

Awareness, attitudes, and practices regarding obstetrical ultrasound among pregnant women in Abbottabad, Khyber Pakhtunkhwa

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Article Info.

Conflict of interest: Nil

Funding Sources: Nil

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Article information

Submission date: 27-10-2024

Acceptance date: 10-12-2024

Publication date: 31-12-2024

Cite this article as: Ismail A, Khurshid W, Jaffri S, Rehman A, Alvi FZ, Alvi MI. Awareness, attitudes, and practices regarding obstetrical ultrasound among pregnant women in Abbottabad, Khyber Pakhtunkhwa. JSTMU. 2024;7(2):184-190.

A B S T R A C T

Introduction: Obstetric ultrasound (OU) is crucial for monitoring the health of developing fetuses and expectant mothers, aiding in the detection of congenital anomalies and pregnancy-related complications. Effective prenatal care relies on understanding the role of OU in managing reproductive health. This study aimed to evaluate the Knowledge, Attitude, and Practice (KAP) regarding obstetric ultrasonography among pregnant patients at City Ultrasound Institute, Abbottabad, Pakistan.

Methodology: A cross-sectional study was conducted from December 23, 2023, to February 9, 2024, involving 159 female outpatients. Data were collected using a dichotomous scale questionnaire assessing KAP related to OU. Statistical analyses were performed using SPSS version 25.0.

Results: The average gestational age of participants was 29.6 weeks. Knowledge, attitude, and practice scores for OU were 67.8%, 67.7%, and 86.6%, respectively. Key findings include: 31.4% of participants knew about OU, 59.7% considered it necessary to confirm pregnancy, and 78% believed it was needed at different stages of pregnancy. Most participants (84.9%) recognized OU's ability to detect anomalies, though 15.7% thought it might harm the fetus. In terms of practice, 88.6% had access to OU facilities, and 90.5% recommended OU to others. However, 9.4% felt their privacy was compromised during scans.

Conclusion: The study reveals that while the practice of OU is widely adopted, there is a significant gap in knowledge among pregnant women regarding its full benefits. Many participants view OU primarily for confirming pregnancy or checking gender, rather than its broader role in monitoring fetal and maternal health.

Keywords: Congenital disease; Obstetrical ultrasonography; Prenatal care.

Introduction

Obstetric ultrasound refers to using sound waves to constitute an image of an embryo/ fetus within a pregnant woman. It also helps to ascertain the overall reproductive health including the mother's ovaries, uterus, and other aspects of pregnancy.¹ This method of analyzing fetal health does not pose any harm to it as it does not involve any ionizing radiations, and no anomaly has been reported to date due to obstetric ultrasonography. Due to this safety

profile, obstetric ultrasound is the most preferred technology to monitor the health of pregnant woman and their developing babies.² Advancements in sonographic imaging technology such as 3D imaging, have led to both better resolution of images, more accurate 3-dimensional (3D) assessment, and more accurate clinical interpretation of ultrasound examination. Ultrasonography is being conventionally used in all healthcare facilities for anomaly

screening in both mothers and baby, with convenience, accuracy, and safety.^{3,4} The introduction of transvaginal ultrasound has made early detection of pregnancy possible and has eliminated the need for a full bladder before ultrasound. The transvaginal transducer has also improved the resolution of images and the accuracy of diagnosis in obese women.⁵

The average span of human pregnancy is 9 months or 280 days, starting from the first day of the last menstrual cycle till the birth of the baby.⁶ Royal College of Obstetricians and Gynecologists, RCOG has recommended a scan at CRL of 45-84 mm to ascertain accurate gestational age, and major structural anomalies, determine single or multiple pregnancies, detect fetal abnormalities, analyze placental placement, have a baseline idea of cervical incompetence to predict preterm deliveries and to improve the overall pregnancy outcomes by provision of required treatment in light of observed outcomes.⁷ Ultrasound is periodically recommended by gynecologists and obstetricians to diagnose any suspected preterm delivery and post-term pregnancy issues, especially in countries of low socio-economic status.^{8,9}

