Association of Sociodemographic, Obstetric, and Attitudinal Factors with Prenatal Ultrasound in Mashhad, Iran

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Abstract

Many antenatal sonographies are out of indication and may be asked due to mothers' requests or other factors. However, these features are not fully understood. This study aimed to assess the association of sociodemographic, obstetric, and attitudinal factors that may affect the number of ultrasound scans. In a cross-sectional study in six hospitals affiliated with Mashhad University of Medical Sciences, 360 mothers who had a delivery or were expected to be near childbirth were enrolled in the study. The mean number of sonographies was compared between different study variables by using Mann–Whitney, Kruskal–Wallis, and Pearson's Chi-squared tests. Moreover, the Spearman Rho test was used to assess the correlation between different variables and the number of sonographies. Totally, 300 cases remained in the study. The mean age of the mothers was 25.95 ± 4.77 years, and the average number of ultrasonographies was 3.50 ± 1.35 . In case of sociodemographic features, the level of education ($r=0.23$; $p<0.001$) and several recent miscarriages ($r=0.140$; $p=0.01$) were correlated with number of sonographies. However, there was no association between maternal age and marriage age with several sonographies ($p>0.05$). Furthermore, mothers with higher family income ($p=0.010$), those with medical insurance ($p=0.010$), those who had male fetuses ($p=0.020$), those who were clerk or student ($p=0.003$), and those who were not aware of the sonography risks ($p=0.020$) had more requests for sonography. It seems that financial factors and awareness of sonography risks play an essential role in sonography requests by mothers.

Keywords

- ultrasonography
- prenatal care
- obstetrics
- attitude
- demography
- Iran

Introduction

Ultrasound examinations are usually requested with medical indications, such as prenatal screening. Mothers may undergo sonography to assess prenatal complications with

valid reasons or evaluate fetal development due to adverse outcomes of some drugs or interventions. However, the mothers may request to have sonography without indication or out of routine screenings.^{1–3} Also, maternal

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perspective should be manipulated and improved to manage health expenditures effectively.⁴⁻⁶ Furthermore, sociodemographic characteristics, obstetric history, and mothers' attitude can affect mothers' motivation toward ultrasound scans.^{7,8} Most of the ultrasound assessments are not according to the medical indications; examples are watching the baby and gender determination. This implies the necessity of research on pregnant women's attitudes toward ultrasound examinations.^{9,10}

A previous study showed that several sociodemographic, obstetrics, and attitudinal factors affect mothers' requests for sonographies.⁷ Moreover, Garcia et al mentioned that besides mother and their partners, all staff should be well informed about ultrasound scans and their indications during pregnancy.¹¹ Nevertheless, other studies have demonstrated that nonmedical reasons such as reassurance of normal fetal development, gender determination, and watching the baby on screen constitute the majority of ultrasound examinations.^{7,12,13} For example, in a cross-sectional study, authors found that 23.2% of pregnant women in the United Kingdom had four or more ultrasound exams during their antenatal care in 1995. Interestingly, this figure had almost doubled by the year 2014. Moreover, ultrasounds with medical indications, such as dating and anomaly scans, also had increased from 31.1 and 68.7% to 95.1 and 99.1% in the span of 19 years, respectively.¹² This means that irrespective of the scan reason, pregnant women in the United Kingdom are becoming more inclined to have more ultrasound exams during their antenatal care. However, as a health care provider perspective, scans with nonmedical indications are not cost effective and are a financial burden on the health care system.

Although most of the related studies on this matter have been conducted in other parts of the world, there is little amount of evidence regarding this issue in Iran. As mother's attitude toward perinatal sonography may be affected by several social, economic, and cultural factors; therefore, this study aimed to investigate sociodemographic, obstetric, and attitudinal factors that might affect preferences for prenatal ultrasound scan by assessing the number of requests and mothers' motivation for the prenatal ultrasound assessment in Mashhad, Iran.

Materials and Methods

Study Population and Sample Size

We conducted a cross-sectional study in six hospitals of Mashhad of Medical Sciences from March to June 2018. The study's sample size was calculated to be 360 volunteers, based on the Enakpene's study, using Cochrane method.¹⁴ A simple nonrandom sampling method according to the number of admissions for delivery was used to collect data. Women who had delivered recently (postpartum period, 6 weeks after delivery) or were expecting to have an upcoming delivery (been in the third trimester) were included in the study and those who did not want to participate in the study or refused to continue were excluded. The mothers could have a normal vaginal delivery or a cesarean section.

