Comparison of Apgar score in new born by vaginal delivery and spinal anesthesia and its relationship with contributing factors

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Abstract

Introduction: Apgar score evaluation is a common method to evaluate physiological changes of newborns and can help to predict the neonatal life chance. This study was conducted to determine the Apgar score of newborns with two methods of vaginal delivery and spinal anesthesia and its relationship with the associated factors in Gorgan health care facility.
Materials and methods: A cross-sectional study was design to conduct the research. Totally 215 cases were selected, including all records of patients during 2010 and Apgar score was checked in the first and fifth minutes. Data were analyzed using chi-square test.
Results: Results showed that 92.5 and 94 percent of neonatal Apgar scores in the first and fifth minutes were more than seven, respectively. There were no significant statistical differences between Apgar scores of the first and fifth minutes in two methods of vaginal delivery and cesarean section under spinal anesthesia technique ($P>0.05$). However, premature newborns, those with low birth weight and maternal preeclampsia had lower Apgar scores, and their statistical differences were significant ($P<0.001$).
Conclusion: The findings indicate the effect of factors such as prematurity, low birth weight, maternal preeclampsia on low Apgar score at birth of the babys. It is important that problems affecting the baby's health care measures must be considered by the planners of the health of mother and child.

Keywords: Apgar, Spinal anesthesia, Vaginal delivery, Cesarean, Newborn

Introduction

To enter into a new world outside of the uterus can be along with these serious and significant changes and physiological adaptation (1, 2). The type of anesthesia is proportionate with the type of operation, the degree of urgency and the patient's physical and path physiological conditions (3). Baby's birth process may affect its physiological progress (1, 4, 5). There are numerous factors that causes problems in infants such as birth weight, gestational age (2, 3) abnormalities associated (2, 4) with vacuum delivery (3), the abnormal embryos (6), premature rupture of membranes, a history of infertility, select the type of anesthesia (2) age of mother (2, 6) and internal disease (6, 7).

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The method of delivery is very important for maternal and neonatal health, and to choose the healthiest way for mother that also would have had the least adverse effect on the newborn, an appropriate method should be considered based on the patient's condition (8) .Spinal anesthesia has both advantages and disadvantages. Some of the disadvantages are as follow: 1. sympathetic nerve block, 2. maternal hypotension and as a result, 3. uterine and placental blood flow, hypoxemia and fetal acidosis (9), and this benefits are 1. Lower maternal and fetal exposure to drugs, 2. Lower risk of aspiration and hypoxia for mother (10) and 3. Fetal narcosis (11, 12). Apgar score is a simple and reliable criterion to predict the final neurologic morbidity in neonates with asphyxia (8, 13) which has been developed by Apgar in 1952, and is average score of five criteria including heart rate, skin color, respiratory condition, muscle rigidity and neonatal reflexes. Each of the aforementioned criteria has been quantified between 0 and 2, these scores are aggregated if the sum score ranged 7 to 10 (8) that means that the baby's general condition is good and there is no need to an immediate medical intervention. Thereby, the newborns that need a quick recovery are identified (14-16). Totally, Apgar scores is a clinical useful method to systematically estimate this intuition of neonatal immediately after birth that is beneficial to identify infants who require resuscitation and to evaluate the effectiveness of resuscitation techniques, and it can help to predict the live chance of neonatal (17). Apgar score is an important index to what extent that the babies are born in poor circumstance will show the poor performance on cognitive tests will in the future (18). Understanding the causes of low Apgar can provide guidelines to prevent contributing factors and reduce the costs imposed to the health care system and to provide community health (17). There are contradictions in various studies considering vaginal delivery and spinal anesthesia and their effects on neonatal Apgar score. The current survey was conducted in order to determine the Apgar score in neonates born by using of two methods of vaginal delivery and spinal anesthesia and their relationship with some contributing factors at the Department of Obstetrics and Gynecology of Gorgan.

