

Comparison of Neurophysiological Assessment of Newborn Babies after Spontaneous Vaginal Delivery and Elective Cesarean Section

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ABSTRACT

Background: It is proposed in different studies that different modes of delivery affect the physiological status of the baby while others studies revealed no change.

Aims: To determine and compare the changes in neonatal APGAR score at 1 and 5 minutes according to the mode of delivery and changes in weight of the baby according to the mode of delivery.

Study design: It was a comparative study and was conducted in Obstetrics and Gynecology Department, Lahore General Hospital, Lahore. Duration of the study was of six months duration.

Sample size: The subjects were divided into two groups; group A and group B. Each group was comprised of 28 patients. Subjects in group A were those who were undergoing spontaneous vaginal delivery and group B was composed of subjects who were undergoing cesarean delivery.

A strict inclusion and exclusion criterion was followed. Physiological status of the baby was assessed from by measuring APGAR score.

Results: The results of this study show significant difference between the study groups.

Conclusion: Subjects undergoing SVD revealed better APGAR score at 1 and 5 minutes as compared to subjects undergoing cesarean delivery.

Keywords: APGAR score, SVD, cesarean delivery

INTRODUCTION

The APGAR score is an expression of the infant's physiologic condition. The APGAR score has a limited time frame, and includes five subjective components. It was developed in 1953 by an obstetric anesthesiologist named Virginia Apgar and referred to as an acronym for: activity and muscle tone, pulse (heart rate), grimace response (medically known as reflex irritability), appearance (skin coloration), and respiration (breathing rate and respiratory effort).⁵ The physiological relationships underlying the components of the APGAR scoring system can be conceptualized as a cycle, in which the five functions are linked by cardiorespiratory reflexes and metabolically supported by the oxygen pathway.⁶ The APGAR score is assessed immediately after the delivery. The APGAR score is usually assessed twice, first at 1 minute and second at 5 minutes after birth⁷. This study is designed to evaluate the neurophysiological status of the babies according to APGAR scores at 1, and 5 minutes after SVD and elective Cesarean delivery.

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AIMS AND OBJECTIVES

The objectives of the study were to

1. determine and compare the changes in neonatal APGAR score at 1 and 5 minutes according to the mode of delivery.
2. determine changes in weight of the baby according to the mode of delivery.

SUBJECTS AND METHODS

It was a comparative study conducted in Obstetrics and Gynecology Department, Lahore General Hospital, Lahore during f six months. Neonates delivered to healthy pregnant females of age 20-40 years. The sample was calculated using P.A.S.S. (2008) (Power Analysis and Sample Size Software). With 90% power of study and 5% level of significance, a sample size of 28/group was achieved i.e. a total of 56 subjects were included in study.

Group A: Those undergoing spontaneous vaginal delivery.

Group B: Those undergoing Cesarean delivery

Neonates delivered to subjects in second stage of labor with vertex presentation undergoing spontaneous vaginal delivery and neonates delivered to subjects undergoing elective Cesarean section for cephalo-pelvic disproportion (CPD), mal-presentation and previous c-section were included in the study.

Pregnancy related problems like pregnancy-induced hypertension, gestational diabetes, intrauterine growth retardation, placental abnormalities, multiple gestation, oligohydramnios, antepartum hemorrhage, infections, preterm, smokers and mothers on CNS depressant drugs were excluded from the study.

Recoding of apgar score

The APGAR score was recorded according to the following table

Sign	Score 0	Score 1	Score 2
Heart Rate	Absent	Below 100/min	Above 100/min
Respiratory effort	Absent	Weak	Good, crying
Muscle tone	Flaccid	some flexion of extremities	Well flexed
Reflex Irritability	No response	Grimace	Cough or sneeze
Colour	Pale or blue	Body pink-extremities blue	Completely pink

The data was entered and analyzed using SPSS (statistical package for social sciences) version 18.0. Mean ± SD (standard deviation) was calculated for quantitative variables (APGAR score, birth weight). "Independent samples" t-test was applied to compare the differences in APGAR score at 1 and 5 minutes between two modes of delivery (SVD and Cesarean delivery).

RESULTS

This study aimed to determine and compare the effects of modes of delivery and types of anesthesia on neonatal physiological parameters by APGAR score. A total of 84 pregnant women fulfilling inclusion criteria were selected in the study and divided in 2 equal groups on the basis of mode of delivery. After delivery, neonatal APGAR score at 1 and 5 minutes was recorded and compared. Subject's particulars, maternal age, mode of delivery, indication for Cesarean section and birth weight sex of baby were also recorded. The mean neonatal birth weights for both modes of delivery were almost equal. The mean ± SD birth weight in SVD group was 2.93±0.38 kg and in Cesarean group it was 2.94 ± 0.38 kg (Table 1).

