

To measure subjects' knowledge, 12 questions were used. A correct answer earned 2 points; a wrong answer added 0 points; and an answer of do not know earned 1 point. The range of the knowledge scores was 0 - 24. To measure attitude, 11 questions were used, with responses on a Likert scale ranged from 1 to 7. The range of attainable scores for attitude statements was 11 - 77.

The instrument was self-structured, as mentioned in the first line of the Data Collection Tool section. Regarding measurement of the PCHBs, there were three questions with yes/no answers. These asked about whether blood tests, dental care, and genetic counseling had been performed. The folic acid and exercise sections included one question each based on the pregnancy risk assessment monitoring system (PRAMS). To measure folic acid uptake, one question on a Likert scale ranging from 1 to 5 was used (I don't take folic acid, 1 to 2 times a week, 3 to 4 times a week, 5 to 6 times a week, every day of the week) (23). In addition, to measure physical activity, one question on a Likert scale ranging from 1 to 5 was used (less than 1 day per week, 1 to 2 days per week, 3 to 4 days per week, 5 or more days per week, I was told by a doctor not to exercise) (23).

Content validity of this instrument was evaluated quantitatively. The content validity ratio (CVR) and the content validity index (CVI) of each item were calculated based on the opinions of 14 experts. We asked all of the experts on the panel to judge the rate of necessity of each item; based on the number of expert panel members, those items with a CVR score of 0.62 or higher were approved and those with CVI score of 0.79 or above were considered satisfactory (24).

Reliability was assessed using internal consistency with Cronbach's alpha and the test–retest method (25). The questionnaire was completed by 62 women twice in a 2-week interval and a correlation coefficient of 79% or more was obtained for all variables. Cronbach's alpha for all items that represented each research variable was equal to or greater than 0.8.

### 3.5. Administration of the Data Collection Questionnaire

First, using the continuous care booklet, eligible women were identified for inclusion in the study and invited to participate. Women who had been visited and had outpatient medical records from at least 3 months prior were included in the study and interviewed. The women who had no medical records in the PCC were called and informed about the aim of the study and then invited to attend the clinic and participate in the study. The two latter groups were asked about PCC and sub-behaviors over the last 3 months before trying to conceive. For women who were referred to the PCC clinic for the first time to attend and create a medical record, and women for whom a medical record had been generated less than 3 months before, the questionnaire was completed on the same day subject to the participants' informed consent. The two latter groups were followed up and asked about their sub-behaviors 3 months after the medical record was created. The sampling strategy is shown in Figure 1.