In developing countries, pregnant women are more prone to developing complications especially because of folic acid and nutritional deficiency that often result in mortality of baby and mother.¹⁰ Also, newborns are more susceptible to developing complications during birth that may prove to be fatal, prenatal ultrasound scans can help detect these problems beforehand and avoid any unpleasant aftermath.^{11,12} According to the demographic and health survey 2017-2018, the perinatal mortality rate in Pakistan is 75 per 1000 births and the post-neonatal mortality rate is 19 per 1000 children, which is very high as compared to developed countries where women have access to better educational sessions on perinatal care and have better quality of life.¹³ The most common cause of perinatal morbidity and mortality is Intrauterine growth retardation (IUGR), which may be avoided and diagnosed earlier through periodic ultrasound scan sessions. The understanding, awareness, and attitude of women regarding antenatal ultrasound scans are critical to overcoming the above-stated complications that lead to high mortality in women and babies.¹⁴

Keeping this perspective in view, this study was conducted to analyze the knowledge, attitude, and practice

of pregnant women about obstetric ultrasound at City Ultrasound Institute, Abbottabad, Khyber Pakhtunkhwa. As data on such studies from a population of Pakistan is very rare, for this purpose, a questionnaire survey was performed on 159 pregnant women who visited the healthcare facility for obstetric ultrasound.

Methodology

A cross-sectional study was designed and conducted at City Ultrasound Institute, Abbottabad, Pakistan. After getting approval from the institute, the study was performed from 23rd Dec 2023 to 30th June 2024, for a time interval of 6 months and 7 days. In total, there were 159 female participants of reproductive age and the data was collected by convenience sampling technique.¹⁵ The survey window was open for this duration of time as a smaller duration would not have given adequate response required to conduct this study and surveys conducted for a much longer period diminish the value of the study. As reported, the survey duration of a minimum of 2 weeks is enough to collect the desired response.¹⁶

A pretesting or pilot testing of this questionnaire was performed. For this purpose, a pilot sample of 30 people was chosen from our target group, and they were asked to share every possible concern that came across their mind while processing the questions. The following questions were asked in the pilot study, do you think the questions are easy to understand? Which part of the questionnaire was most difficult for you? Which language do you prefer for communicating with the surveyors while filling out the questionnaire? Do you prefer to answer as Yes or No (Dichotomous) or based on the level of agreement for each question (Likert scale)? The resulting data was used to improve the questionnaire language and train the staff involved in questionnaire handling and communication with the participants.

The investigators collected data on questions divided into 4 categories. The first category consisted of information about; (i) gestational age at the time of study (ii) educational level (iii) occupation of the participants. All participants were explained the rationale of the study and written consent was obtained before collecting questionnaire data from the participants and discussions were held to address any potential concerns.¹⁷

The other questions belonged to three categories, with 5 questions in each (i) Knowledge (ii) attitude, and (iii) practice. The 'knowledge' part of the questionnaire aimed at analyzing the general familiarity of the participants with the subject matter and the importance of its implementation in pregnant women's lives. The 'attitude' related questions focused on their behavior towards ultrasound, which was deeply impacted by their knowledge of obstetric ultrasound and the choices they made during pregnancy and antenatal care. The 'practice' related questions primarily focus on the assessment of the implementation of obstetric ultrasound practice in women and their comfort/ confidence level during ultrasound practices.

A dichotomous scale questionnaire format was used to collect data from the participants. A dichotomous questionnaire (Yes or No option-based) is considered an ideal approach for factual reporting of a study. They are simple, easy to analyze, a quicker but proficient strategy to collect data, and are considered less confusing for participants. For each question, a "Yes" response was given 1 point while a "No" response was awarded 0. The patients who consented to be part of the study were given a comfortable environment and required assistance to fill out the questionnaire.¹⁸ The questions from each category have been given in Table 1 below:

The inclusion criteria for this KAP analysis comprised (i) Pregnant inpatients and outpatients and (ii) Willingness to participate in the study. The exclusion criterion for this study included (i) the Patient's inability to read/write, and (ii) an unstable mental condition.¹⁹ The dependent variable was the knowledge, attitude, and practice of expecting women toward prenatal ultrasonography. Independent variables included educational background, occupation, age at the time of pregnancy, and socio-economic background. The sample size was calculated by using the online tool [calculator.net](https://www.calculator.net/sample-size-calculator.html) ((<https://www.calculator.net/sample-size-calculator.html>)). To estimate the sample size, 50% prevalence was taken with a confidence level of 95%, while the total margin error (d) was set at 5% by using the formula: $n = Z^2 P(1-P)/d^2$

Table 1: Knowledge, attitude, and practice questionnaire on obstetric ultrasound study.

Questions	
KNOWLEDGE	
A	Do you know about obstetric ultrasound?
B	Do you think an ultrasound is required to confirm pregnancy?
C	Do you think that ultrasound is necessary at different time intervals during pregnancy?
D	Do you think that ultrasound can accurately determine the anomalies in the baby and the expecting mother?
E	Do you feel that ultrasound might be harmful to the fetus?
ATTITUDE	
F	Do you prefer getting an ultrasound done periodically during pregnancy?
G	Do you feel comfortable during the ultrasound?
H	Do you think ultrasound may be helpful in the prediction of the delivery mode (vaginal or cesarean) of baby
I	Do you inquire about the baby's gender during ultrasound?
J	Do you feel your privacy is violated during ultrasound?
PRACTICE	
K	Do you have access to an ultrasound facility?
L	Is an obstetric ultrasound facility easily affordable for you?
M	Do you feel the ultrasound results are reliable?
N	Do you recommend other expecting mothers to get ultrasounds?
O	Does your doctor address your ultrasound-related concerns politely?

The participants were informed about the rationale of the study. The anonymity of their response and confidentiality of data was assured to them. The diversity based on their education level, job status, age, and understanding level was respected. An environment of credibility and trust was built by formal discussion with participants making them comfortable in lodging their response. SPSS version 25.0 software was used for data analysis. Independent sample t-test and one-way ANOVA test of significance were used. A Pearson correlation analysis was used to compare correlations between variables.

Results

The sample size of this study was calculated to be 152. The response rate of this study was high as most of the women were willing to participate in this study. The average gestational week of the participants was 29.6 weeks which shows most participants were in the third trimester of pregnancy. Approximately 20.1% (n=32) participants were uneducated, 18.8% (n=30) participants had received primary level education, 22% (n=35)

participants had received secondary level education, 5.6% (n=9) participants had completed vocational courses, 16.9% (n=27) participants had received bachelor's level education while 16.3% (n=26) participants had received education above bachelors' level.

Table 2: Gestational age at the time of KAP analysis

S.No	Gestational Age	Number of participants (n)
1	0-14 weeks	20
2	15- 28 weeks	40
3	28- 42 weeks	99

Table 3: Educational level of participants who visited rural health centers and participated in the KAP study.

S.No	Educational level	Number of participants (n)
1	Uneducated	32
2	Primary	30
3	Secondary	35
4	Bachelors	27
5	>Bachelors	26

Most participants were housewives (44.6%), followed by women working either in the government or private sector (39%) while 3.1% were self-employed, 3.2% were laborers and only 2.5% belonged to women serving as agriculture workers. Tables 2 and 3 below summarize the data on the gestational and education levels of participants in this study.

The results obtained have been reported as a bar graph as given below. According to questions mentioned in Table 1 for each category and results mentioned in Figures 1, 2 and 3 below, only $31.4 \pm 3\%$ (n=50) of patients knew about obstetric ultrasound (A), $59.7 \pm 4\%$ (n=95) considered it necessary to confirm pregnancy (B), $78 \pm 3\%$ (n=124) participants considered ultrasound necessary at various time intervals during pregnancy (C), $84.9 \pm 4\%$ (n=135) knew that an obstetric ultrasound can accurately detect anomaly in growing fetus and pregnant mother (D) while $15.7 \pm 2\%$ (n=25) thought that ultrasound is harmful to fetus (E). The knowledge of women regarding obstetric

ultrasound to detect anomalies in mother and fetus was highest (D= 84.9 ± 4) while a small proportion of participants thought that it is harmful to the fetus (E= $15.7 \pm 2\%$). These results show that the knowledge aspect of participants was 56.53% positive regarding obstetric ultrasound.

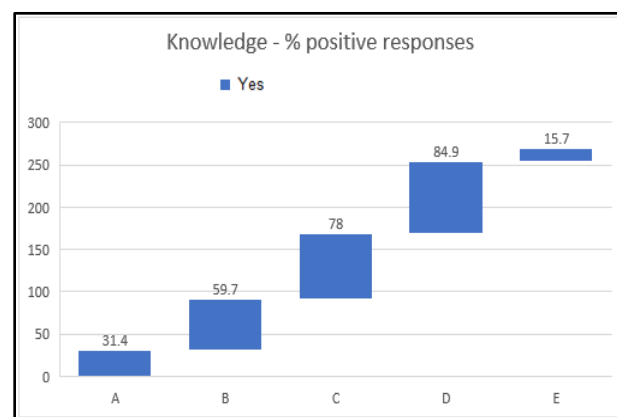


Figure 1: Positive response rate to Knowledge-related questions of KAP analysis

For attitude part of the questionnaire, $79 \pm 6\%$ (n=126) of women prefer getting an ultrasound done periodically during pregnancy (F), $91.1 \pm 5\%$ (n=145) were comfortable during ultrasound (G), $84.2 \pm 3\%$ (n=134) thought that ultrasound may be helpful in prediction of delivery mode of baby (H), $74.8 \pm 4\%$ (n=119) were interested in inquiring about the baby gender during ultrasound (I), while $9.4 \pm 5\%$ (n=15) felt their privacy is violated during ultrasound (J). In practice terms, the highest positive response was received for women who felt comfortable during obstetric ultrasound (G= $91.1 \pm 5\%$) while the lowest was observed for women who felt that they were being violated during ultrasound (J= $9.4 \pm 5\%$). An overall $66.7 \pm 2\%$ positive practice aspect of obstetric ultrasound was observed showing a commendable awareness in these women.

For the practice part of the KAP study, we found that $88.6 \pm 3\%$ (n=141) of women had access to an ultrasound facility (K), $71 \pm 4\%$ (n=113) of women could easily afford an obstetric ultrasound facility (L), $88 \pm 2\%$ (n=140) considered the ultrasound reports reliable (M), $90.5 \pm 7\%$ (n=144) expecting mothers recommended other pregnant women to get an obstetric ultrasound (N) while $95 \pm 6\%$ (n=151) mentioned that obstetricians address their pregnancy-related concerns politely during ultrasound (O).

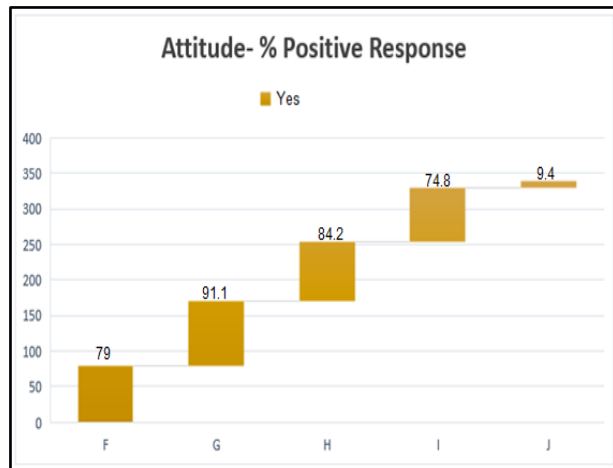


Figure 2: Positive response rate to Attitude related questions of KAP analysis

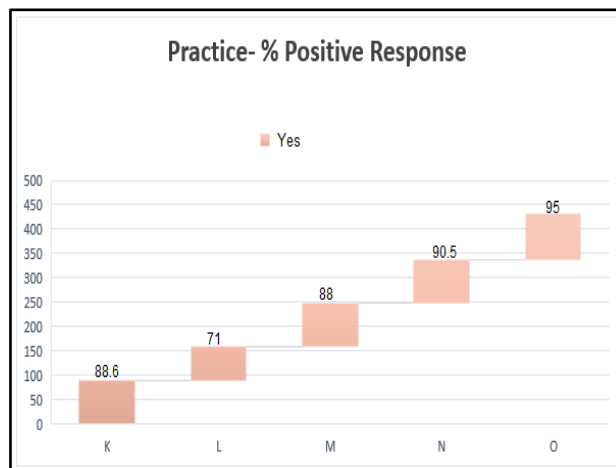


Figure 3: Positive response rate to Practice related questions of KAP analysis

The highest positive response in practice terms was calculated from participants who shared that their concerns are politely addressed by their obstetrics ($O=95\pm6\%$) while the lowest was calculated for women who mentioned that affording obstetric ultrasound is not easy for them ($L=71\pm4\%$). An overall $74.3\pm5\%$ positive response towards obstetric ultrasound practice shows that many women have confidence in the outcomes of ultrasound and consider it a necessary part of pregnancy and infant's health.

