IMPACT OF PRENATAL ULTRASOUND CONSULTATION ON MATERNAL ANXIETY

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ABSTRACT:

Objective: To determine whether ultrasound consultation reduces maternal anxiety and increases feto-maternal attachment (the desire to care for the fetus and care for self).

Study design: Analytical study.

Patients and Methods: Patients coming for routine obstetric ultrasound at the Department of Radiology, Aga Khan University Hospital Karachi were recruited in the study. The study was carried out over the period of two months from January-February 2007 in which sixty patients were included in the study. Patients were randomly assigned to a standard care group or an ultrasound consultation group (30 patients in each arm). Both groups were required to fill a questionnaire before and after their ultrasound examination. The ultrasound consultation group in addition received counseling before they went in for the ultrasound regarding fetal development and maternal-fetal interaction. The two groups were then compared for difference of change in feto maternal attachment scores and change in anxiety levels regarding their pregnancies before and after the ultrasound. SPSS software (version 14) was used for compilation of the data and the statistical computations. Categorical data was compared using Chi-square test and continuous variables were analyzed with paired t-test. P value <0.05 was considered significant.

Result: A positive difference in feto-maternal attachment and reduction in anxiety levels was seen in both the groups but this difference was statistically significant in the ultrasound consultation group only.

Conclusion: This study suggests that ultrasound examinations with prior consultation has a positive impact on patients as it strengthens bonding toward the fetus, reduces maternal anxiety and increases maternal investment in health during the pregnancy.

Keywords: Feto-maternal attachment, anxiety, ultrasound, pregnancy, perception

INTRODUCTION

Ultrasound imaging is an important screening and diagnostic tool in prenatal care but it is widely perceived by expectant women more as an opportunity to see the baby[1]. Most women view ultrasound as being beneficial while some express considerable fear. The quality of client-provider interaction plays a decisive role in how the procedure is perceived[2]. A desire to see the fetus before birth is a natural tendency among parents.

Any prenatal diagnostic procedure can cause emotional stress in the pregnant woman. There may be anxiety about the nature of the procedure and the attendant risk of the loss of a wanted pregnancy[3]. The prevalence of antenatal anxiety per se has been found to be around 60%[4]. Association between maternal anxiety in pregnancy and increased uterine artery resistance index has also been observed[5].

It has also been observed that maternal-fetal attachment increased after both 2D and 3D ultrasound exposure[6-8] with women receiving their first ultrasound examination at around 12 weeks showing the greatest change[9-12]. Studies have shown that the women's knowledge regarding ultrasonography was variable[13] and the level of education was the major determinant of this knowledge. This factor should be taken into consideration by the practitioner during prenatal surveillance.[14]

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Furthermore, there is evidence that women often lack information about the purposes for which an ultrasound scan is being done and the technical limitations of the procedure[15,16].

Ultrasonography has the potential to provide reassurance of the fetus' health, to enhance the enthusiasm about the pregnancy, to increase parents' bonding toward the fetus, and to decrease destructive behavior toward the fetus[17]. A few studies show that decreased anxiety and stress immediately following the ultrasound examination are due to increased anxiety before real-time scan[18].

No research has been conducted to understand the emotional impact of ultrasound images on parents in our community. The primary purpose of this study was to evaluate the impact of prenatal ultrasound consultation on reduction of anxiety in pregnant women scheduled for routine ultrasound and its contribution in increasing maternal-fetal attachment (the desire to care for the fetus and care for self).

PATIENTS AND METHODS

This research was a randomized trial conducted at the Department of Radiology, Aga Khan University Hospital Karachi over a period of two months from January to February 2007. Sixty patients coming for routine obstetric ultrasound were recruited in the study. Patients were recruited after taking informed consent if their gestational age was more than 6 weeks. The approval of ethical review committee was not taken because the confidentiality of the patient was maintained, no invasive procedure was done and informed consent was taken from the patient. Women who had been advised other examinations simultaneously for example ultrasound Doppler or biophysical profile were excluded from the study as there were more chances of their baseline anxiety levels being high. Women were then randomly assigned to a standard care group or an ultrasound consultation group (thirty in each arm). Randomization was done using a random number table. The first thirty numbers obtained from the random number charts were allotted to the ultrasound consultation group.