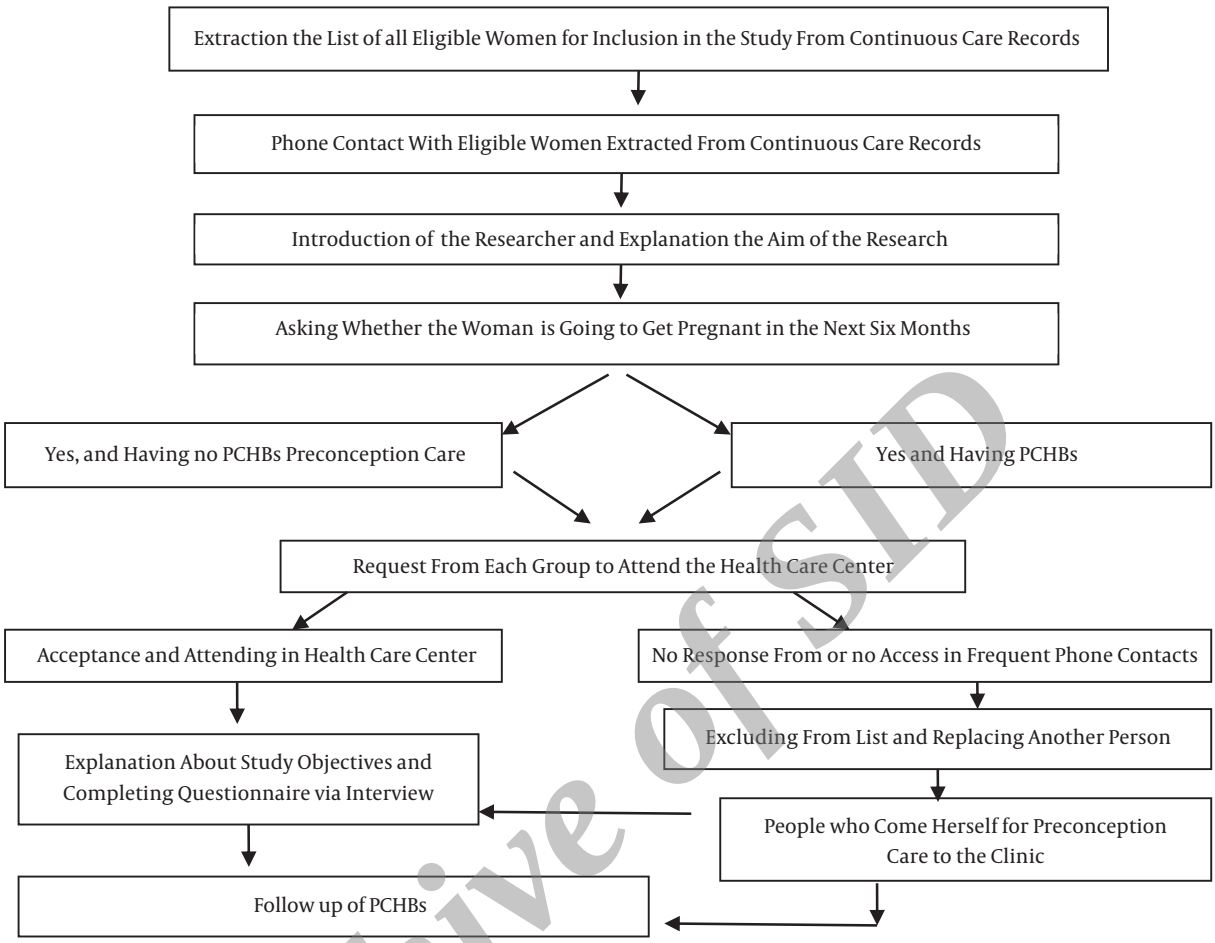


**Figure 1.** Algorithm for the Sampling Strategy

### 3.6. Statistical Analysis

Data analysis was carried out using SPSS version 16.5. The Kolmogorov-Smirnov test was used to normalize of the data. All variables had non-normal distributions and transformations alone could not bring the distributions to normality.

Frequency distribution and nonparametric tests, including Spearman correlation, the Chi square test, and the Kruskal-Wallis test were used for data analysis. A P-value $< 0.05$ was considered statistically significant.

### 3.7. Ethical Approval

Permission for the research was obtained from the ethics committee of Mashhad University of Medical Sciences (grant no: 921372). Data were collected from participants who provided written informed consent for the interview.

## 4. Results

In total, 480 subjects were recruited for this study, with a participation rate of 100%. The mean age of the women was 27.96 $\pm$ 5.51 years. Of 480 women, 373 (77.7%) attended pre-pregnancy care programs; 152 (31.7%) and 328 (68.3%) of the subjects received preconception and interconception care, respectively. Of the 480 women, 325 (67.7%) received care from the midwives in the healthcare centers.

The sociodemographic, obstetric, and medical characteristics of subjects are shown in Table 1.

The mean and standard deviation of knowledge and attitude scores were 20.58 $\pm$ 2.67 and 71.53 $\pm$ 4.71, respectively. The minimum and maximum scores for knowledge and attitude were 10 - 24 and 51 - 77, respectively.

