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An observational analysis on antenatal ultrasound and socio-demographic profile

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Introduction

Antenatal care is one of the indicators of availability of health care facilities in the country. It is a type of preventive medicine. In antenatal care mothers receive routine check-ups for vitals, foetal growth, physiological changes of pregnancy, receive immunizations, receive supplementation including prenatal screening and treatment. Antenatal care helps in identifying high risk pregnancies which require further management. It helps women in preparation of delivery and to recognised warning signs. Ultrasonography is one of the vital part of antenatal care. Utilization of antenatal care has increased over the decades and ultrasonography has been a great contributor to this.

Materials and methods

This is a 2-year non-interventional observational study conducted on 363 patients in the Department of Obstetrics and Gynecology in a Tertiary Care Referral Hospital. All patients who have even a single antenatal ultrasonography done and have now delivered in the hospital were included. Women who abort or undergo MTP will be excluded. The study aims to analyse the number of ultrasonography scans done in a given patient in respect to the patient profile parameters like socioeconomic status; rural or urban status and any relationship to their previous pregnancy outcomes. The common determinants which affect the use of ultrasound that we aimed to identify were age, residence, socioeconomic, status, previous pregnancy outcome.

Statistical analysis

Sample size calculation was done using epiinfo.exe, which is open-source statistical calculator software freely downloadable from CDC, USA website. Using the Stat Calc calculator, assuming a population size of 6500 (i.e., the average number of annual confinements in this institute over the last 3 years), An expected frequency of 50% an acceptable margin of error of 5%, design effect of 1.0 and confidence level of 95%, the sample size comes to be 363.

The various parameters which will influence the obstetric and neonatal outcomes will be analysed using cross tabulations (Pearson's Chi-square test) and statistical significance will be calculated.

Statistical Data Analysis

The data on categorical variables is shown as n (% of cases) and the data on continuous variables is presented

as mean and standard deviation (SD). The inter-group statistical comparison of distribution of categorical variables is tested using Chi-Square test or Fisher's exact probability test if more than 20% cells have expected frequency less than 5. All results are shown in tabular as well as graphical format to visualize the statistically significant difference more clearly.

In the entire study, the p-values less than 0.05 are considered to be statistically significant. All the hypotheses were formulated using two tailed alternatives against each null hypothesis (hypothesis of no difference). The entire data is statistically analyzed using Statistical Package for Social Sciences (SPSS ver 22.0, IBM Corporation, USA) for MS Windows.

Results

Table 1: Distribution of number of antenatal scans done in the study group.

No. of scans	No. of cases	% of cases
1 – 2	102	28.09
≥ 3	261	71.90
Total	363	100.0

Of 363 cases studied, 102 (28.09 %) had 1 – 2 scans done and 261 (71.9 %) had ≥ 3 scans done in the study group.

Table 2: Distribution of number of antenatal scans done according to maternal age in the study group.

Maternal Age group (years)	No. of antenatal scans				Total (n=363)		P-value
	1 – 2 (n=201)		≥ 3(n=162)				
	N	%	n	%	n	%	0.05*
≤ 23 years	26	21.5	95	78.5	121	100.0	
24-31 years	61	32.8	125	67.2	186	100.0	
>32 years	15	26.8	41	73.2	56	100.0	
Total	102	28.1	261	71.9	363	100.0	

Distribution of no. of scans performed differs significantly between various maternal age groups in the study group (P-value=0.05). Significantly higher proportion of cases in the younger age group had relatively higher no. of scans and vice-versa (P-value<0.05).

Table 3: Distribution of number of antenatal scans done according to maternal education in the study group.

Maternal Education	No. of antenatal scans						P-value
	1 – 2 (n=201)		≥ 3 (n=162)		Total (n=363)		
	N	%	N	%	n	%	
Illiterate	10	25.0	30	75.0	126	100.0	<0.001*
School	37	19.2	156	80.8	40	100.0	
Graduate or above	55	41.3	75	58.7	4	100.0	
Total	102	28.1	261	71.9	363	100.0	

Distribution of number of scans performed differs significantly between various maternal education groups in the study group (P-value<0.05). Significantly higher proportion of mothers with graduate or post-graduate education had relatively higher number of scans done and vice-versa (P-value<0.05).

Table 4: Distribution of number of antenatal scans done according to residential status in the study group.

Residential area	No. of antenatal scans				Total (n=363)		P-value
	1 – 2 (n=201)		≥ 3 (n=162)				
	N	%	n	%	n	%	0.85NS
Rural	16	27.1	43	72.9	59	100.0	
Urban	86	28.3	218	71.7	304	100.0	
Total	102	28.1	261	71.9	363	100.0	

Distribution of no. of scans performed did not differ significantly between group of cases with rural residence and group of cases with urban residence in the study group (P-value>0.05).

Table 5: Distribution of number of antenatal scans done according to maternal employment in the study group.

Employment status	No. of antenatal scans				Total (n=363)		P-value
	1 – 2 (n=201)		≥ 3 (n=162)				
	N	%	N	%	n	%	
Employed	28	31.1	62	68.9	90	100.0	0.46^{NS}
Unemployed	74	27.1	199	72.9	273	100.0	
Total	102	28.1	261	71.9	363	100.0	

Distribution of no. of scans performed did not differ significantly between group of employed and group of unemployed mothers in the study group (P-value>0.05).

Discussion

Antenatal ultrasound is a component of antenatal care. Antenatal care aims at identifying high risk pregnancies and providing them appropriate management. Ultrasound also plays a major role in this aspect.

As we see in of our study group antenatal ultrasound is used very frequently as much as of 363 cases studied, 20 (5.5%) had 1 scan, 82 (22.6%) had 2 scans, 99 (27.3%) had 3 scans, 62 (17.1%) had 4 scans, 23 (6.3%) had 5 scans, 29 (8.0%) had 6 scans, 1 (0.3%) had 7 scans, 24 (6.6%) had 8 scans, 10 (2.8%) had 9 scans, 7 (1.9%) had 10 scans, 3 (0.8%) had 11 scans and 3 (0.8%) had 12 scans done in the study group , which is comparable to a study conducted in China where 96.1% women received ultrasound screening and the average number of scans was 2.55. 46.8% women received at least 3 ultrasound scans and the maximum number reached up to 11(1). WHO recommendation is that at least one scan before 24 weeks for the purpose of dating and detection of foetal malformation and placentation (2). In a cluster randomised study conducted in clusters of 5 countries Kenya ,Congo, Pakistan, Zambia, Guatemala showed 78% of intervention clusters received at least 1 ultrasound study 60% received 2 scans which is consistent with our study statistics where 28.1% received 1 to 2scans and 71.9 % received 3 or more than 3 scans(3).When it comes to socio demographic role in the utilization of scans, In a study conducted in Nigeria by Sadiq Umar A et al the frequency of scans done in the age group of 25 to 34 years was 61%, whereas 31% in age group between 15 to 24 and 7.2% in age group of 35 to 44 years which is similar to our study where younger women have received more number of scans(4). As age increases most of the women are multiparous and have previous pregnancy experience which might result in decreased use of ultrasound. This Nigerian study also compared the number of scans with respect to maternal education the result was frequency of scans was more in women with educational status above secondary school which was above 53.3% which is comparable to our study where the frequency of antenatal scans is more in women with graduate and post graduate education. This Nigerian study divided the women with scans less than 5 and more than 5 where 79% of women fell into category of scans less than 5. Whereas in our study we have divided women into scans less than and more than 3 and found out .28.1% of women had 1o 2 scans and 71.9% had more than or equal to 3 (4). In the study that was conducted in rural China change in outcome due to any scans was also estimated. Study showed women with younger age, higher education of women and husband had received more number of ultrasound scans which is similar to our study where women with higher education of graduate and post graduate level received more number of scans (1). In a cross-sectional descriptive study done in Zaria in Nigeria, women attending antenatal care in primary health centres were interviewed to find the effect of various demographic variables on usage of ultrasound it was found that expectant women's

occupation status did not have any effect on utilisation of ultrasound, which is comparable to our study. This study also showed that women's educational status has an impact on utilization of ultrasound which is also comparable to our study. But this study did not show any correlation between maternal age and usage of ultrasound whereas our study shows younger primiparous women have undergone more number of scans (3). Our study results are comparable to the study conducted in peri urban area in Uganda which had estimated the frequency of scans are more in primigravida which was up to 54% compared to 48% in multigravida. In our study 50% primigravida received more than 3 scans and 38% multigravida received more than 3 scans but when compared for 1 to 3 scans 61 % of multigravida had received at least 1 scan (5).

In a cross-sectional descriptive questionnaire-based study conducted in Nigeria by Ikea Ko LC et al it was found that level of education of women affected their desire to get an ultrasound. Women with higher educational status did get more number of scans which is comparable to our study (6). A study conducted in Rwanda in Africa by Homlund et al to assess in poor economic setting the availability of ultrasonography and its use and effect on pregnancy using questionnaire. The study showed most of the scans were done by obstetricians and there was necessity for improvement in skill setting and study showed ultrasonography did improve in antenatal follow up and ANC registration and hospital deliveries in women. Similarly in our study women with early registration and more antenatal follow up have more number of scan(7).In a study conducted in Uganda by Andrew b Ross etal it was shown that introduction of ultrasound in rural area at low cost improved antenatal follow up that is consistent with our study where increased antenatal visits are associated with more number of scans(8).In a study conducted in Vietnam regarding disparities in utilization of antenatal care there was a significant difference between urban and rural areas in receiving ultrasound examination. Women residing in urban areas received significantly more number of scans but 96.8% of women received a single scan even in rural areas. In our study there is no difference between rural and urban area residents with regards to number of scans, this might be due to easy access to urban area to the women who reside in rural areas close to the city. Our study also shows more number of ultrasounds in women who have registered pregnancy, which shows improved antenatal care in due to ultrasound and increased number of scans in women who are receiving adequate antenatal care (9).

Conclusion

Maternal &neonatal morbidity and mortality are the two most important health indicators for a country. To ensure appropriate maternal and neonatal health, it is important that the quality of antenatal care is optimized based on available knowledge and current resources. It is concluded that Ultrasonography is a vital investigation for management of pregnancy. Utilization of ultrasound is dependent on multiple factors including patient's age, education, parity, antenatal booking and follow up, previous pregnancy outcome. Women with younger age, higher education, early booking of pregnancy, more antenatal follow up had more number of scans.

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