In the standard care group, patients were required to fill a questionnaire before and after their ultrasound examination. In the ultrasound consultation group the women were again required to fill the questionnaire before the ultrasound. They were then briefed on fetal development, and maternal-fetal interaction and usefulness of ultrasound as a diagnostic modality. They were also required to fill the same questionnaire after their ultrasound (Questionnaire attached). The briefing done to all patients in the ultrasound consultation group was by the same person.

Both groups were shown the fetus during their ultrasound examinations and important anatomical structures were pointed out. There was no history of congenital anomalies in previous or current pregnancies in any patient of either group. The ultrasounds for both the groups were done by sonologists with at least five year experience.

The feto-maternal attachment instrument comprised of 6 questions, which were summed-up for each patient before and after the ultrasound examination. The two groups were then compared for difference in feto maternal attachment scores and change in anxiety levels regarding their pregnancies before and after the ultrasound. Likert scale for anxiety assessment was used, which had been used in a similar study and had been validated[17]. SPSS software version 14 (SPSS Inc, Chicago, IL) was used for compilation of the data and the statistical computations. Categorical data was compared using Chi-square or Fisher's exact test where appropriate and continuous variables were analyzed with paired t-test. P value <0.05 was considered significant.

RESULTS

On comparison, the two groups were found to be similar with regards to their demographic characteristics like age, parity, gestational age, educational level etc (Table I).

Table I. Demographic characteristics

Variables	Intervention		P-value*
Maternal age	Yes	No	
<30	20(66.7) +	21(70)	
30-40	10 (33.3)	6 (20)	
>40	0	3 (10)	0.07
Parity			
Primigravida	11(36.7)	14(46.7)	
Multigravida	19 (63.3)	16 (53.3)	0.43
Gestational age			
First trimester	11(36.7)	8 (26.7)	
Second trimester	8 (26.7)	10 (33.3)	
Third trimester	11(36.7)	12 (40)	0.69
Maternal Education			
Matric	4 (13.3)	5 (16.7)	
Intermediate	7(23.3)	13 (43.3)	
Graduate	14(46.7)	10 (33.3)	
Post-graduate	5 (16.7)	2 (6.7)	0.23

*p-value < 0.05 is considered significant
+numbers shown in parentheses are percentages

Twenty five patients were primigravida and 35 were multigravida. The number of primigravida and multigravida in both groups were comparable to remove bias (Table I) as anxiety level was slightly less in multigravidas. All patients were educated, nine were matriculate, 20 had done their intermediate, 24 were graduate and 7 were postgraduate, reflecting the fact that mostly the patients were from middle to high socioeconomic status.

Materno-fetal attachment instrument (MFAS) is basically a questionnaire requiring 5 minutes for completion. Each question has a 7-point scale (1-strongly agree, 7 –strongly disagree). The subscales to the MFAS are Differentiation of Self from Fetus, Interaction with Fetus, Attributing Characteristics to the Fetus, and Giving of Self. The original validation of the questionnaire had a coefficient of reliability of 0.85. It has been used in multiple studies of maternal-fetal attachment. Changes of scores in the MFAS before and after an ultrasound examination indicate changes in maternal-fetal attachment. This change was however statistically significant in the ultrasound consultation group only (Table II). The change calculated for the total score was significant enough in suggesting that there is increased bonding towards the fetus for mothers.

Table II. FMA (Feto-maternal attachment) scores before and after ultrasound (US)

	Interven-tion	N	Mean	Std. Deviation	P-value*
FMA score before US	No	30	30.000	3.54	0.944
	yes	30	29.9333	3.77	
FMA score after US	No	30	30.966	3.83	<0.0001*
	Yes	30	36.66	2.95	

*p value < 0.05 is considered significant

In both the groups the total score from the materno-fetal attachment instrument was similar before the ultrasounds and showed a positive change in attitude of the parent toward the fetus after the ultrasound visualization of the fetus. When the questions were assessed individually, a significant difference was noted in all the 6 questions in the ultrasound consultation group indicating the better ability of the patient post consultation to perceive the fetus as an individual and increasing the feeling of care towards it.

