

Original Research Article

Comparative study on newborn's health through APGAR score in government and private hospital in Agra city

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Abstract

As one of the most significant demographic groups in the country, children are the nation's biggest gift. Newborns may be evaluated quickly and effectively with the use of the Apgar score. The baby itself, the mother, or the labour process may all have an impact on the ultimate score. An assessment of a newborn's health at delivery and the need for urgent care was meant to be achieved via the Apgar score system. The research comprised 200 delivery. Five percent of the 200 pregnant women who were there gave birth to stillborn babies, whereas the rest (95.0%) did not. More stillbirths occur in government hospitals than in private ones. Pregnant women's BMI, their prenatal visits, and the length and weight of their newborns delivered in government and private hospitals all showed positive and significant relationships ($p < 0.05$). Pregnant women at private hospitals had a higher mean Apgar score at one minute of life (7.87) than pregnant women at government hospitals (7.08). Pregnant women in government and private hospitals had significantly different mean Apgar scores at 1 and 5 minutes of the infant ($t=2.168$, $p<0.05$) and ($t=3.214$, $p<0.05$), respectively. Pregnant women's BMI, their prenatal visits, and the length and weight of their newborns delivered in government and private hospitals all showed positive and significant relationships ($p<0.05$).

Keywords: Pregnant, BMI, Apgar Score, prenatal visit, Live birth, Still birth

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Introduction

Strong foundations for our nation's future are laid by mothers and children in good health. The mother's diet throughout her pregnancy may have an impact on the baby's health. The goal of prenatal care for mothers is to have a healthy baby at the conclusion of their pregnancy. The Apgar score system is a thorough screening method to assess a baby's health at delivery. The rate of heartbeat, breathing rate, muscular tone, reflex irritability, and colour are the five factors used to evaluate newborns. Each category is given a number between 0 and 2, with a maximum score of 10. Usually, the test is administered twice: the first time about one minute after delivery, and the second time around five. The test may occasionally be administered again if there are problems regarding the baby's health. An infant deemed healthy is one who completes the test with a score of seven or above. Your baby's health is not indicated by a lower score. It indicates that your child could require emergency medical attention, such as oxygen therapy or airway suctioning, to improve breathing. Sometimes, especially in the initial few minutes following birth, perfectly healthy newborns score lower than normal. When the test is retaken five minutes after delivery, it is normal for a baby delivered by C-section, after a difficult labour and delivery, or after a high-risk pregnancy to have a relatively low score (particularly at one minute).

Apgar score Table:

S. No.	Sign	0	1 minute	5 minute	1 minute	1 minute	5 minute	2	1 minute	5 minute
1.	Heart rate	No heart beat			Under 100 beat per min			100 to 140 beats per min		
2.	Respiratory	No breathing for 60 sec.			Irregular, shallow breathing			Strong breathing and crying		
3.	Reflex irritability sneezing coughing and grimacing	No response			Weak reflexive response			Strong reflexive response		
4.	Muscle tone	Completely limp			Weak movement of arms and legs			Strong movement of arms and legs		
5.	Colour									

		Blue body, arms and legs			Body pink with blue arms and legs			Body arms and legs compl etly pink		
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Apgar, Virginia (1953)

One Minute Score= , Five Minute Score=

Objective

- To evaluate the newborn's health using the Apgar score in both government and private hospitals
- Observations on the relationship between the weight and Apgar scores at 1 and 5 minutes after the baby is delivered, and the health and prenatal care of expectant moms

Research Methodology

Mothers were chosen as the study's sample using a multistage stratified random sampling procedure. Two hundred pregnant patients from one government and one private hospital in the Agra District's urban region made up the sample.

A questionnaire was developed to obtain information on prenatal care during pregnancy and after delivery from pregnant women in respect to specific characteristics.