Discussion

Obstetric ultrasound is a noninvasive and safe method of imaging the pelvic and abdominal cavities of expecting mothers to assess any anomaly in the growing fetus or

pregnant mother.¹⁷ This involves high-frequency ultrasonic waves which provide real-time images of the fetus. World Health Organization (WHO) recommends that every pregnant woman must undergo an obstetric ultrasound before week 24 of pregnancy to assess any possible anomaly in the developing fetus or expected mother.¹⁰ Early detection of any possible Congenital anomaly is a major concern of every expecting mother. The knowledge, attitude, and practice of expecting mothers towards congenital anomalies and the usage of ultrasound in detecting these problems beforehand influence their decision to opt for obstetric ultrasound.¹⁸

KAP (Knowledge, Attitude, Practice) studies have been utilized for decades to analyze the extent of understanding of subject matter, design or implement new strategies, and identify potential concerns at the patient's end that need to be addressed.¹⁸ The present KAP study was conducted in the rural health center Haripur where pregnant women belonging to various strata of life visit for routine checkups. From a knowledge perspective, a vast majority of women (50%) knew about obstetric ultrasound and its implications, whereas most of the women thought that it is necessary just to confirm pregnancy (78%) and that it can detect any anomaly in the growing fetus (84.9%). Some participants (15%) were not even comfortable with ultrasound owing to the common false belief that it is harmful to the fetus.

As reported by a study conducted in Mulago Hospital Uganda, approximately 88.3% of participants knew about OU which is quite higher than the results of our study. Also, the misconception regarding OU being harmful to the fetus was quite high comparatively (66%) compared to ours. In this study too, the response rate was good but women had misconceptions of OU being harmful to the fetus and did not know the broader implications of OU. These women also reported their primary aim of getting OU was to validate pregnancy and to confirm the baby's gender, while they also believed that OU could cause them cancer.²¹ Our findings correlate with results reported by a study conducted at public hospitals in Addis Ababa, Ethiopia where only 50% of pregnant women had good knowledge regarding obstetric ultrasound and 95% of participants considered it important for confirmation of pregnancy.

In comparison with the same study conducted at the obstetrical outpatient clinic at King Abdul-Aziz University Hospital, in Jeddah, 93% of women have good knowledge

about OU, 78% considered it safe for themselves while 83.8% considered it harmless for their fetus. The great difference in knowledge perspective of our study with this one shows that countries with better quality of living and socio-economic status have better access to educational programs for the public regarding postnatal care.²² An Islamabad-based study conducted in a tertiary care hospital also reported that although most of the participants who visited this facility had better socio-economic status and overall education level only 46% of participants had good knowledge about the obstetric ultrasound and its positive impacts on pregnant mothers and fetal care while only 35.7% showed a positive attitude towards ultrasound practice. Moreover, the education level of the participants was reported to be significantly correlated with their knowledge level.²³

Our study showed that 79% of women considered it necessary to get OU during pregnancy while a vast majority of women (74.8%) were interested just in confirming the gender of the baby or in predicting the mode of delivery (84.2%). This prevalence was found to be much higher in results reported at King Abdul Aziz University Hospital where 97.6% of women preferred OU to confirm the baby's gender. While, in Mulago Hospital, 67% of women underwent OU to predict and manage the mode of delivery.

The overall knowledge, attitude, and practice level of OU in our study was 67.8%, 67.7%, and 86.6% respectively, these outcomes are much higher than previously reported by similar studies. The knowledge level of women was very low as compared to similar studies conducted in underdeveloped areas like Mulago where 96.4% of women had good knowledge about obstetric ultrasound.²¹ We also found that women belonging to the working class and higher than primary education had better knowledge and attitude towards OU, congenital abnormalities, had fewer misconceptions, and recommended other women OU for prenatal care, while women belonging to the labor class had very scanty knowledge on the subject and had misconceptions regarding safety and efficacy of ultrasound.

The outcomes of the KAP study largely depend upon the strategy employed, and the training of staff involved in survey and questionnaire design. The results of such studies also differ depending on the literacy rate, religious

values, residence, and economic status of the participants. Also, it provides no insight into why a certain response was chosen by the participants. As a future recommendation, a larger sample size and specific methodological needs must be taken into consideration while designing such studies. The improvements in the systematic design and reporting part of KAP analysis further improve the outcomes of the study and can foster the implementation of its findings for improvement in overall public health.

Conclusion

The present study was conducted at City Ultrasound Institute, Abbottabad which had a great diversity among pregnant women visiting for antenatal care. Our study shows a good level of knowledge, attitude, and practice among women, but we found a lot of participants had misconceptions regarding the need and safety of OU during pregnancy. This emphasizes the need to design such mass educational programs at the national level that can educate women, remove their misconceptions, and enhance their interest in a vital scanning procedure of obstetric ultrasound.

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