Table 1: Birth weight (kg) of neonates according to mode of delivery

SVD		Cesarean delivery	
Mean±SD	Range	Mean± SD	Range
2.93 ± 0.38	2.50 - 3.80	2.94±0.38	2.50 – 3.80

As shown in table 2, the APGAR scores recorded for both modes of delivery i.e. SVD and Cesarean delivery showed a significant difference at 1 and 5 minutes between the groups. The mean ± SD

APGAR score at 1 minute was 7.96±0.19 in SVD which was significantly higher from that of Cesarean delivery in which mean±SD APGAR score at 1 minute was 7.16±0.65 (p-value <0.001). The mean±SD APGAR score at 5 minute was 9.86±0.45 in SVD which was significantly higher from that of Cesarean delivery in which mean±SD APGAR score at 5 minute was 9.48±0.74 (p-value=0.005) (Table 2).

Table.2 Comparison of APGAR scores between two modes of delivery by "Independent samples" t-test

APGAR Score	SVD	Cesarean delivery	P-value
at 1 Minute	7.96±0.19(7-8)	7.16±0.65 (6- 8)	<0.001**
at 5 Minutes	9.86±0.45 (8-10)	9.48±0.74 (8-10)	0.005*

Data are reported as Mean ± SD and range within parentheses. *Significant **Highly significant

DISCUSSION

The 1 minute APGAR score correlates with survival while the 5 minute score may predict neurological outcome. A baby who scores 7 or above at 1 minute after birth is generally considered as having good health. However, a lower score is indicative of certain transient abnormality requiring immediate intervention to ameliorate the condition like opening of the airway by placing in neutral position/slight sniffing position^{5,7}.

At 5 minutes after birth, a persistently low APGAR score, below 7, may require institution of other necessary emergency measures and intense monitoring of the baby⁸. A five-minute APGAR score <7 has a consistent association with prevalence of neurologic disability and with low cognitive function in early adulthood. Infants with low APGAR score at birth have increased risk of poor functioning in cognitive tests in later life.⁹ It is also associated with an increased risk of Attention deficient hyperactive syndrome in childhood.¹⁰ There is strong evidence for withholding or discontinuing further resuscitation in case of absence of signs of life during the first 10 min after birth despite continuous and adequate resuscitative efforts¹¹.

This study was designed to determine and compare the effects of modes of delivery on neonatal physiological parameters by APGAR score. The APGAR scores recorded for two modes of delivery, i.e. SVD and Cesarean delivery, showed a significant difference at 1, and 5 minutes between the groups. Similar to reports from other developed countries the average score at 1, and 5 minutes in SVD was significantly higher than that of Cesarean delivery. This is in line with previous study conducted by Lee et al. (2008) in Nova Scotia who observed that

neonates born via Cesarean delivery had lower 5-minute APGAR score as compared with those born from spontaneous vaginal deliveries¹². Similarly, in a retrospective survey comparing neonatal outcomes of those delivered in public hospitals with those having private insurance and delivering in private hospitals, APGAR scores were found to be lower for those delivered by Cesarean than for those delivered vaginally¹³.

Contrary to our data, Bodner et al (2011) conducted a prospective comparison between elective Cesarean section and planned vaginal delivery over a period of four years. They found no significant difference in 1 and 5 minute APGAR scores between the two groups¹⁴.

Neonates delivered through Cesarean delivery had lower APGAR scores as indicated by our study. The low score may be an effect of anesthesia during Cesarean delivery or maybe the baby was not stimulated as would have been in normal vaginal delivery which is a natural process of child birth. Vaginal delivery provides natural stimulation to the baby while in the birth canal. As the infant passes through the birth canal, subsequent delivery of the neonatal trunk relieves the thoracic compression, and the thorax and the lungs expand. Most infants initiate respiratory efforts a few seconds after birth and thus form the basis of higher APGAR scores in SVD as compared to Cesarean delivery in which this natural mechanism of delivery is not involved.

RECOMMENDATIONS

We recommend that this evidence further be supported by a well designed randomized controlled clinical trial, not only to establish the efficacy but also the safety of the mode of delivery and type of anesthesia to be administered. The extensions and application of this study to various socioeconomic segments of the society as well as employing a larger cross-section of the population will further add to our knowledge and at the same time will provide substantial validity to all the findings.

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