


# Ultrasound assessment of women presented during the first trimester of pregnancy in a rural teaching hospital

Sagar Koirala<sup>1</sup>,  Shambhu Kumar Yadav<sup>1</sup>, Kabita Sah Swarnkar<sup>1</sup>, Seshananda Sanjel<sup>2</sup>

<sup>1</sup>Department of Gynae/Obstetrics, Karnali Academy of Health Science, Jumla

<sup>2</sup>Department of Community Health Sciences, Karnali Academy of Health Science, Jumla

## ABSTRACT

**Introduction:** First-trimester ultrasound (up to 13 weeks 6 days) is increasingly utilized to verify viability, determine pregnancy age via crown-rump length, identify multiples and chorionicity, and screen for aneuploidy and structural abnormalities. It also aids in diagnosing miscarriage, ectopic pregnancy, and molar pregnancy. Previous research shows differing rates of early pregnancy loss and ectopic pregnancy, highlighting the importance of obtaining local data from Karnali Academy of Health Sciences (KAHS).

**Methods:** A retrospective cross-sectional review involved 451 first-trimester women attending KAHS between January 1 and June 30, 2024. Records with ultrasound reports were included, while incomplete reports were excluded. Data were extracted from the Radiology and Gynecology/Obstetrics outpatient department registries into Excel and analyzed descriptively using SPSS. Ethics approval was obtained from KAHS IRC Ref: 081/082/82.

**Results:** The median age was 24 years (interquartile range 8; range 14–55), with 60.1% aged 20–29. The caste distribution showed the highest group to be Brahmin/Chhetri 66.3%. Ultrasound results showed a viable fetus in 88.25%, retained products of conception in 10.19%, early fetal demise in 0.89%, molar pregnancy in 0.44%, and a blighted ovum in 1 case (0.22%). For viable pregnancies, gestational age was not normally distributed; the median was 7.86 weeks (interquartile range 3.43; range 4–13.43). Gravidity ranged from G1 to G10.

**Conclusion:** First-trimester ultrasound predominantly confirms viable pregnancies while detecting a small share of early losses and rare pathologies, supporting timely early-pregnancy care. These findings align with broader evidence, but comparisons should account for differing denominators and care pathways.

**Keywords:** Antenatal care, First trimester, Ultrasound, Unwanted pregnancy

## INTRODUCTION

Routine ultrasound (USG) is recognized as part of prenatal care and is more frequently used during the second trimester [1,2] also referred to as intrauterine growth restriction (IUGR). Nevertheless, in recent years, it has been increasingly used during the first trimester, a period that starts from the moment the feasibility of pregnancy is confirmed by verifying the presence of a gestational sac in the uterine cavity with an embryo showing cardiac activity, until 13 weeks and 6 days of gestation [2] also referred to as intrauterine growth restriction (IUGR). USG during the first trimester of pregnancy is done to confirm fetal viability, establish an accurate gestational age from the measurement of fetal crown-rump length, identify multiple pregnancies and determine their chorionicity and amnionicity, and to screen for significant fetal anomalies, both structural abnormalities and aneuploidy [3]. In addition, a high sensitivity

and relatively low false-positive rate screening tests for chromosomal anomalies are undertaken by measurement of fetal nuchal translucency (NT) in combination with maternal age, other USG markers (e.g. fetal nasal bone, ductus venosus flow, fetal heart rate, and assessment of tricuspid valve flow), measurement of maternal serum free beta-human chorionic gonadotropin and pregnancy-associated plasma protein-A, in the form of a combined test [4]. Eventually, USG is critical for the diagnosis of abnormalities such as miscarriage, ectopic pregnancy, aneuploidy, and structural anomalies [5].

A study done in western Nepal has reported 10.5% missed abortions, 6.3% incomplete abortions, 4.6% complete abortions, 4.0% blighted ovum, 3.6% without sonographic evidence of pregnancy, 2.3% ectopic pregnancies, and 1.9% molar pregnancies among the patients presented in the first trimester for USG [6]. In another study, the incidence of ectopic pregnancy was found to be 0.35% which is most common among the reproductive age group between 20 and 40 years. Additional findings were pelvic inflammatory disease, 38.5% and type III ectopic pregnancy, 80.8%, the most common type [7]. These findings from the different studies shows the importance of first-trimester USG. This study aimed to identify the different conditions during the first trimester through the USG in patients attending Karnali Academy of Health Sciences.

## METHODS

This was a retrospective cross-sectional study carried out in KAHS, a teaching hospital that is situated in a remote area of Nepal. As this is a tertiary-level hospital that provides USG service as well as gynaecology and obstetrical services, this site is favourable for this study.

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**Corresponding Author:**

Dr. Sagar Koirala

Department of Gynae/Obstetrics, Karnali Academy of Health Science, Jumla

Email: koiralasagar01@gmail.com

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First-trimester pregnant women who presented in the Gynecology/Obstetrics OPD from January 1, 2024, to June 30, 2024, were included. The first trimester was considered to be the time between the last menstrual period and the end of 13 weeks of gestation. All those patients whose records were present along with the USG finding during this period were included in the study. Incomplete reports that do not provide the complete information as per the pro-forma were excluded from the study. Based on the inclusion and exclusion criteria, a record of 451 women was taken for the study.

Data were collected using a structured pro-forma. Per forma was developed by an extensive review of the literature and consultation with the experts. The reports of the ultrasound were reviewed from the records of the Radiology Department and the OPD of the Gynecology/Obstetrics Department. The collected data were entered into the MS Excel software. The data were transferred into IBM SPSS 21 for data analysis. The data obtained in the pro-forma was presented as frequency and percentage.

Ethical approval was obtained from the institutional review committee of KAHs. (Ref:081/082/82)

## RESULTS

A total of 451 patients were taken for the study.

The data on age were not normally distributed (i.e., the Kolmogorov-Smirnov and Shapiro-Wilk tests had p-values of less than 0.05). The median age of the patients was 24 years. The interquartile range was 8 years. The minimum age of the patient was 14 years, and the maximum age was 55 years. The age group of the patient is as shown in Table 1.

**Table 1: Age group of the patient who underwent USG in the first trimester(N=451)**

Age Group	Frequency	Percentage
≤ 19 years	70	15.5
20-29 years	271	60.1
30-39 years	101	22.4
40-49 years	7	1.6
≥50 years	2	0.4

Among 451 women, the Brahmin/Chhetri caste had the highest number of patients. The cast-wise distribution is shown in Table 2.

**Table 2: Caste of the women(N=451)**

Caste	Frequency	Percent
Brahmin/Chhetri	299	66.3
Dalit	77	17.1
Others	49	10.9
Janajati	22	4.9
Madhesi	4	0.9

Among the 451 patients who underwent ultrasonography in the first trimester, the majority had a viable fetus, seen in 398 (88.25%) cases. Retained products of conception (RPOC) were identified in 46 (10.19%) patients. Early fetal demise was observed in 4 (0.89%) cases, while molar pregnancy was reported in 2 (0.44%) patients. A blighted ovum was detected in 1 (0.22%) patient. The women were from first gravida to tenth gravida. The gravida and the fetal status in the USG report are shown in Table 3.

Among the patients who had the living fetus in the USG report, the week of gestation was not normally distributed (i.e., the Kolmogorov-Smirnov and Shapiro-Wilk tests had p-values of less than 0.05). The median week of gestation of a living fetus was 7.86 weeks with the interquartile range of 3.43 weeks. The minimum week of gestation was 4 weeks, and the highest was 13.43 weeks.

**Table 3: The gravida and the fetal status of the women presenting for USG in the first trimester (N=451)**

Gravida	Fetus status					Total
	Blighted Ovum	Fetal Demise	viable	Molar	RPOC	
1	0	2	89	2	15	108
2	0	0	107	0	6	113
3	1	1	114	0	20	136
4	0	0	50	0	2	52
5	0	1	18	0	1	20
6	0	0	16	0	2	18
7	0	0	3	0	0	3
10	0	0	1	0	0	1

## DISCUSSION

This study showed that first-trimester ultrasound showed RPOC were identified in 46 (10.19%) patients. A study done in Kolkata, India, showed that the identification of abortion or pregnancy loss in the first trimester by USG was 16% [8]. A study done in the Nepal Medical College (NMC), Kathmandu, showed that the early USG showed the abortion rate of 21.4% [6], which is far more than the findings in our research. This could be because vaginal bleeding cases are primarily presented in the Emergency department, where USG is also performed. However, those results are not recorded in the Department of Radiology's records.