Data Collection

A questionnaire was designed in a panel discussion of gynecologists and social medicine experts to collect data on the study. The questionnaires were filled out by the cooperation of participants and doctors as an interviewer. It had three parts, including sociodemographic data (mothers' age, mothers' age at the marriage time, mothers' level of education, mothers' career, family income, and having insurance), obstetric history (miscarriage age and number of miscarriage), and some information about prenatal ultrasound in current pregnancy (including the number of ultrasound examination, child sex and attitude of mothers toward possible ultrasound's risk factors).

Ethics

All the participants were provided with written informed consent and were allowed to discontinue the study. The patient's privacy and confidentiality of collected data were also considered. Moreover, the study protocol was approved by the Ethics Committee of Mashhad University of Medical sciences.

Data Analysis

Data were analyzed by using SPSS version 16. Mann-Whitney, Kruskal-Wallis, and Pearson's Chi-squared tests were used to compare the mean number of sonographies between different variables. Moreover, to assess the correlation between number of ultrasonographies and different study data, Spearman's Rho test was used. Statistical significance was considered $p < 0.05$.

Results

Study Participants

Although it was estimated to have 360 mothers in our study, data of around 60 cases were missed, as they refused to continue the study and finally samples of 300 women were enrolled in the study. Participants had a mean age of 25.95 ± 4.77 years and an age range of 15 to 37 years. The average number of ultrasound scans was 3.50 ± 1.35 , with a maximum of nine sonographies in three women (1%). The data gathered from the women showed 6.6% of them had screening only in one trimester, 42.2% had a screening in two trimesters, and 51.1% had a screening in all three trimesters (► Table 1).

The Motivation of Women for Prenatal Ultrasound

As can be seen in ► Fig. 1, the most crucial reason for requesting prenatal ultrasound is gender determination followed by fetus vitality and fetus age.

Sociodemographic

Our correlation test results showed that mothers with a higher education level requested more ultrasound scans ($r = 0.23$; $p < 0.001$). Moreover, mothers whose jobs were clerks and students had more requests than others ($p = 0.003$). Furthermore, those mothers with a higher family income had more requests for sonographies ($p = 0.010$).

Table 1 Age of the participants, the average number of ultrasound scans, and the distribution of scans through trimesters

Variable		Total (n = 300)
Age		25.95 ± 4.77
Ultrasound scans		3.50 ± 1.35
Scans during trimesters	First trimester	6.6%
	Second trimester	42.2%
	Third trimester	51.1%

Note: Data are presented as mean ± standard deviation or n (%).

Fig. 1 Reasons of mothers to request prenatal ultrasonography by percent.

Mothers who had insurance also asked for more sonographies than those with no insurance ($p = 0.010$). At last, there was no significant association between ultrasound scan with maternal age and marriage age ($p > 0.05$; ► **Table 2**).

Obstetrics and Attitude

Interestingly, mothers whose babies were boys had more requests for sonography than those with girls (p -value = 0.020). There was a significant association between ultrasound scans and the number of recent miscarriages ($r = 0.140$; $p = 0.01$). Moreover, the Kruskal–Wallis test showed mothers who believed that ultrasound scan is not harmful had more requests than others ($p = 0.020$; ► **Table 2**).

Discussion

This study proved that mothers with a high level of education had more requests for ultrasound scans, which may be due to the fact that their awareness about pregnancy complications are greater than mothers with low education levels. Furthermore, families with high socioeconomic status had better access to sonography and do not mind financial factors, as previous studies also supported this finding.^{7,15} Mothers who experienced miscarriage were more cautious about the fetus's vital signs and thus had a higher number of sonographies. Gudex et al concluded that experiencing re-

cent miscarriages caused more demands for an antenatal ultrasound scan.⁷ Our analysis showed mothers' views about possible risk factors of ultrasonography influence their desire for this modality. However, some studies demonstrated that ultrasound examination and its repetition were safe in any ages.^{16–18} Surprisingly, we found that child sex and maternal career were associated with the number of ultrasound viewing, which was novel. May be, cultural factors may affect the families to be more cautious about male fetuses, as having a male child is preferred traditionally in rural areas of Mashhad due to religious reasons. Also, maternal career may affect the family income that may eliminate financial factors; however, this should be further investigated in future studies.

