

Minimum data set and educational content required to design a mobile-based nutrition education application for women with infertility in Iran

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Research Article

Keywords: Infertility, Nutrition Education, Mobile phone Health (mHealth), Needs assessment

Posted Date: March 17th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1454978/v1>

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Abstract

Background

Infertility is one of the major health problems causing many problems and challenges for the couples and society. Given the worldwide exponential rise of infertility, mobile phone-based applications are drastic ways to deliver nutrition educational contents to women with infertility. The present study aimed to prepare the required educational contents for designing a mobile phone-based nutrition educational application for women with infertility.

Methods

Educational contents were initially determined based on the literature review and library resources. The collected information was used to design a researcher-made questionnaire containing 28 items in six dimensions. Later, 15 nutrition and five infertility specialists, selected via purposeful sampling, were asked to complete the questionnaire about the necessary information to be included in the software. Content validity of the questionnaire was confirmed using a panel of experts including medical informatics, health information management, nutritionists, and infertility specialists, who reviewed the items, made some revisions, and confirmed the final contents. Reliability of the questionnaire was also corroborated using the KR-20 coefficient (0.89).

Results

According to the specialists, the amount of consumed calories per meal and the interval between meals were not significantly effective on fertility. Other factors such as main definitions, disease and treatment instructions, personal activities and habits, and menstruation were deemed necessary by the respondents. Participants also suggested adding an introduction on different types of diets, users' suggestions and opinions, and introduction of senior nutrition centers to the questionnaire.

Conclusions

Followed by obtaining the required valid and reliable contents, a mobile phone-based nutrition education application can be designed to improve the patients' awareness and facilitate their treatment process.

1. Background

The desire for childbearing has always been an inherent characteristic of women throughout the history, so that reproduction is inspected as one of the most important goals of marriage and family formation. However, about 50 to 80 million people in the world suffer from some forms of infertility.(1, 2) According to the World Health Organization (WHO), one in six couples suffers from infertility, compared with one in

four in the developing countries. In Iran, this rate is about 13 to 20 percent, which is higher than the global average.(3, 4)

According to the WHO, infertility is defined as not being able to conceive after 12 months of unprotected sex.(5) Infertility or delay in fertility not only affects couples' relationship, but also may lead to marital problems.(6) Infertility is a threat to stability and strength of marital relationship and family survival, especially in traditional societies such as Iran.(7, 8) Followed by maternal/paternal death and spouse infidelity, infertility is considered as the fourth stressor in the people's life that can cause many economic, personal, social, and psychological problems.

Based on the literature (9, 10), a variety of factors may increase the risk of infertility, including: obesity, smoking, recreational drugs (narcotics and anabolic steroids), alcohol consumption, rising age of marriage and childbearing, psychological stress, poor nutrition, and modern lifestyle consisting of reduced activity, better food accessibility, more desire for food, as well as popularity of ready-made and high-calorie foods. Some of these factors are immutable (age and disease), while others are modifiable (lifestyle and nutrition).(11, 12)Although women have mostly been blamed for infertility, studies have shown that men and women hold an equal share of 40% in infertility while the final 20% is attributed to other unknown factors. Among influential factors in female infertility, machine lifestyle and inappropriate eating habits resulting in overweight and obesity are of great importance. In confirmation of the traditional Iranian medicine, the modern medicine has also made remarkable strides in investigating the role of nutrition in infertility, reproductive system, infections, and diseases. (13–17)

The infertility treatment process is relatively long and patients need a variety of information and trainings. Given that education and awareness (such as lifestyle changes) need long-term process and cannot be resolved in one or more sessions, patients require frequent visits that impose more costs on patients in addition to treatment (18, 19). As a result, they may not complete the training process and may even give up treatment. In this regard, the use of electronic communication devices has been found to increase significantly due to industrialization, so that the per capita number of mobile phone devices was expected to reach 1.5 per person by 2022(20, 21). Mobile phones have played a significant role in expansion of distance learning; they promoted education outcomes, especially in the field of health, provided health services, reduced medical costs, and solved many cultural and religious problems in the society. According to many users, mobile phone-based applications are more efficient and attractive than other traditional teaching methods such as lecturing and counseling.(22–24)

Considering the importance and impact of proper nutrition and lifestyle on infertility and considering the expansion of electronic technologies using mobile phones, the preset study aimed to assess the needs and pertinent contents to design a mobile phone-based nutrition educational application for women with infertility.