About 191 (39.8%) of women used folic acid supplements in the correct way. Only 33 (6.9%) of women engaged in regular physical activities. Approximately 159 (33.1%) of

**Table 1.** Sociodemographic, Obstetric, and Medical Characteristics of Subjects (N = 480)

| Variable | Preconception Care, No. (%) | | | P Value | | |
|---|---|---|---|---|---|---|
| | Yes | No | Total | $\chi^2$ | df | P |
| **Age woman** | | | | 8.28 | 5 | 0.141 |
| < 20 | 28 (77.8) | 8 (22.2) | 36 (100) | | | |
| 20 - 25 | 95 (71.4) | 38 (28.6) | 133 (100) | | | |
| 26 - 30 | 126 (79.7) | 32 (20.3) | 158 (100) | | | |
| 31 - 35 | 83 (82.5) | 23 (21.7) | 106 (100) | | | |
| 36 - 40 | 38 (90.5) | 4 (9.5) | 42 (100) | | | |
| > 40 | 3 (60) | 2 (40) | 5 (100) | | | |
| **Level of education** | | | | 1.116 | 3 | 0.77 |
| Elementary | 56 (82.4) | 12 (17.6) | 68 (100) | | | |
| Below high school | 61 (76.2) | 19 (23.8) | 80 (100) | | | |
| Diploma | 180 (77.6) | 52 (22.4) | 232 (100) | | | |
| University | 24 (24) | 76 (76) | 100 (100) | | | |
| **Occupation** | | | | 8.24 | 3 | 0.041 |
| Housewife | 342 (79.2) | 90 (20.8) | 432 (100) | | | |
| Government employee | 14 (56) | 11 (44) | 25 (100) | | | |
| Non-skilled worker | 1 (50) | 1 (50) | 2 (100) | | | |
| Work at home | 16 (76.2) | 5 (23.8) | 21 (100) | | | |
| **Income level** | | | | 8.28 | 5 | 0.141 |
| Less than adequate | 75 (78.9) | 20 (21.1) | 95 (100) | | | |
| Adequate | 292 (78.1) | 82 (21.9) | 374 (100) | | | |
| More than adequate | 6 (54.5) | 5 (45.5) | 11 (100) | | | |
| **Number of pregnancies** | | | | 1.35 | 3 | 0.717 |
| 0 | 114 (75) | 38 (25) | 152 (100) | | | |
| 1 | 157 (78.5) | 43 (21.5) | 200 (100) | | | |
| 2 | 60 (77.9) | 17 (22.1) | 77 (100) | | | |
| ≥ 3 | 42 (82.4) | 9 (17.6) | 51 (100) | | | |
| **Number of children** | | | | 2.28 | 3 | 0.516 |
| 0 | 143 (76.9) | 43 (23.1) | 186 (100) | | | |
| 1 | 179 (78) | 48 (22) | 218 (100) | | | |
| 2 | 51 (82.3) | 11 (17.7) | 62 (100) | | | |
| ≥ 3 | 9 (64.3) | 5 (35.7) | 14 (100) | | | |
| **Number of abortions** | | | | 2.23 | 2 | 0.327 |
| 0 | 285 (76.2) | 89 (23.8) | 374 (100) | | | |
| 1 | 67 (82.7) | 14 (17.3) | 81 (100) | | | |
| ≥ 2 | 21 (84) | 4 (16) | 25 (100) | | | |
| **Preterm labor** | | | | 2.25 | 1 | 0.635 |
| Yes | 18 (81.8) | 4 (18.2) | 22 (100) | | | |
| No | 355 (77.5) | 103 (22.5) | 458 (100) | | | |
| **Intrauterine fetal death** | | | | 0.891 | 1 | 0.345 |
| Yes | 9 (90) | 1 (10) | 10 (100) | | | |
| No | 364 (77.4) | 106 (22.6) | 470 (100) | | | |
| **History of medical diseases** | | | | 0.04 | 1 | 0.835 |
| Yes | 41 (78.8) | 11 (21.2) | 52 (100) | | | |
| No | 332 (77.6) | 96 (22.4) | 428 (100) | | | |

women had dental care; 47 (9.8%) received genetic counseling; and 160 (33.3%) underwent blood testing. There were significant relationships between attending PCC and taking folic acid supplements, performing physical activities, undergoing blood tests, and receiving dental care and genetic counseling ($P < 0.0001$; Table 2).