Materials and Methods

In this cross-sectional study, the sample size was selected based on Z formula by %95 significance level, 214 mothers (111vaginal deliveries and 103 cesarean) were studied. The study population included infants born by vaginal delivery or cesarean section under spinal anesthesia that monitored in Dezyani Medical Education-Health Center, Gorgan. Data were collected randomly from two groups including mothers who delivered by cesarean section under spinal anesthesia and mothers with vaginal delivery, and according to the reports were recorded in their checklists(including complete patient history, obstetrician health reports, sonography, consultations conducted by other specialists associated with potential patient problems, previous investigates, patient's history and cares, obstetrician-gynecologist orders, possible reports about pregnancy period and its importance, special cases, cesarean history and its causes, history of vaginal delivery and the potential maternal and fetal problems, the history of anesthesia and spinal anesthesia and the Apgar scores recorded at the first and fifth minutes) during 12 consecutive months in 2010. To check the status of neonates, Apgar scores between 7 and 10 was considered as an appropriate general condition and scores less than 7 represented a critical condition and immediate need for resuscitation.

Data were analyzed by SPSS-16 statistical software and through descriptive methods and chi-square test. The significance level was also considered % 95.

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Results

Totally, 215 mothers (111 vaginal deliveries and 103cesarean with 1 missing) were studied. There was a significant correlation between the location and type of delivery (P<0.017). The relationship between ethnicity and Apgar score (1st and 5thmin) was not significant (P<0.716) and (P<0.764). Other clinical and demographic characteristics are shown in Table 1.

Table 1. Clinical and demographic characteristics of mothers and infants.

Variable	Category	N (%)
Apgar (1th min)	> 7	198 (92.1%)
	< 7	17 (7.9%)
Apgar (5th min)	> 7	201 (93.5%)
	< 7	14 (6.5%)
Birth weight	< 2 kg	17 (8.1)
	2 – 2.5 kg	18 (8.1)
	2.5 – 4 kg	170 (81.3)
	> 4 kg	5 (2.4)
Type of childbirth	Vaginal	111 (51.9%)
	Cesarean	103 (48.1%)
Lodging	City	127 (59%)
	Village	88 (41%)
Ethnicity	Fars	150 (71.8%)
	Turkman	28 (13.4%)
	Sistani	29 (13.9%)
	Ghazagh	2 (0.9%)
Preterm delivery	Yes	30 (14.1%)
	No	183 (85.9%)

There was no statistically significant correlation between the two methods of vaginal delivery and cesarean section using spinal anesthesia and their relationship with 1st min (P<0.451) and 5thmin Apgar (Table 2).

Among mothers who had a preterm delivery, the Apgar score in1st and 5th min were %36.7 and %26.7, lower than 7, respectively; while, those without preterm delivery had an Apgar of % 2.7 and %3.3 lower than 7, respectively. This difference was statistically significant (P<0.001), as the age group between 31-35 years was the highest with % 33.3, and age group between 21-25 years with % 8.9 showed the lowest preterm delivery. All infants less than 2kg, % 52.9 and % 41.2 had an Apgar score less than 7 at 1st and 5th minutes, respectively. Infants between 2-2.5 kg were % 23.5 and % 5.9, and infants between 2.5-4 were % 1.8 and % 2.9 that had Apgar score less than 7, and finally none of infants with more than 4 kg had an Apgar score less than 7 (P<0.001). Apgar score in mothers with preeclampsia was significantly lower than those without preeclampsia (P<0.05) (Table 3). In this study, there was no significant relationship between the number of parturition, sex, premature rupture of membrane, previous cesarean, breech birth, failure to comply baby's head with the pelvis, mekunialtik and detachment of placenta with Apgar scores at 1st and 5th minutes.

Table 2. Relationship between type of childbirth and Apgar score at 1st and 5th minutes.

Apgar score / Type of parturition	1st minute		P value	5th minute		P value
	> 7	< 7	0.451	> 7	< 7	0.097
Yes	93.7%	6.3%		96.4%	3.6%	
No	90.3%	9.7%		90.3%	9.7%	

Table 3. Apgar at 1st and 5thminutes in terms of preeclampsia.