This study showed that normal pregnancy was identified in 88.25% of the patients who underwent the USG during the first trimester. A study performed in NMC, Kathmandu, among 304 patients showed that a normal pregnancy was identified among 66.8% of the patients who underwent USG in the first trimester [6]. A study conducted in the Saveetha Medical College, India, among 100 pregnant women showed that in the first trimester, ultrasound, 80% of the pregnancies were normal [9]. The difference in the percentage of normal pregnancy in USG findings may be due to the difference in the sample size or merely a coincidence. The first definite sonographic finding to suggest early pregnancy is visualization of the Gestational Sac (GS), which can be seen as early as 4 weeks of GA [10]. Pregnancies might be detected in the uterus before 5 weeks of amenorrhoea. Therefore, early USG is crucial, especially in patients suspected of ectopic pregnancy. [11].

This study shows that early fetal demise was 0.89%, molar pregnancy was in 0.44%, and blighted ovum was 0.22%. Anembryonic gestation and trophoblastic pregnancies occur in low single-digit percentages, contributing to early pregnancy loss rates of 12–17%, with small case counts and low detection rates typical in single-center studies [12,13]. The 0.44% figure for molar pregnancy may be plausible in early-pregnancy imaging. Still, higher rates in Nepal (e.g., 4.2 per 1,000 live births at BPKIHS) suggest it reflects different denominators, like first-trimester scans, rather than true prevalence. Comparing these directly can be misleading [14]. Hospital-based first-trimester ultrasounds show anembryonic gestation in about 6.5% of scans and trophoblastic pregnancy around 0.3%. Depending on the cohort denominator, this could suggest under- or over-estimation if the base isn't directly comparable to ultrasound data series [13]. The statement's low percentages for early fetal issues make sense within a small group, especially if the denominator includes all early pregnancy visits or scans. These numbers match what the literature shows: anembryonic gestation is quite uncommon in the first trimester, and molar pregnancy is even rarer. Comparing this to broader population data, like per 1,000 live births, can sometimes lead to differences. While the statement seems reasonable on its own, it's important to be careful when applying it to larger groups, as it really depends on the specific denominator and the context of the group being studied.

We obtained the data from the hospital registry, and a total enumeration was done. Usually, the USGs were done in the hospital setting. Hence,

this unique setting provided us with easy access to data.

The study was conducted using secondary data, which may have compromised its generalizability. Additionally, the study might have potential bias due to misclassifications of the variables. The associations could not be measured because the survey was carried out among pregnant women who underwent an ultrasound.

## CONCLUSION

Based on the evidence presented, first-trimester ultrasound proves to be a valuable diagnostic tool for identifying early pregnancy outcomes, with the majority of cases showing viable pregnancies and a small proportion revealing early fetal demise, molar pregnancy, or blighted ovum—findings that align with global data and underscore the importance of context-specific denominators when interpreting prevalence rates.

## DECLARATION

### Acknowledgement

We want to thank the hospital administration, including the hospital director, for providing access to the record. All the pregnant women were acknowledged for their data.

### Author Contributions

Concept of research: SK, SS; Design of research: SK, SKY, KSS, SS; Literature search: SK, SS; Data collection: SK, SS; Data analysis: SK, SS; Data Interpretation: SK, SS; Drafting the manuscript: SK, SS; Reviewing of the manuscript for important intellectual content: SK, SKY, KSS, SS; Final approval of the version ready for submission: SK, SKY, KSS, SS; Agreement to be accountable for all aspects of the work: SK, SKY, KSS, SS; Correspondence to journal: SK

### Ethical Approval

IRC KAHS approved this research with the reference number of 081/082/02 on 22nd August 2024.

### Consent/Assent

Written approval was obtained from the Director of KAHS-teaching hospital for use of the data.

### Data Availability Statement

All the data will be available on request.

### Conflicts of Interest

We declare that none of us has a conflicting interest.

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There is no source of funding for the study. This is a self-funded study by the researchers.

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