There were no significant relationships between PCC attendance and a history of preterm labor, abortion, or

**Table 2.** Frequency Distribution of Preconception Behaviors According to the Preconception Care Attendance (N = 480)

| Variable | Preconception Care Attendance[a] | | Total | P-Value | | |
|---|---|---|---|---|---|---|
| | Yes | No | | $\chi^2$ | df | P |
| **Folic acid consumption** | | | | 1.28 | 4 | < 000.0 |
| No folic acid | 57 (15.3) | 74 (69.2) | 131 (27.3) | | | |
| 1 to 2 times a week | 13 (3.5) | 5 (4.2) | 18 (3.8) | | | |
| 3 to 4 times a week | 85 (22.8) | 14 (13.1) | 99 (20.6) | | | |
| 5 to 6 times a week | 38 (10.2) | 3 (2.8) | 41 (8.5) | | | |
| Every day of the week | 180 (48.3) | 11 (10.3) | 191 (39.8) | | | |
| Total | 373 (77.7) | 107 (22.3) | 480 (100) | | | |
| **Exercise** | | | | 24.38 | 4 | 0.000 |
| No exercise | 135 (36.2) | 63 (58.9) | 198 (41.2) | | | |
| Less than 1 day per week | 78 (20.9) | 23 (21.5) | 101 (21) | | | |
| 1 to 2 days per week | 96 (25.7) | 17 (15.9) | 113 (23.5) | | | |
| 3 to 4 days per week | 33 (8.8) | 2 (1.9) | 35 (7.3) | | | |
| 5 or more days per week | 31 (8.3) | 2 (1.9) | 33 (6.9) | | | |
| Total | 373 (77.7) | 107 (22.3) | 480 (100) | | | |
| **Blood test** | | | | 1.31 | 1 | < 0.000 |
| Yes | 298 (79.9) | 75 (20.1) | 160 (33.3) | | | |
| No | 75 (20.1) | 85 (79.4) | 320 (66.7) | | | |
| Total | 373 (77.7) | 107 (22.3) | 480 (100) | | | |
| **Dental care** | | | | 37.83 | 2 | < 0.000 |
| Yes | 147 (39.4) | 12 (11.2) | 159 (33.1) | | | |
| No | 194 (52) | 91 (85) | 285 (59.4) | | | |
| Not been recommended | 32 (8.6) | 36 (7.5) | 36 (7.5) | | | |
| Total | 373 (77.7) | 107 (22.3) | 480 (100) | | | |
| **Genetic counseling** | | | | 48.70 | 2 | < 0.000 |
| Yes | 43 (11.5) | 4 (3.7) | 47 (9.8) | | | |
| No | 78 (20.9) | 59 (55.1) | 137 (28.5) | | | |
| Not recommended | 252 (67.6) | 44 (41.1) | 296 (61.7) | | | |
| Total | 373 (77.7) | 107 (22.3) | 480 (100) | | | |

[a]Values are expressed as No. (%).



medical conditions (Table 3).

The results of study showed positive correlations between knowledge and folic acid consumption (r = -0.181, P = 0.001), physical activity (r = 0.184, P = 0.001), and fruit consumption (r = 0.126, P = 0.001), respectively. The correlations of healthy behaviors (taking folic acid, physical activity, and eating fruits and vegetables) with knowledge, attitude, number of pregnancies, and number of live children are shown in Table 4.

