

COMPARISON OF APGAR SCORE IN NEONATES: SPINAL VERSUS GENERAL ANAESTHESIA FOR ELECTIVE CAESAREAN SECTION.Sahana K.S¹**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: BACKGROUND: 10 point Apgar score has been used to assess the condition and prognosis of newborn infants throughout the world. Objective of the study is to compare the effects of general and spinal anesthesia on Apgar score in newborns of pregnant women undergoing elective caesarean section. **STUDY DESIGN:** Retrospective observational study. **SETTING:** This study was conducted in the department of pediatrics between December 2012 to June 2013. **SUBJECTS AND METHODS:** Recorded Apgar scores of 90 neonates were retrospectively studied after obtaining data from medical records department. Mothers of neonate in Group R (N: 60) underwent caesarean section by spinal anesthesia and mothers of neonates in Group G (N: 30) by general anesthesia. Apgar score ≥ 7 was considered as Satisfactory to the newborns. **ANALYSIS:** The data collected was analyzed through statistical package SPSS version 10.0. Descriptive statistics were used to describe the data; independent samples t-test was used to compare quantitative variables. Qualitative variables were compared through chi-square test. P value < 0.05 was taken as statistically significant. **RESULTS:** Apgar score measured at 1 and 5 min, after delivery was ≥ 7 in 58 (96.66%) and 60 (100%) neonates in group R, while it was 22 (73.33%) and 28 (93.33%) neonates in group G for regional and general anesthesia respectively. Apgar score >7 was observed in significantly more neonates in group R as compared to group G ($p < 0.05$). Mean \pm SD values of Apgar score at 01 and 5 minutes was also significantly higher in group R than group G [8.44 ± 0.51 vs. 6.90 ± 0.71 at 01 min and 9.71 ± 0.25 vs. 9.04 ± 0.77 at 5 min] ($p < 0.001$). **CONCLUSION:** Apgar scores were better preserved in neonates born to mother under spinal anesthesia for lower segment elective Cesarean sections.

KEYWORDS: Apgar score, Cesarean section, Spinal anesthesia, General anesthesia, neonate.

INTRODUCTION: The Apgar score was primarily designed as a research tool, enabling the grouping of infants according to their condition at birth. In 1953, Virginia Apgar, M.D. published her proposal for a new method of evaluation of the newborn infant. APGAR score is a clinical test performed on a newborn one and five minutes after birth. It is a composite measure of breathing effort, heart rate, muscle tone, reflexes, and skin color and is an indicator of the newborn's need for medical attention shortly after birth. Apgar score (AS) is routinely used for assessment of newborns immediately after birth and consists of five variables viz. Respiratory efforts, heart rate, color, muscle tone, and reflex irritability. It is being used as a standardized tool for expressing the physiologic condition of newborn at birth and also to record fetal to neonatal transition. However, Apgar score has major limitations like having a limited time frame and including subjective components. Each of these is given a score of 0, 1 and 2. The score is traditionally reported at 1 and 5 min after birth.¹ A score of 0-3 at 5 min is a suggestive criteria for asphyxial insult and is a predictor of neonatal mortality. Infants with a score of ≥ 7 are considered normal.¹

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Apgar scoring is a research tool rather than a criteria for clinical assessment on which to base management decision or prognosis. Apgar score at 1, 5 min have a low specificity for asphyxia and consequently poor predictive value for long term neurological sequelae.² score can be falsely low in very preterm, maternal drug intake, CHD, and CNS malformations, hence low scores cannot be always equated to asphyxia. However it is useful in assess cardiopulmonary status, tell about need of resuscitation and its effectiveness. It is assigned every 5 min until 20 min or till 2 successive score are 7 or greater. The neonatal resuscitation program (NRP) guidelines state that "Apgar scores should not be used to dictate appropriate resuscitative actions, nor should interventions for depressed infants be delayed until the 1-minute assessment." However, an Apgar score that remains 0 beyond 10 minutes of age may be useful in determining whether additional resuscitative efforts are indicated.