There was also a significant decrease in anxiety scores after the ultrasound consultation (Table III). The difference in anxiety scores in both groups before the ultrasound consultation was not statistically significant. This suggests the potential benefits of supplementing the routine obstetric ultrasound examination with a consultation aimed at increasing maternal interaction with the fetus during the procedure and recognition of the fetal form, which can in turn increase maternal understanding of fetal behavior and development, and the ability to reduce maternal anxiety during the scan.

Table III: Anxiety Levels before and after Ultrasound in the two groups

Anxiety	Before Ultrasound			After Ultrasound		
	Intervention		χ^2 (p)	Intervention		χ^2 (p)
	No(n)	Yes(n)		No	Yes	
Low	19	20	0.7310	18	30	<0.0001*
Moderate- High	11	10		12		

*p value < 0.05 considered significant

DISCUSSION

The study suggests that ultrasound examinations have a positive impact on mothers in that they strengthen bonding toward the fetus and result in an increase in positive feelings towards the fetus. It strongly correlates with a recent study which showed that ultrasound consultation was responsible for increasing maternal-fetal attachment and reducing maternal anxiety[17]. This study explained that the ultrasound consultation increases the maternal recognition of fetal form which in turn increases maternal understanding of fetal behavior and reduces maternal anxiety during the scan.

Another study on two and three dimensional ultrasonography also has shown increased fetal bonding with better recognition of fetal form[19,20]. Zlotogorski et al. showed that the reduction of anxiety following ultrasound examination was inversely related to gestational age, but was unrelated to demographic or medical variables, such as the risk level at the time of the scan[21].

An association between maternal anxiety in pregnancy and increased uterine artery resistance index was also noted by Teixeira et al[5]. Mechanisms have been suggested by which psychological state of mother may affect fetal development and the influence of maternal anxiety has been suggested as one of the mechanisms. No study as yet has been conducted to understand the emotional impact of ultrasound images and reports on patients in the local community. This is a simple procedure

which can have a marked impact on the expectant mother and the progress of gestation.

These results reinforce the need to include ultrasound consultation as part of routine ultrasound screens. There is probably a place for combined Obstetrics/Ultrasound clinics in which the patients will not only save time and get good health care guidance but will also return in a better form of mental health as well.

Limitations of this study include the difficulty to assess feelings quantitatively as it is qualitative which may have different impact on different individuals. This may have varied among patients. The second limitation was the small sample size due to a short study period but the results even with this small sample size are in accordance with the previous international studies[17].

There could be benefits including increased maternal-fetal attachment, reduced maternal anxiety, knowledge of fetal development and behavior, and increased maternal investment in health during the pregnancy

CONCLUSION

Ultrasonography allows for images to be produced that parents can recognize and relate to. It positively changes the attitude of expectant parents toward the pregnancy by enhancing the parental- fetal bond, reducing anxiety in parents, and also increasing awareness of the importance of taking care of one's own health.

Pre-examination questionnaire

Name _____ **MR No.** _____

Phone No. _____ **Date of Utrasound** _____

1. Maternal age (week) **<30** **30-40** **>40**

2. Parity **Primigravida** **Multigravida**

3. Gestational age **4. Educational Level**

5. Occupation **6. No of Ultrasound in this Pregnency**

1. After the ultrasound, I will know my baby better.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

2. I am concerned about how my feelings might affect my baby.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

3. I am concerned about how my eating might affect my baby.

7	6	5	4	3	2	1
`Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

4. I am concerned about how exercise might affect my baby.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

5. After watching the ultrasound, I will be more concerned about my baby's health.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

6. I feel attached to my baby.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

Mother's pre examination anxiety:

1	2	3	4	5	6
Low			Moderate		High

Post-examination questionnaire

Name _____ **MR No.** _____

1. After watching the ultrasound, I know my baby better.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

2. After watching the ultrasound of my baby, I am concerned about how my feelings might affect my baby.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

3. After viewing the ultrasound, I am concerned about how my eating might affect my baby.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

4. After viewing the ultrasound, I am concerned about how exercise might affect my baby.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

5. After watching the ultrasound, I am more concerned about my baby's health.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

6. After watching the ultrasound, I feel more attached to my baby.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

7. Watching the ultrasound was really worthwhile.

7	6	5	4	3	2	1
Strongly agree	Agree	Agree somewhat	Neutral	Disagree somewhat	Disagree	Strongly disagree

Mother's post examination anxiety:

1	2	3	4	5	6
Low			Moderate		High

REFERENCES

1. Gudex C, Nielsen BL, Madsen M.Why women want prenatal ultrasound in normal pregnancy? Ultrasound Obstet Gynecol 2006;27:145-50.