Significant relationships were found between PCC attendance and women's jobs ($\chi^2$ = 10.61, df = 2, P = 0.005), as well as between attending for dental care and level of family income ($\chi^2$ = 8.20, df = 2, P = 0.017). Within the groups, the results showed that 342 (91.7%) of housewives compared with 15 (4%) employed women and 16 (4.3%) women with home jobs performed PCC. In addition, 137 (86.2%) women with adequate compared with 22 (13.8%) women with an inadequate level of family income received dental care. The Kruskal-Wallis test showed that there were significant differences between mean scores of physical activity

**Table 3.** Frequency Distribution of Previous Obstetrics and Medical History According to PCC Attendance (N = 480)

| Variable | Preconception Care Attendance | | Total | P Value | | |
|---|---|---|---|---|---|---|
| | Yes | No | | $\chi^2$ | df | P |
| **Preterm labor history** | | | | 0.225 | 1 | 0.635 |
| Yes | 18 (81.8) | 4 (18.2) | 22 (4.6) | | | |
| No | 355 (77.5) | 103 (22.5) | 458 (95.4) | | | |
| Total | 373 (77.7) | 107 (22.3) | 480 (100) | | | |
| **Abortion history** | | | | 2.23 | 1 | 0.327 |
| Yes | 285 (76.4) | 89 (83.2) | 374 (77.9) | | | |
| No | 67 (18) | 14 (13.1) | 81 (16.9) | | | |
| Total | 21 (5.6) | 4 (3.7) | 25 (5.2) | | | |
| **Medical history** | | | | 0.044 | 1 | 0.835 |
| Yes | 41 (78.8) | 11 (21.1) | 52 (10.8) | | | |
| No | 332 (77.6) | 96 (22.4) | 428 (89.2) | | | |
| Total | 373 (77.7) | 107 (22.3) | 480 (100) | | | |

**Table 4.** Correlation Between Different Aspects of Women's Characteristics and Preconception Health Behaviors

| Variable | Folic Acid Consumption | Exercise | Fruit Consumption | Vegetable Consumption |
|---|---|---|---|---|
| **Age** | 0.039 | 0.057 | -0.041 | 0.042 |
| **Number of pregnancies** | 0.056 | 0.038 | -0.035 | 0.055 |
| **Number of living children** | 0.020 | 0.041 | -0.001 | 0.044 |
| **Knowledge** | 0.181* | 0.184* | 0.126* | 0.061 |
| **Attitude** | 0.121* | 0.098* | 0.075 | 0.091* |

($\chi^2 = 10.46$, df = 3, $P < 0.015$) and eating fruit ($\chi^2 = 8.53$, df = 3, $P < 0.036$) among women with various levels of education.

## 5. Discussion

The results of the present study assessing women's PCHBs showed that 77.7% of women who had desire for pregnancy attended PCC. Bayrami et al. reported that 46.6% of Iranian women who the intention to become pregnant followed PCC (22). In a study in the United States, 33.1% of women of reproductive age carried out PCC (26). Moreover, a study in Denmark showed that almost 100% of women referred to healthcare centers to receive prenatal care as soon as their pregnancy was diagnosed (9). However, the PCC coverage was low in most studies, which could be due to different factors, such as low public awareness and insufficient attention of health staff to the provision of this service.

In this study, 39.8% of women who intended to become pregnant regularly used folic acid supplements once a day from 3 months before trying to become pregnant. Riazi reported that although 80% of women had planned pregnancies, only 9% used folic acid in the preconception period (18). In the Mannien et al.'s study, 55.5% of women used folic acid in the preconception period (27). In the present study, 48% of women who attended a PCC clinic routinely used folic acid supplements, while this rate was 20% in women who did not attend the clinic before pregnancy. The results of these studies indicate that despite the establishment of PCC clinics, the use of folic acid supplements has not been improved in recent years.

In this study, 33% of women received dental care. In the study by Bayrami et al., about 17% of the subjects referred to a dentist during the preconception period (22) Despite acknowledging the importance of maternal oral health during the preconception period, it seems that low awareness and the expenses of dental care might have led to this poor adherence to preconception behavior.