The most important cause of fetal distress in any anesthetic method is the reduction in the amount of O₂ available to the fetus as a result of the reduction of uteroplacental blood flow. Maternal, placental, and fetal factors play roles in such reduction. The effect of anesthetic drugs is direct or through the changes in the mother.³ The Apgar scores are taken at 01 and 05 minutes after delivery. Of the two scores, the 05 minutes score is regarded as the better predictor of survival in infancy in the long term. Whereas the 01 minute score definitely has the value for; assessing the effects of different drugs given to the mother during the Cesarean section. This method is even more appealing because it is non-invasive.^{4,5}

METHODOLOGY: Data was collected from medical records section of our hospital from December 2012 to June 2013, after obtaining ethical committee clearance for the study. Data from 90 patients were collected for study purpose. Exclusion criteria includes Patients with severe pregnancy induced Hypertension on treatment, eclampsia, obstructed labor, fetal distress due to any reason with meconium stained liquor or placenta previa. Data included indication, type of anesthesia, anesthetic drugs given, one and five minute Apgar, neonatal ICU admission, and perinatal death. There were 580 deliveries during the study period of which 145(25%) was through caesarean section. 90 patients were selected, after excluding mothers with fetal distress. data was divided in to two groups of neonates i.e. Group R (N- 60), whose mother was given spinal anesthesia and Group G (N -30), whose mother received general anesthesia. All pregnant women with term gestational age 37-40 weeks, ASA-1 or 2, with singleton pregnancy were included. Fetal factors considered were normal growth parameters on ultrasound and clinical examination.

General anesthesia was given by a standardized anesthesia technique by performing rapid sequence induction and intubation with inj. propofol 2mg/kg, inj. suxamethonium 1.0 mg/kg, and application of Sellick's maneuver. After confirmation of endotracheal tube by auscultation of breath sounds/end tidal CO₂, inj. vecuronium 0.1mg/kg was given. Maintenance was done on 0.5% isoflurane in oxygen/nitrous oxide (50=50). After the delivery of baby bolus dose of inj. Fentanyl 1.5 µg/kg and an infusion of 20 units of oxytocin was given. At the end of surgery when patient resumed some breathing effort, residual effects were reversed with inj. neostigmine 0.35mg/kg and inj. glycopyrrolate 0.05mg/kg. When the patient became fully awake, the endotracheal tube was removed.

Patients in spinal anesthesia group were preloaded with 500 ml of crystalloid solution. Bupivacaine 0.5%, 1.8 ml was given at L3-4 or L4-5 interspace in sitting or lateral position. all

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patients were put in supine position after placing a wedge under right buttocks. Supplemental oxygen 4 liter/min was administered via face mask.

Recorded data of Apgar score at 01 and 05 minutes were collected. Newborn outcome was acceptable if the Apgar score was ≥ 7 . The data collected was analyzed through statistical package SPSS version 10.0. Descriptive statistics were used to describe the data; independent samples't-test was used to compare quantitative variables. Qualitative variables were compared through chi-square test. p value < 0.05 was taken as statistically significant.

Apgar Scale (evaluate @ 1 and 5 minutes postpartum)				
Sign		2	1	0
A	Activity (muscle tone)	Active	Arms and legs flexed	Absent
P	Pulse	>100 bpm	<100 bpm	Absent
G	Grimace (reflex irritability)	Sneezes, coughs, pulls away	Grimaces	No response
A	Appearance (skin color)	Normal over entire body	Normal except extremities	Cyanotic or pale all over
R	Respirations	Good, crying	Slow, irregular	Absent

Fig. 1: APGAR SCORE CHART

RESULTS: Most of the pregnant women were 18 to 30 years of age (93.33%) in both groups. 90 patients (neonates) were enrolled in the study. all the patients completed the study protocol were included in the data analysis. Thus group R and group G consisted of 60 and 30 patients each. There was no significant difference in the demographic data between the study groups [$p > 0.05$] (Table 1).

Demographic data	Group R(N- 60)	Group G(N -30)	P value	significance
AGE	25.2 \pm 5.80	26.5 \pm 5.24	>0.05	NO
Primi gravida	28	14	>0.05	NO
Multi gravida	32	16	>0.05	NO
Height	156.7 \pm 5.21	154.3 \pm 4.87	>0.05	NO
Weight	56.54 \pm 8.34	55.47 \pm 7.84	>0.05	NO

Table 1: Demographic data (mean \pm SD) in the study groups.

The mean age of the patients received spinal anesthesia was 25.20 \pm 5.80 years and those received general anesthesia was 26.5 \pm 5.24 years. Significant difference was not observed in age, parity, height and weight of two groups ($p > 0.05$). (table 1)

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Mean±SD values of Apgar score of neonates at 01 minutes was significantly high in those women who received spinal anesthesia, 8.44±0.51 as compared to those who received general anesthesia 6.90±0.71 ($p<0.001$). Apgar at 5 min was also significantly high in group R compare to group G [9.71±0.25 vs. 9.04±0.77 ($p<0.001$)].