Results & Discussion

Weight of Newborn in kg.	Government Hospital		Private Hospital		Total	
	Number.	Percentage	Number.	Percentage	Number.	Percentage
1-2	15	15.0	4	4.0	19	9.5

2–3	71	71.0	71	71.0	142	71.0
3–4	14	14.0	25	25.0	39	19.5
Total	100	50.0	100	50.0	200	100.0
Mean	2.43		2.63		2.53	
SD	0.41		0.47		0.45	
T	3.207					
P	<0.05					

Table1: Subject's distribution at gov. and private hospital as per weight of newborn

Table 1 shows the distribution of subjects at government and private hospitals based on the infant's weight. Out of the 100 subjects who gave birth in a government hospital, the majority (71.0%) delivered a baby weighing 2-3 kilogram, followed by 15.0% who had 1-2 kilogram baby weight and the minimum (14.0%) who had 3-4 kilogram weight. Similarly, out of the 100 pregnant women who gave birth in a private hospital, the majority (71.0%) delivered a baby weighing 2-3 kg, followed by 25.0% who delivered a baby weighing 3-4 kg and the minimum (4.0%) who handled a newborn weighing 1-2 kg.

Pregnant women at private hospitals had a mean baby weight of 2.63 kg, which was higher than that of pregnant women at government hospitals (2.43 kg). Statistically significant differences were found in the mean weight of the newborn. ($t = 3.207$, $p < 0.05$).

In a study on maternal anthropometry and newborn birth weight, Shrivastava et al. (2016) found that 300 neonates were LBW (cases) and 300 were NBW (controls), with mean birth weights of 2.05 ± 0.252 kg in cases and 2.9 ± 0.295 kg in controls.

A comparable study was carried out by Natnael et al. (2023), and the babies in that study had an average birth weight of 2977g.

Outcome of Delivery	Government Hospital		Private Hospital		Total	
	Number.	Percentage	Number.	Percentage	Number.	Percentage
Live Birth	94	94.0	96	96.0	190	95.0
Still Birth	6	6.0	4	4.0	10	5.0
Total	100	50.0	100	50.0	200	100.0

Table 2: Subject's distribution at government and private hospital according to place of delivery and outcome of delivery (termination of pregnancy)

$$\chi^2 = 0.421, df = 1, p > 0.05.$$

Table 2 illustrates the subject distribution based on delivery location and result (pregnancy termination). Out of 200 expectant women, 95.0% had live deliveries and the remaining 5.0% experienced stillbirths. Study showed that 94% patients had live births who delivered baby at government hospital, while 6.0% had still births; Similar trend was observed in private hospitals as well, where live births were 96% and still births were 4%. Statistically, insignificant association was observed regarding the termination of pregnancy with expecting mothers at government and private hospital

$$\chi^2 = 0.421, df = 1, p > 0.05)$$

Ramseyer et al. (2020) reported that higher still births were observed in the hospitals with low volume at the time of cesarean section as compared to high-volume hospitals (13.4% vs 5.5%, $P < 0.0001$).

Apgar Score at 1 Minute	Government Hospital		Private Hospital		Total	
	No.	%	No.	%	No.	%
1–5	9	9.0	16	16.0	25	12.5
5–7	42	42.0	17	17.0	59	29.5
8–10	49	49.0	67	67.0	116	58.0
Total	100	50.0	100	50.0	200	100.0

Mean	7.08	7.87	7.48
SD	2.49	2.66	2.60
T	2.168		
P	<0.05		

Table 3: Subject's distribution at government and private hospital according to APGAR score at 1 minute of new born