2. Tautz S, Jahn A, Molokomme I et al. Between fear and relief: how rural pregnant women experience foetal ultrasound in a Botswana district hospital. Soc Sci Med 2000; 50:689-701.

3. Kowalcek I. Stress and anxiety associated with prenatal diagnosis. Best Pract Res Clin Obstet Gynaecol 2007 ;21:221-8.

4. Faisal-Cury A, Rossi Menezes P. Prevalence of anxiety and depression during pregnancy in a private setting sample. Arch Womens Ment Health 2007; 10: 25-32

5. Teixeira JM, Fisk NM, Glover V. Association between maternal anxiety in pregnanacy and increased uterine artery resistance index: cohort based study. BMJ 1999; 318:1288-9

6. Lerum CW, LoBiondo-Wood G. The relationship of maternal age, quickening, and physical symptoms of pregnancy to the development of maternal-fetal attachment. Birth 1989; 16:13–7.

7. Zechmeister I. Foetal images: the power of visual technology in antenatal care and the implications for women's reproductive freedom. Health Care Anal 2001; 9:387–400

8. Fletcher JC, Evans MI. Maternal bonding in early fetal ultrasound examinations. N Engl J Med 1983; 308:392–3

9. Sedgmen B, McMahon C, Cairns D et al. The impact of two-dimensional versus three-dimensional ultrasound exposure on maternal-fetal attachment and maternal health behavior in pregnancy. Ultrasound Obstet Gynecol 2006; 27:245-51

10. Rustico MA, Mastromatteo C, Grigio M et al. Two dimensional vs. two- plus four-dimensional ultrasound in pregnancy and the effect on maternal emotional status: a randomized study. Ultrasound Obstet Gynecol. 2005; 25:468-72

11. Ji EK, Pretorius DH, Newton R et al. Effects of ultrasound on maternal-fetal bonding; A comparison of 2 and 3 dimensional imaging. Ultrasound Obstet Gynecol 2005; 25: 473-7.

12. Colucciello ML. Pregnant adolescents' perceptions of their babies before and after realtime ultrasound. J Psychosoc Nurs Ment Health Serv 1998; 36: 12-9

13. Kohut RJ, Dewey D, Love EJ. Women's knowledge of prenatal ultrasound and informed choice. J Genet Couns 2002;11: 265-76

14. Julian-Reynier C, Macquart-Moulin G et al. Prenatal diagnosis: perceptions of women concerning their pregnancies. J Gynecol Obstet Biol Reprod 1994; 23:691-5

15. Garcia J, Leanne B, Jane H et al.Women's views of pregnancy ultrasound: a systematic review. Birth 2002 ;29: 225-50.

16. Basama FMS, Leonard B, Leighton M. Audit: women's perception and knowledge of the 20 weeks anomaly scan. J Obstet Gynaecol 2004; 24: 44-6.

17. Boukydis CF, Treadwell MC. Women's responses to ultrasound examinations during routine screens in an obstetric clinic. J Ultrasound Med 2006; 25:721-8.

18. Schonholzer SM, Gotzmann L, Zimmermann R et al. Psychological aspects of ultrasound examinations during pregnancy. Gynakol Geburtshilfliche Rundsch. 2000;40:119-24.

19. Gattu S, Ji EK, H Pretorius DH. Pre-examination and post-examination assessment of parental-fetal bonding in patients undergoing 3-/4 dimensional obstetric ultrasonography. J Ultrasound Med 2006; 25:1411-21.

20. Timor-Tritsch, Platt LD. Three-dimensional ultrasound experience in obstetrics. Curr Opin Obstet Gynecol 2002; 14: 569-75.

21. Zlotogorski Z, Tadmor O, Rabinovitz R et al. Parental attitudes toward obstetric ultrasound examination. J Obstet Gynaecol Res 1997; 23: 25-8.

Ethical Approval

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All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed.