

Comparison of ABGAR Score among Gestational, Pregestational Diabetes and Normal Pregnant Women

Nahla A. Al-Bakri, Department of Biology, College of Education for Pure Sciences (Ibn Al-Haitham), University of Baghdad, Baghdad, Iraq.

Email: nahlaalbakri62@gmail.com, Mobile: +9647901436010

ORCID: <http://orcid.org/0000-0002-3814-6676>

Estabraq A. Mahmoud, Department of Biology, College of Education for Pure Sciences (Ibn Al-Haitham), University of Baghdad, Baghdad, Iraq.

Email: estabraq.a@ihcoedu.uobaghdad.edu.iq; Mobile: +9647903311649

ORCID: <http://orcid.org/0000-0003-1729-2102>

Ban J. Qasim, Department of Pathology, College of Medicine, Al-Nahrain University, Baghdad, Iraq.

Email: dr.banqasim@yahoo.com; Mobile: +9647901366138

ORCID: <http://orcid.org/0000-0001-7606-2863>

Correspondence author: Nahla A. Al-Bakri, Department of Biology, College of Education for Pure Sciences (Ibn Al-Haitham), University of Baghdad, Baghdad, Iraq. Email: nahlaalbakri62@gmail.com, Mobile: +9647901436010

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Abstract

Background: The Apgar score is calculated based on the five features: heart rate, reflexes, color, muscle tone, and respiratory effort. Each element is scored from 0 to 2, with a total probable score of 10 at 1 minute and 5 minute.

Aim: To study the influence of gestational diabetes mellitus (GDM) and diabetes mellitus on APGAR score in neonate.

Materials and methods: The samples were studied from Department of Obstetrics and Gynaecology in Al-Imamain Al-Kadhimiyyain (AS) Medical city, Baghdad Teaching Hospital and Al-Karkh Maternity Hospital in the period between 1 December 2016 and 1 May 2017, after obtaining the approval from Iraqi Ministry of Health. A total of 102 neonates were included in this study which includes 34 neonates of mothers with gestational diabetes (GDM), 34 neonates of mothers with pregestational diabetes (DM) and 34 neonates of mothers with normal pregnancy as control group.

Results: APGAR score of neonate (after 5 min) have been highly significant ($P \leq 0.001$) among three groups. Therefore, maternal history of GDM and DM appear to be associated with the after 5 minute APGAR score of neonates with GDM and DM mothers as compared to neonates of normal mothers.

Conclusion: The neonates of diabetic mothers are lower APGAR score than that of normal mothers, this due to maternal hyperglycemia and fetal hyperinsulinism

Keywords: APGAR score, Diabetes mellitus, Gestational diabetes, Neonates.

Introduction:

A method to evaluate the newborn's health status soon after birth was developed by Apgar and York in 1953 [1]. The Apgar score is calculated based on the

five features: heart rate, reflexes, color, muscle tone, and respiratory effort. Each element is scored from 0 to 2, with a total probable score of 10 at 1 minute and 5 minute. Further scores can be obtained at 5 minute periods based on the status of the neonate. The APGAR score is used as a predictor of neonatal survival and to evaluate the need for resuscitative interferences. The scoring system is prejudiced by many factors such as gestational age and infant maturity. Moreover, the specific features are personal to the scorer. While it has some inherent limitations, its use for determining neonatal status after delivery is broadly accepted [2,3].

Lower APGAR scores were displayed to be related with an increased risk of mortality and perinatal complications in preterm infants [4]. Efforts have also been made to use APGAR scores for predicting a child's prospect health, but studies have produced indecisive results [5].

Many pregnancies are complicated by type 1 or 2 diabetes mellitus or gestational diabetes. Furthermore, mothers with gestational diabetes have been appeared to be at an increased risk of developing type 2 diabetes mellitus after pregnancy [6]. Maternal diabetes mellitus is identified to increase the risk of macrosomia in infants due to insulin resistance and more exposure to glucose *in utero* [7] and enlarged fetal birth weight has been associated with raised second and third trimester postprandial glucose values. Macrosomic infants are at an increased risk of numerous complications containing preterm birth, shoulder dystocia, and hypoglycemia [8]. A study associating the APGAR scores of neonates of diabetic mothers and nondiabetic mothers would be useful in determining if maternal diabetes is in fact linked with lower 1-minute and 5-minute APGAR scores. This work aimed to study the influence of gestational diabetes mellitus (GDM) and diabetes mellitus on APGAR score in neonate.

Materials and Methods

Study population

The samples were collected from Department of Obstetrics and Gynaecology in Al-Imamain Al-Kadhimiyain (AS) Medical city, Baghdad Teaching Hospital and Al-Karkh Maternity Hospital during the period from 1st December 2016 to 1st may 2017. Three studying groups were analysed: First group included neonates of women with uncomplicated, healthy with singleton pregnancy were studied at term (37-40) weeks of gestation, within 5 minute after vaginal delivery and no miscarriage, the group was considered as control group (cases n=34). The second group included neonates of women with pregnancy complicated by gestational diabetes mellitus (cases n=34) at third trimester with singleton pregnancy. The third group included neonates of women with pregnancy complicated by pregestational diabetic mellitus (DM) (cases n=34) at third trimester with singleton pregnancy too. The mothers' informed consents were gained according to Local Research Ethics Committee approval in Iraqi Ministry of Health. Data of 102 neonates of mothers with control, GDM and DM were collected. The study protocol was approved by the Ethical Committees of the College of Education for Pure Sciences (Ibn Al-Haitham), University of Baghdad, and the Al-Imamain Al-Kadhimiyain (AS) Medical city, Baghdad Teaching Hospital and Al-Karkh Maternity Hospital.

Statistical analysis

The data analysis was performed using SPSS program version 15 and 18 (SPSS Inc., Chicago, IL, USA). Analysis of variance using one-way ANOVA was used as appropriate test for parametric data. All the data were presented in this study as mean $\pm$ standard error of the mean (mean $\pm$ SEM). The level of significance was at the agreement limits (95% confidence interval of the difference between the three

groups, and values of $p \leq 0.05$ and $p \leq 0.001$ were considered statistically significant and highly significant, respectively between the studied groups.

Result

APGAR score at 5 minute (Table 1 and Figure 1) was significantly higher difference ($P \leq 0.001$) in the control group (8.30 ± 0.02) compared with both two diabetes groups (GDM and DM) (5.87 ± 0.26 and 6.15 ± 0.04), but no differences ($P > 0.05$) between two diabetes groups together. Control group recorded the highest APGAR scores followed by DM group then GDM group at last.

Table 1. The mean 5 minute APGAR score of control, GDM, and DM groups.

Parameters	Controls N=34 (Mean $\pm$ SEM) (Range)	GDM N=34 (Mean $\pm$ SEM) (Range)	DM N=34 (Mean $\pm$ SEM) (Range)	p- value among all groups	p-value between groups
APGAR score (after 5 min)	8.30 ± 0.02^a (7.66-8.33)	5.87 ± 0.26^b (0-7.00)	6.15 ± 0.04^c (5.67-6.67)	0.000*	ab0.000* ac0.000* bc0.207**

One-way ANOVA test; *highly significant at $P \leq 0.001$ or significant at $P \leq 0.05$; ** not significant at $P > 0.05$; SEM= standard error of mean. a= control, b= GDM women, c=DM women.

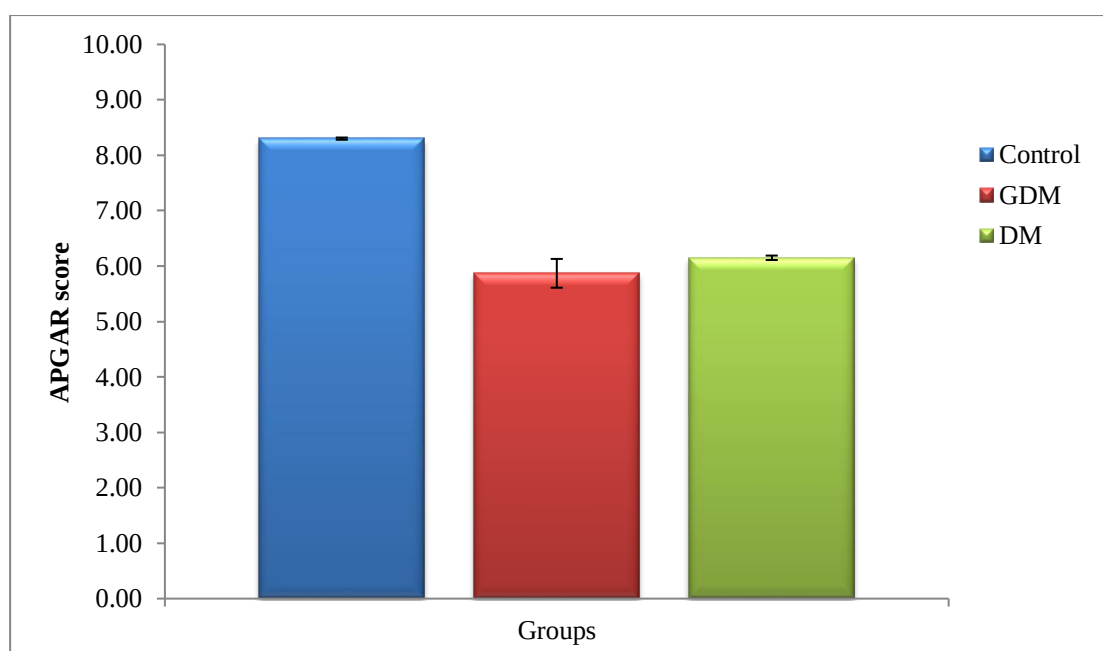


Figure 1. APGAR score of control, GDM, and DM groups at 5 minute.

Discussion

The APGAR score is used as an estimation method of the newborn's birth quality at fifth minute of life. It measures the direct adjustment of the newborn to extra uterine life, analysing the neonate vitality. It consists of the assessment of five matters of the neonate's physical investigation: heart rate, reflex irritability, muscle tone, respiratory effort and skin colour [3]. The APGAR score at 5 minute, it is considered to be more precise, foremost to the prediction of neurological health and outcomes such as neurological sequelae or death [9]. The risk of neonatal or infant death is highest at a low 5 minute APGAR score of 0 to 3 and moderate at middle score of 4 to 6 compared with a normal APGAR score of 7 to 10 [4].

In the present study, similar to other studies, neonate of pregnancies complicated by diabetic mellitus especially GDM had low APGAR score at 5 minute than those of control subjects [9-11]. Additionally, the result of our study consistent with [12] study which reported that both diabetes groups (GDM and DM) had APGAR score <7 at 5 min after birth. Oppositely, Jang *et al.* [13] study found no significant differences between women with type 2 diabetes and nondiabetic control in APGAR score at 1 and 5 minute. As well as Yeagle *et al.* [14] found that maternal history of GDM and type 2 diabetes does not appear to be associated with the 1 and 5 minute APGAR scores of full-term newborns of mothers with GDM and type 2 diabetes as compared to neonates of mothers without a history of impaired glucose tolerance.

Conclusions

The neonates of diabetic mothers are lower APGAR score than that of normal mothers, this due to maternal hyperglycemia and foetal hyperinsulinaemia

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