The distribution of subjects in government and private hospitals based on their apgar scores at one minute of birth is shown in table 3 above. Of the 100 participants who gave birth at the government hospital, the majority (49.0%) gave birth to a baby with an apgar score between 8 and 10 minutes after birth, followed by 42.0% with an apgar score between 5 and 7, and the smallest (9.0%) with an apgar score between 1 and 5 minutes after birth; While the majority of the 100 pregnant women at the private hospital (67.0%) gave birth to a baby with an apgar score between 8 and 10 minutes after the baby was born, 17.0% gave birth to a baby with an apgar score between 5 and 7, and 16.0% gave birth to a baby with an apgar score between 1 and 5. Among the 200 pregnant women in the current study, the mean apgar score at one minute of the baby was 7.48. Pregnant women in private hospitals had a higher mean apgar score at one minute of the baby's birth (7.87) than those at government hospitals (7.08). Pregnant women at government and private hospitals showed statistically significant differences in mean apgar scores at 1 minute of birth ($t=2.168$, $p<0.05$).

Apgar Score at 5 Minute	Government Hospital		Private Hospital		Total	
	No.	%	No.	%	No.	%
1–5	7	7.0	2	2.0	8	4.0
5–7	33	33.0	20	20.0	54	27.0
8–10	60	60.0	78	78.0	138	69.0
Total	100	50.0	100	50.0	200	100.0

Mean	7.84	8.76	8.30
SD	2.15	1.86	2.00
T	3.214		
P	<0.05		

Table 4: Subjects distributions at government and private hospital
according to apgar score at 5 minute of new born

Table 4 shows the patients distribution in government and private hospitals based on their apgar scores at five minutes after birth. Of the 100 participants who gave birth at the government hospital, the majority (60.0%) gave birth to a baby with an apgar score between 8 and 10 minutes after birth, followed by 33.0% who gave birth to a baby with an apgar score between 5 and 7 minutes after birth, and the smallest percentage (7.0%) who gave birth to a baby with an apgar score between 1 and 5. In contrast, the majority of the 100 pregnant women at the private hospital (78.0%) gave birth to a child with an apgar score between 8 and 10 minutes after the baby was born, followed by 20.0% who gave birth to a child between 5 and 7, and the smallest percentage (2.0%) who gave birth to a child with an apgar score between 1 and 5.

Pregnant women in private hospitals had a higher mean apgar score at 5 minutes of delivery (8.76) than those at government hospitals (7.84). Pregnant women at government and private hospitals showed statistically significant differences in mean apgar scores at 5 minutes of birth ($t = 3.214$, $p < 0.05$).

.Parameter	Statistical Values				
	Mean	SD	r	T	p
BMI of Pregnant Mother	21.67	2.99			
Length of Newborn in cms.	45.82	3.94	+0.224	2.275	<0.05

Weight of Newborn in kgs.	2.42	0.41	+0.271	2.787	<0.05
Apgar Score at 1 Minute	7.08	2.49	+0.074	0.705	>0.05
Apgar Score at 5 Minutes	7.84	2.15	+0.148	1.484	>0.05

Table5: Correlation between body mass index of subjects with length, weight and apgar score at 1 and 5 minutes of the new born delivered at government hospital

Above table 5 highlights the correlation between body mass index of subjects with length, weight and apgar score at 1 and 5 minutes of the new born delivered at government hospital.

Body mass index of pregnant women showed a positive correlation with length and weight of newborn delivered at government hospital ($p < 0.05$) that is, as the body mass index of the pregnant women at government hospital increased the length and weight of new born also increased and vice-versa.

Positive and insignificant correlations were also observed between body mass index of pregnant women with apgar score at 1 and 5 minute of new born delivered at government hospital at 5% level of significance.

Johnson (1994) found a substantial correlation ($p < 0.05$) between maternal anthropometric measures and pregnancy outcomes, including delivery weight and height.

Nweke (2025) found the significant association between mother delivery, BMI and newborn birth weight ($p < 0.001$). The weight of mother at the time of delivery showed remarkable correlation with birth weight of the newborn ($r = 0.45$, $p < 0.005$) while a weak correlation was observed of maternal height with birth weight of the newborn ($r = 0.36$, $p < 0.002$).