2. Materials And Methods

In order to determine educational needs regarding dietary intakes and diet in women with infertility, research articles and publications related to nutritional considerations in infertility were reviewed. To this end, need assessment was conducted using a researcher-made questionnaire including demographic information (3 questions; age, gender, and work experience) and educational contents (28 questions).

The educational contents covered six dimensions of: main definitions (3 questions), disease and treatment instructions (4 questions), diet and nutrition (6 questions), Dietary habits (9 questions), personal activities and habits (3 questions), and Menstruation status (3 questions). At the end of each section, an open-ended question was included to obtain the participants' additional comments. Content validity of the questionnaire was confirmed by a panel of experts including two specialists in medical informatics and health information management, one nutritionist, and one specialist in infertility. Reliability of the questionnaire was corroborated by KR-20 coefficient (0.89).

The research population consisted of all nutrition and infertility specialists working in Research and Clinical Center for Infertility, Yazd Shahid Sadoughi University of Medical Sciences, which is one of the greatest scientific and well-equipped centers in central Iran. Given geographical location of this center and its lower costs compared to specialized centers in other provinces, Yazd Reproductive Sciences Institute receives a large number of patients with various cultures, customs, and traditions from all over the country. Followed by performing purposeful sampling method, 20 participants were selected including nutrition (n = 15) and infertility (n = 5) specialists. However, a total of 15 questionnaires (12 nutritionists and 3 infertility specialists) were investigated since five physicians did not complete the administered questionnaires.

Inclusion criteria were having at least five years of work experience and cooperation with Infertility Center of Yazd Shahid Sadoughi University. In terms of the exclusion criterion, individuals who were reluctant to participate in the study were removed from data analysis.

To observe ethical considerations, all participants were explained about the study goals and procedures. They were also ensured about confidentiality of information and voluntary participation in the research.

Followed by administering the needs assessment questionnaire among specialists, the collected data were analyzed using SPSS software version 25. Data analysis was performed using descriptive statistics and educational contents approved by at least 60% of the participants were considered essential.

3. Results

Based on the demographic information (Table 1), the participation rate of nutritionists (67%) was higher than the infertility specialists. Majority of the participants (86%) had 40 years of age and older. Nearly 75% of the respondents had more than 10 years of work experience, which indicates their good experience in the field of infertility.

Table 1 Frequency distribution of the participants' demographic characteristics

Participants / Demographic information		Nutritionist		Infertility specialist		Total	
		N	%	N	%	N	%
Age	40 <	2	13.3	0	0	2	13.3
	40-50	5	33.3	3	20	8	53.3
	50 >	3	20	2	13.3	5	33.3
Gender	Female	6	40	3	20	9	60
	Male	4	26.6	2	13.3	6	40
Work experience	10 <	3	20	1	6.6	4	26.6
	10-20	4	26.6	1	6.6	5	33.3
	>20	3	20	3	20	6	40

Nutrition education needs were specified under six domains: main definitions, disease and treatment instructions, diet and nutrition, eating habits, personal activities and habits, as well as menstruation (Table 2). According to the specialists, 26 items (among 28 items of the need assessment questionnaire) were needed for developing the application. All items in the dimensions of main definitions, disease and treatment instructions, personal activities and habits, as well as menstruation were deemed necessary. Regarding the diet and nutrition dimension, most respondents believed that the items that asked about calorie intake in each meal and interval between meals were not effective on infertility, which were removed from the educational contents.

Followed by extracting, summarizing, and modifying the additional suggestions provided by some respondents with regard to the other required nutritional information, the participants were asked to review and confirm them. Unfortunately, only 10 specialists, out of 15, responded to these suggestions. Table 3 represents the additional suggestions provided by some respondents. At this stage, only 'introduction of infertility clinics and centers in Iran' did not obtain the required score as a necessary item (60%), but the rest of items were determined as necessary.

4. Discussion

Most studies conducted in Iran scrutinized the effect of nutrition on infertility, importance of educating infertile couples, creation of a minimum data set for patients with infertility, creation of electronic infertility records with traditional medicine approach, etc. In other words, no study has ever investigated nutrition education to the best of our knowledge (16, 25, 26).

Given that patients need comprehensive information about their disease, its complications, and treatment process, education can be considered as an effective tool in controlling and improving the disease, reducing costs, and raising public awareness. Based on the studies conducted in different parts of the

world (27, 28), couples with infertility problems do not have enough knowledge about their disease and this lack of knowledge about the disease causes and effective factors is a major obstacle.

Lemoine et al. (29) examined the information needs of fertile people in Canada and noted that people seeking fertility and infertility services received a variety of diagnostic and therapeutic information, but people whose information needs were met achieved better psychological outcomes. As Nowruz et al.(30) Reported, approximately half of patients had limited knowledge about infertility-related factors. They concluded that designing, implementing, and evaluating an appropriate training program is necessary to improve patients' awareness regarding infertility. To meet this gap, the present study was conducted to provide the required educational contents for designing a nutrition application for people with infertility.

Table 2 Frequency distribution of experts' answers about nutrition educational content

Row	Responses / Educational content	Necessary		Unnecessary		
		N	%	N	%	
1	Definitions	Infertility	15	100	0	0
		Dietary pattern	13	86.6	2	13.4
		Life style	12	80	3	20
2	Disease and treatment instructions	Hormonal diseases	11	73.3	4	26.7
		Chronic diseases	15	100	0	0
		Consumption of herbal tea and drinks	13	86.6	2	13.4
		Taking medication	15	100	0	0
3	Diet and nutrition	Importance of nutrition	12	80	3	20
		Effects of obesity	14	93.3	1	6.7
		Special treatment regimen	9	60	6	40
		The amount of calories consumed per meal	6	40	9	60
		Taking supplements and vitamins	10	66.6	5	33.4
		Allergy to certain foods	12	80	3	20
4	Dietary habits	Consuming fast foods	9	60	6	40
		Consuming fried foods	9	60	6	40
		Consuming fruits and vegetables	12	80	3	20
		Consuming simple carbohydrates	13	86.6	2	13.4
		Consuming of fats	11	73.3	4	26.7
		The interval between meals	7	46.6	8	53.4
		Number of meals per day	10	66.6	5	33.4
		Drinking carbonated beverages	12	80	3	20
		Drinking alcohol	8	53.3	7	46.7
5	Personal activities and habits	Having physical activity	10	66.6	5	33.4
		Tobacco use (cigarettes and hookahs)	13	86.6	2	13.4
		Using mobile phones	12	80	3	20

6	Menstruation status	Menstrual status	15	100	0	0
		Menstrual duration	15	100	0	0
		Menstrual severity	15	100	0	0

Table 3 Frequency distribution of experts' responses to suggestions

Row	Responses /Suggestions	Necessary		Unnecessary	
		N	%	N	%
1	Introducing different types of diets	7	70	3	30
2	Introducing infertility clinics and centers in Iran	4	40	6	60
3	adding users' suggestions and comments section	7	70	3	30
4	Introducing senior nutrition centers for nutritional advice	8	80	2	20

Mostajeran et al.(25) Investigated symptoms of infertility and its predisposing factors from the viewpoint of traditional Iranian medicine. Upon their findings, applying new prevention and treatment strategies, modifying lifestyle and eating habits, as well as using herbal medicines can be effective in treating infertility. According to the study conducted by Sadeghi et al.(31) Intake of simple carbohydrates and sweets was higher in infertile women, while fiber intake was significantly higher in healthy women. Furthermore, overweight and obesity was 2.2 times more prevalent among infertile women compared with the healthy women and a significant difference was observed between women with and without infertility in terms of their mean weight and body mass index. Similarly, intake of herbal medicines and traditional Iranian medications was esteemed necessary by our respondents.