Dental care had the lowest prevalence among PCHBs in the group that attended PCC; however, in accordance

with the study of Connor et al., there was a statistically significant relationship between PCC attendance and having a dental visit (26). Lack of practicing dentists in health centers in Iran and the expense of dental care may have caused the low level of dental care during the preconception period. In the present study, there was a statistically significant relationship between family income and dental care behavior, so that women with adequate family income were more likely to receive dental care.

In this study, 7% of women tending to pregnancy exercised regularly at least 3 days per week, and there was a statistically significant relationship between level of education and exercise. In a Pennsylvania Women's Health cohort study, only 12% of women engaged in physical activity (28). In addition, 8% of women who visited the PCC clinic engaged in regular exercise, while this rate was only 2% in women without a preconception record. These findings indicate that regular physical activity is considered less even in women who have a preconception record.

In the present study, only 9.8% of eligible couples received genetic counseling. Studies show that consanguineous marriage leads to an increased incidence of infant mortality, congenital anomalies, and mental retardation. It is necessary to take action to reduce these adverse outcomes through notification of youth and families of the risks of consanguineous marriage and facilitating access to genetic counseling before marriage and prenatal screening.

In the current study, the mean attitude score toward PCC was high, which is congruent with the results of studies of Kennedy et al. and Maza et al. (29, 30). In the present study, the mean score of knowledge about pre-pregnancy behaviors was high. The highest score of knowledge was related to the use of folic acid; this result was similar to that reported in the study by Pandolfi (31). A positive correlation between knowledge score and use of folic acid was also found in this study.

Despite strict recommendations for women with a history of preterm birth, medical complications, low birth weight, and intrauterine death to engage in PCC (32, 33), no relationship between PCC attendance and medical problems, preterm birth, or abortion was seen in the current study. Similarly, in the study by Connor et al, there was no relationship between pre-pregnancy care and preterm delivery or gestational diabetes (26). The lack of relationship in this study may have been due to low number of women with a history of adverse pregnancy (preterm delivery, abortion, and medical disease).

Interconception care is defined as providing care for women and their families from the birth of a child to the next pregnancy. In other words, it involves taking steps to improve the next pregnancy outcome. For healthy women, interconception care is an opportunity for health promotion, while for high-risk women, such as those with chronic disease and a history of preterm birth, it provides the opportunity to reduce the risks before the next pregnancy (33).

Although previous studies have indicated that there is a relationship between the level of education and PCC (26, 34), in this study, the educational level of women was not related to PCC behavior. Tamal et al. also found no relationship between the level of education and intention to seek PCC (35). This may indicate that services and information related to PCC are provided by centers.

In the present study, a significant relationship was found between a woman's job and PCC attendance; PCC was higher among housewives than employed women. Tamel et al. also showed that employed women have a lower tendency to engage in pre-pregnancy care (35). This can be due to the working times of healthcare centers, which might interfere with the working hours of employed women.

### 5.1. Limitations and Strengths of the Study

Regarding its limitations, the current study was conducted among the women attending governmental healthcare centers; women referring to private clinic were not included. This could affect the generalizability of the results. The other limitation of the present study was that the questionnaires were completed through interviews. It is possible that the participants did not express their true feelings and gave false information during the interviews. To control this limitation, it was attempted to double check the information obtained from participants with the contents in the PCC records available in the healthcare centers. It is suggested that longitudinal studies should be conducted in other regions of the country concerning PCHBs. However, the strengths of the study were the large sample size and the inclusion of only women who intended to become pregnant in the next 6 months. Selection bias was reduced by using this selection method.

### 5.2. Conclusion

In the present study, although 77.7% of women planning to become pregnant attended PCC and had a PCC record, the majority of them did not carry out the behaviors recommended by the ministry of health guideline. In addition, interconception care was neglected by women who had a history of adverse pregnancy, such as preterm labor, abortion, and medical diseases during previous pregnancies. It is therefore recommended that healthcare services, such as dental care and folic acid supplementation, should be provided free of charge. Moreover, a culture of

exercise should be promoted for women of reproductive age in the community.

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## Footnotes

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