Parameter	Statistical Values				
	Mean	SD	r	t	p

BMI of Pregnant Mother	22.51	2.61			
Length of Newborn in cms.	46.36	3.47	+0.260	2.666	<0.05
Weight of Newborn in kgs.	2.63	0.47	+0.283	2.921	<0.05
Apgar Score at 1 Minute	7.87	2.68	+0.105	1.045	>0.05
Apgar Score at 5 Minutes	8.76	1.86	+0.158	1.584	>0.05

Table 6: Correlation of body mass index of subjects with length, weight, and apgar score at 1 and 5 minutes after birth of newborn in a private hospital

A correlation between BMI of the subjects with length, weight and apgar score at 1 and 5 minutes of the newborn delivered at private hospital has been presented in table 6.

A positive correlations was found between body mass index of pregnant women with length and weight of newborn at private hospital ($p < 0.05$) that is, as the body mass index of the pregnant at private hospital increased, the length and weight of newborn also increased and vice-versa.

When data was analyzed for body mass index of pregnant women with apgar score at 1 and 5 minutes of newborn at private hospital, a positive but insignificant correlation was observed at 5% level of significance.

Parameter	Statistical Values				
	Mean	SD	r	t	p
Antenatal Visits of Pregnant Mother	3.26	1.07			
Length of Newborn in cms.	45.82	3.94	+0.250	2.556	<0.05
Weight of Newborn in kgs.	2.42	0.41	+0.541	6.368	<0.05
Apgar Score at 1 Minute	7.08	2.49	-0.056	0.555	>0.05
Apgar Score at 5 Minutes	7.84	2.15	-0.129	1.288	>0.05

Table 7: Correlation between antenatal visits of subjects with length, weight and apgar score at 1 and 5 minutes of the new born delivered at government hospital

Above table 7 shows the correlation between antenatal visits of pregnant women with length, weight and apgar score 1 and 5 minutes at government hospital.

Positive and significant correlations were observed between antenatal visits of pregnant women with length and weight of newborn at government hospital ($p < 0.05$) that is, as the antenatal visits of pregnant women at government hospital increased, the length and weight of newborn also increased and vice-versa.

There was a negative and insignificant correlation between antenatal visits of pregnant women with apgar score at 1 and 5 minutes of new born at government hospital at 5% level of significance.

Krishuatrey et.al. (2015) reported an increasing trend in mean birth weight of infant with increasing number of antenatal visit of mothers.

Parameter	Statistical Values				
	Mean	SD	r	t	P
Antenatal Visits of Pregnant Mother	3.32	1.13			
Length of Newborn in cms.	46.36	3.47	+0.287	2.966	<0.05
Weight of Newborn in kgs.	2.63	0.47	+0.206	2.084	<0.05
Apgar Score at 1 Minute	7.87	2.68	+0.034	0.337	>0.05
Apgar Score at 5 Minutes	8.76	1.86	+0.027	0.367	>0.05

Table 8: Correlation between antenatal visits of subjects with length, weight and apgar score at 1 and 5 minutes of the new born delivered at private hospital

Above table 8 reveals the correlation between antenatal visits of pregnant mother with length, weight and apgar score of the newborn delivered at private hospital.

Positive and significant correlations were observed between antenatal visits of pregnant women with length and weight of newborn delivered at private hospital ($p < 0.05$) that is, as antenatal visit of the subjects increased, the length and weight of the new born delivered at private hospital increased and vice-versa.

In private hospital's delivery, a positive and insignificant correlations was observed between antenatal visits of pregnant women with apgar score at 1 and 5 minutes of newborn at 5% level of significance. In a similar type of study, Doss (2023) reported positive relationship between the number of prenatal visits and infant apgar scores.

Conclusion

Based on the findings of the current study, it is possible to infer that the majority of newborns have apgar scores of 8-10 at 1 minute and 5 minutes, which is higher among pregnant women at private hospitals than pregnant women at government hospitals. As a result, we may conclude that the newborns in the private hospitals are healthier than those in the government hospitals.

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