A study(14) over the relationship of individuals' dietary factors and preconceptions with fertility indicated that consuming more fruits along with reducing the intake of fast food and sugary drinks improved pregnancy. This suggests the significant role of certain foods and dietary patterns in fertility, which has recently attracted more attention in nutrition education. In a study by JahangiriFard et al.(32) The relationship between dietary patterns and fertility outcomes was examined among infertile women. The results showed that diet adherence was higher in fertile women. They also stated that nutritional interventions before attempting to treat infertility improved the treatment outcomes. In the same vein, Alizadeh et al.(33) concluded that the rate of fertility was six times higher in people with appropriate diet and lifestyle, so that consumption of unsaturated fatty acids, fruits, vegetables, and low-fat dairy products improved fertility. These studies provide a robust theoretical background in support of the educational contents recommended by participants of the present study in the field of diet and eating habits.

Given the exponential growth of new technologies, such as mobile phones applications in various fields, designing and implementing mobile phone-based training programs is an efficient way to raise

awareness and conduct training programs. This method, namely mobile health, has found a scientific place, especially in the field of health education and treatment for different diseases.

In a similar study(34), targeting at developing educational contents for patients with epilepsy, specialists and patients confirmed the necessity of educational content in three areas of disease information, lifestyle, and medications. Safdari et al.(35) Also designed a self-care program for infertility considering three main areas of demographic characteristics, Disease section and Lifestyle management, among which patients' education and lifestyle management was approved by 80% of the participants that supports our results. However, these researchers developed a self-care program and did not elucidate details of the nutrition education, which was met in the present research. The relationship between using smartphone applications and reproductive knowledge among Australian Women was examined by Ford et al(27). They stated that women who were trying to conceive or had infertility problems sought related information, observed treatment considerations, attended training courses, and tried to improve their awareness more frequently than the healthy women. Preliminary evidences corroborate usefulness of smartphones as a medium to provide fertility information to women. Oostingh et al(36). designed the coaching program of Smarter Pregnancy on the Android platform and studied the impact of nutrition education on infertile couples undergoing in vitro fertilization. They found that inappropriate lifestyle and nutrition behaviors improved among users of this application, so that their poor nutrition habits and fruit consumption improved by 73% and 55%, respectively. Findings of the above-mentioned studies were in the same line with the present study.

Our study was subject to some limitations. Some experts did not cooperate in completing the questionnaire due to lack of time and knowledge about the study objectives. We tried to meet this problem by providing them with an introduction letter from Yazd University of Medical Science, including the study objectives and procedure. Considering the current prevalence of Corona Virus Disease pandemic throughout the world, data collection was only limited to Yazd Infertility Center.

5. Conclusion

One of the most important first steps in designing an educational application is to determine and develop its educational needs and contents. In the present study, educational contents of a mobile phone-based nutrition application for women with infertility problems were specified and confirmed by reviewing the related literature and collecting opinions of a panel of nutrition and infertility specialists in Yazd Infertility Center, respectively. Findings of this study can be beneficial for the health care institutions and providers to design an effective application in order to improve the level of awareness and quality of life in people with infertility.

Declarations

Acknowledgments

Authors appreciate nice cooperation of the experts who participated in this research and the staff of Yazd Shahid Sadoughi Infertility Center.

Authors' contributions

ML: participated in Conceptualization, Methodology, Validation, Writing - Review & Editing, Visualization.

AN: participated in Conceptualization, Validation, Formal analysis, Writing - Review & Editing, Visualization.

BM: participated in Data collection and analysis, Visualization, Writing - Review & Editing.

SAFA: participated in Conceptualization, Methodology, Software, Writing - Original Draft, Visualization, Editing, Project administration.

All authors have read and approved the manuscript.

Funding

The author(s) received no financial support for the research, authorship, or/ and publication of this article.

Availability of data and materials

The data used and analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate:

This study was reviewed and approved by the review board and the ethics committee of Iran University of Medical Sciences (IR.IUMS.REC.1399.680).

At each stage, before completing the questionnaire, the participants informed consent with orally and in writing.

Consent for publication

Not Applicable.

Competing interests

All authors declare no conflict of interest.

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