Apgar score / Preeclampsia	1st minute		P value	5th minute		P value
	> 7	< 7	0.013	> 7	< 7	0.023
Yes	78.6%	21.4%		82.1%	17.9%	
No	94.1%	5.9%		95.2%	4.8%	

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Discussion

In the present study, % 7.9 of infants at minute 1 and % 6.5 at minute 5 had Apgar less than 7, that in Eslami et al. In Yazd were % 9.9 less than 7 (17 cases) and in Uganda were % 8.1 less than 9 (18 cases) that both are in accordance with current findings.

The current results indicate a significant relationship between preterm births and low Apgar score. Several factors such as placental, fetal, and maternal factors affect preterm birth (19). Perez et al. In a study recognized the impact of factors such as premature rupture of fetal membranes, multiple-birth, maternal illness during pregnancy, inadequate care during the prenatal period, urinary tract infection during pregnancy and low levels of economic and social situation on low Apgar score (20). In another study, Thorngren (2001) reported that preterm and post-term after 41 weeks of pregnancy, especially in Week 43, have considerable effect, low birth weight and low Apgar scores during the first 5 minutes (21) and also in the present study, the mother with 41weeks of pregnancy did not appear, however, the Apgar score was good by the end of 40 weeks of pregnancy. Hussein Zakaria et al. reported preterm delivery with a low Apgar score that was 4 times higher (22) which was in line with Halima et al (23). In this study, there was also a significant association between age and preterm delivery, as the age group between 31-35 years possessed the highest percentage of preterm delivery. This unveils a better surveillance system for this age group.

The difference between the two methods of natural childbirth (vaginal delivery) and cesarean section using spinal anesthesia was not significant. Effect of spinal and general anesthesia on the Apgar score have been considered by Norouzi (24) and... they found that the Apgar was high among mothers who were under spinal anesthesia, and stress-related hormones, presence of epinephrine and nor epinephrine concentrations in maternal and infant are probable causes as reported by Forghani due to being awake and sympathetic depression in mothers, and it can be reasonably applied for present work.

In another point of view, infants less than 2kg delineated the highest Apgar score with the values less than 7. Greater weight loss, need more advanced resuscitation and intubation and more specialized facilities and experts, which is compatible with Weinberger's findings (25). The mortality rate among newborn categories having very low weight was three times more than low-weight newborns and 8 times more than normal newborns in low Apgar score group of neonates. Infants with poor situation and low Apgar score at birth are at risk of poor performance on cognitive tests for their future life more than others, so that special protective actions must be done (18).

Furthermore, there was a significant relationship between preeclampsia and low Apgar score that is in agreement with Hosseinian study (22). In terms of complications and problems pertaining to both mother and neonate, existence of preeclampsia and eclampsia during pregnancy is very important, because it has been found to be attributed to placenta involvement and factors associated with preeclampsia that lead to low-weighed infants (26-28). Low birth weight and prematurity is higher in mothers with iron deficiency and low blood pressure (29, 30), and these factors may cause a low Apgar score at birth and infant mortality (31). Special care is necessary during pregnancy for mothers with preeclampsia. Sex had no effect on Apgar that was compatible with Eslami study findings (32). In this investigation, there was no positive and significant relationship between fetus position, detachment and Apgar score, which is not in relevance with Hosseinian (22), Krebs (33) and Eslami survey (32). Thorngren et al (21) reported that the highest morbidity and mortality was

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observed among breech babies who were born using vaginal delivery. In a study implemented in the Netherlands, the risk of low Apgar score in vaginal delivery was reported 15 times higher than breech babies who were born through cesarean (34) and Sex of neonate had no effect on Apgar score which was similar to Eslami exploration (32).

Conclusion

With regard to the present study, anesthesia and natural birth have no negative effects on Apgar if controlled; however, medical necessary care in maternal and fetal complications affecting the baby's health must be considered by policy makers and planners. It is vital to apply quantitative methods and more accurate measurement such as arterial blood gas for a more detailed assessment of infants because Apgar is a qualitative criteria and observational.

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