Notably, maternal age did not have any significant relation with number of requests, although one study observed that mothers with younger marriage age had more motivation for ultrasonography; thus, demographic variants such as average marriage age could differ between two populations.¹⁵ Moreover, our study pointed out that having insurance resulted in more ultrasound scans, supported by a previous study. Studies also pointed out that patients with private insurance requested more ultrasound scans.¹⁹ This should be considered by the authorities as requesting sonography without indication poses a further economic burden on the system. Finally, our study estimated distinct motivations for ultrasonography that gender determination was the most dominant, which contrasts with other studies; psychiatric factors such as women's attitudes and religion might differ in societies.²⁰

Our studies, just like other studies, had some strong points and some shortcomings. On the one hand, doctors filled out questionnaires by interviewing participants as it was opposed to previous studies that participants filled questionnaires by themselves, which caused heavier bias. Contrary to most previous studies, we assessed the association of obstetric factors such as child sex and miscarriages. However, major limitation of this study was recall bias of the participants due to the study design. Another limitation of our study was that we did not assess other factors such as the level of partner's education, mother's characters (including the level of anxiety), and the prescriber's conflict of interest. In addition, the sample size of our study was no adequate to evaluate factors such as two recent miscarriages. Finally, the lack of randomization in choosing hospitals could result in sampling bias. With this regard, several future studies should be conducted to overcome these limitations.

Conclusion

In conclusion, this investigation showed that maternal motivation for ultrasound examination is influenced by some sociodemographic, obstetric, and attitudinal factors. Moreover, the findings of this research provide insights into the economic burden of nonindicated prenatal sonographies. As our study showed, mothers who had insurance requested more sonographies, which poses more pressure on the insurance system. However, the role of medical staff and doctors should be further investigated in this regard. Maybe,

Table 2 Comparing the mean number of sonographies between different sociodemographic, obstetric, and attitudinal statuses and the results of correlation test

Feature		Number of ultrasound scans (mean $\pm$ SD)	n (%)	p-Value
Maternal age ^a	≤ 20	3.17 $\pm$ 1.21	42 (14.0)	0.64
	20–25	3.58 $\pm$ 1.13	97 (32.3)	
	25–30	3.56 $\pm$ 1.84	102 (34.0)	
	30 $\leq$	3.19 $\pm$ 2.02	59 (19.6)	
Level of education ^a	Illiterate or elementary	2.97 $\pm$ 2.04	58 (19.3)	<0.001
	Diploma	3.48 $\pm$ 2.09	153 (51.0)	
	Associate D ^b	3.33 $\pm$ 2.22	24 (8.0)	
	Bachelor's D ^b	3.80 $\pm$ 1.98	65 (21.7)	
Mothers' career ^d	House wife	3.40 $\pm$ 1.68	268 (89.3)	0.0003
	Clerk	3.73 $\pm$ 1.58	2 (0.7)	
	Worker and farmer	2.00 $\pm$ 1.45	4 (1.3)	
	Student	4.50 $\pm$ 1.25	22 (7.3)	
	Self-employee	4.00 $\pm$ 1.75	4 (1.3)	
Family income ^d	Low	3.30 $\pm$ 1.64	105 (35.0)	0.01
	Moderate	3.41 $\pm$ 1.33	143 (47.7)	
	High	3.80 $\pm$ 1.54	50 (16.7)	
Insurance ^b	Yes	3.47 $\pm$ 1.25	273 (91.0)	0.01
	No	3.11 $\pm$ 1.34	27 (9.0)	
Marriage age ^a	<20	3.42 $\pm$ 1.28	122 (40.7)	0.055
			86 (28.7)	
	20 $\leq$	3.48 $\pm$ 1.05	92 (30.7)	
Number of recent miscarriage ^c	0	3.42 $\pm$ 1.08	255 (85.0)	0.55
	1	3.92 $\pm$ 1.09	24 (8.0)	
	2	3.14 $\pm$ 1.14	21 (7.0)	

(Continued)

Table 2 (Continued)

Feature		Number of ultrasound scans (mean $\pm$ SD)	n (%)	p-Value
Child sex ^b	Male	3.60 $\pm$ 1.65	153 (51.0)	0.02
	Female	3.20 $\pm$ 1.24	55 (18.3)	
Attitude toward sonography risk ^c	It has no risk	3.67 $\pm$ 1.27	84 (28.0)	0.02
	Have no idea about the risk	3.35 $\pm$ 1.40	210 (70.0)	

Abbreviation: SD, standard deviation.

^aLevel of education, maternal age, marriage age and level of education were analyzed with Spearman Rho.

^bChild sex and having insurance were analyzed with Mann–Whitney.

^cA number of recent miscarriages and mother's attitude about ultrasound risks were analyzed with Kruskal–Wallis test.

^dMaternal career and family income was analyzed with Pearson's Chi-square test.

restriction in nonindicated sonographies further helps system improvement and even fetus health.

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Conflict of Interest
None declared.

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