Variables	Group R (Spinal Anesthesia)	Group G (General Anesthesia)	P-Values
Apgar at 01 min	8.44 ± 0.51	6.90 ± 0.71	<0.001
Apgar at 05 min	9.71 ± 0.25	9.04 ± 0.77	<0.001

Table 2: Mean±SD comparison OF APGAR between groups.

Acceptable newborn Apgar score i.e. ≥ 7 at one minute was observed in 22(73.33%) neonates of Group G while it was observed in 58(96.66%) neonates in group R. Unsatisfactory Apgar score was observed in 8(26.7%) neonates in group G as compared to 2(3.4%) neonates in group R. acceptable Apgar score at five minutes was observed (Apgar ≥ 7) in all i.e. 60(100%) neonates in group R while in group G it was observed in 28(93.33%) neonates. acceptable newborn Apgar score was significantly high in group R than group G ($p < 0.05$).[table 3]

Outcomes	Group R (Spinal Anesthesia) n=60	Group G (General Anesthesia) n=30	Total n=90	p-Value
Apgar ≥ 7	60(100%)	28(92.5%)	88(96.3%)	<0.05
Apgar<7	0(0%)	2(6.67%)	02(3.8%)	

Table 3: Comparison of acceptable neonatal condition with respect to Apgar score at five minutes.

2 (3%) infant born by general anesthesia (Group G) required prolong mask ventilation (60 sec) and NICU admission and There was no neonatal mortality

DISCUSSION: Spinal anesthesia has become the preferred anesthesia for cesarean section. Internationally, obstetric anesthesia guidelines recommend spinal and epidural over general anesthesia (GA) for most caesarean sections (CSs).^{6,7} While there is evidence that GA is associated with an increased need for neonatal resuscitation,⁸ study done by Page et al, suggested that combination of fetal heart rate monitoring, cord blood ph. and Apgar assessment is better than anyone parameter alone for evaluation of fetal status just after delivery.⁹

Our study concluded, Apgar score of neonate at 01, 5 minutes was significantly high in those women who received spinal anesthesia (9.04±0.77 and 9.71±0.25), then when compared to those who received general anesthesia.(6.90±0.71 and 8.44±0.51). Kolatat et al,¹⁰ and Ong B Y,¹¹ also found lower Apgar scores in the neonates whose mothers received general anesthesia.^{10,11}

Acceptable Apgar score (≥ 7) at one minute was observed high in spinal group of 58(96.66%) neonates when compared to general anesthesia group of 22(73.33%) neonates. Unsatisfactory Apgar score was observed in 8(26.7%) neonates in general anesthesia group as compared to

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2(3.4%) of the neonates who received spinal anesthesia. Alfredo M et al,¹² found lesser depressed newborns 1.1% in the spinal group compared to 25.9% in the general group.¹²

Acceptable Apgar score (≥ 7) at five minutes was significantly high in group R than group G. In group R, it was observed in all i.e. 60(100%) neonates while in group G it was observed in 28(93.3%) neonates and Apgar score < 7 were seen in 2(6.7%) neonates of group G. Tabassum et al,¹³ found Apgar scores were higher at 01 and 5 min in spinal group compare to general anesthesia group ($p < 0.05$). however some authors found similar Apgar at 5 min in both the groups.^{14, 15} in a study done by Amomani OS, also concluded that regional anesthesia (spinal/epidural) has better Apgar score at 1 and 5 min when compared to general anaesthesia.¹⁶

According to Robert et al,¹⁷ no anesthetic method was necessarily safer or hazardous than another and each method has its own liabilities. He showed regional anesthesia was associated with fetal acidemia, and had features of an acute respiratory type of acidemia and approximately 18% of infants had umbilical artery blood pH values of 7.19 or less. however some clinical studies suggested that there is little to choose between general and spinal for obstetric anesthesia with regards to their effect on fetal acid and base balance.¹⁸ However for emergency caesarean section for fetal distress, spinal anesthesia shows better Apgar scores at 1 and 5 min when compared to general anaesthesia.^{19, 20}

CONCLUSION: We observed Apgar score in neonates whose mother received general anesthesia were lower than, neonates whose mothers received spinal anesthesia. Satisfactory Apgar scores were significantly higher in spinal anesthesia group. neonatal outcome is favorable in spinal anesthesia and can be preferred over general anesthesia. It can be further evaluated by a large studies on Apgar scores in neonates following both elective and emergency cesarean sections.

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