

## FREQUENCY OF NEONATAL HYPOGLYCEMIA IN LARGE FOR GESTATIONAL AGE INFANTS OF NON-DIABETIC MOTHERS IN A COMMUNITY MATERNITY HOSPITAL

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**Summary:** Large for gestational age (LGA) infants are at increased risk for hypoglycemia. The aim of the study was to determine the frequency of neonatal hypoglycemia in LGA infants of non-diabetic mothers in a Community Maternity Hospital in Gaziantep, Turkey. Hospital records of 5229 infants of non-diabetic mothers were examined retrospectively. Newborns with birth weight more than 4000 g were defined as LGA. The control group consisted of 100 appropriate for gestational age (AGA) newborns. Capillary blood glucose was measured at the second hour of life. Glucose values lower than 40 mg/dL (2.2 mmol/L) were defined as hypoglycemia. Ninety-six (1.8%) of the 5229 infants were found to be LGA. The mean capillary glucose levels of the LGA newborns were significantly lower than those of the AGA newborns (54 mg/dL (3.0 mmol/L) vs. 95 mg/dL (5.2 mmol/L),  $p < 0.0001$ ). Neonatal hypoglycemia was established in 16 of 96 LGA infants (16.7%). In the control group hypoglycemia was absent. The rate of hypoglycemia in LGA infants was significantly higher than the rate in the AGA infants ( $p = 0.0000$ ). As hypoglycemia is not rare in LGA infants and can have serious consequences, blood glucose levels should be screened routinely in LGA infants.

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**Key words:** Neonatal hypoglycemia; Large-for-gestational age

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### Introduction

Hypoglycemia is one of the major metabolic abnormalities of the newborn and is usually defined as a plasma glucose concentration less than 40 mg/dl (2.2 mmol/L) (7). It is well known that large for gestational age infants (LGA) are at risk for transient hypoglycemia, though the mechanism is not clear. It has been suggested that hyperinsulinism may be responsible for the hypoglycemia (1). Fetal hyperinsulinism may cause excessive intrauterine growth. If undiagnosed and untreated, hypoglycemia may cause serious complications, such as brain damage (4).

The aim of the study was to determine the frequency of neonatal hypoglycemia in LGA infants of non-diabetic mothers in a Community Maternity Hospital in South East Turkey. The most higher prevalence of diabetes mellitus (9.4%) was in Turkey is Gaziantep city, where the study was performed. In addition to, Gaziantep is the second city for the higher prevalence of obesity (27.2%) (9). Maternity Hospital of Gaziantep serves to the population of town and rural. Patients with low social-economic status of both populations are referred to this hospital.

### Material and Methods

The study population consisted of infants of non-diabetic mothers who were born at the Community Maternity Hospital of Gaziantep, between the years 2003–2004. Data was extracted from hospital records of 5337 infants. Mothers of 61 infant had known diabetes mellitus and gestational diabetes mellitus was diagnosed in 47 mothers. 108 infants of these diabetic mothers were not included in the study and the frequency of LGA was evaluated in 5229 infants of non-diabetic mothers.

Newborns with birth weight more than 4000 g were defined as LGA and their blood glucose level were measured and recorded in their charts. An oral glucose tolerance test (OGTT) was not performed routinely in mothers of LGA infants to exclude GDM. Mothers' diabetes status was based mainly on verbal maternal history and in a few patient (5%) on OGTT as recorded in the charts.

The control group consisted of 100 newborns whose weight was between 3000–3500 g and who were defined as appropriate for gestational age (AGA). Glucose levels of all infants (LGA and AGA) were measured via capillary blood

by glucometer (Glucometer Elite, Bayer Diagnostics, Germany). All readings were obtained at the second hour of life by the neonatal care unit nurse. Glucose values lower than 40 mg/dL (2.2 mmol/L) were defined as hypoglycemia.

## Results

A total of 5229 infants of non-diabetic mothers were born during the study period. Among them, ninety-six (1.8%) were found to be LGA. Neonatal hypoglycemia was established in 16 of 96 neonates with LGA (16.7%). In the control group (n=100) with normal weight, hypoglycemia was absent. The percentage of infants with hypoglycemia in the LGA group was significantly higher than the percentage in the AGA infant group ( $p=0.0000$ ).

The mean capillary glucose levels of the LGA newborns were significantly lower than those of the control group with normal weight for the gestational age (54 mg/dL (3.0 mmol/L) vs. 95 mg/dL (5.2 mmol/L),  $p<0.0001$ ). The clinical characteristics of the infants with LGA and AGA are shown in Table 1.

**Tab. 1:** Clinical characteristics of the infants with LGA and AGA.

	LGA	AGA	p
Mean blood glucose (mg/dL)	54±19	95±21	<0.0001
Mean blood glucose (mmol/L)	3.0±1.1	5.2±1.2	<0.0001
Mean birth weight (g)	4347±265	3351±278	<0.0001
Mean age of the mother (years)	29±7	28±6	NS

LGA: Large for gestational age; AGA: Appropriate for gestational age; NS: Non significant

## Discussion

Neonatal hypoglycemia is a common problem in LGA infants (8). It is well known that neonatal hypoglycemia occurs more frequently in LGA infants than AGA infants (12). The incidence of neonatal hypoglycemia in LGA infants is reported as having a wide range (8.1–33%) (5,6, 10–12). This wide range may be explained by the differing definitions of hypoglycemia in the various studies, and by the non-uniform time of capillary sampling in the different studies.

The frequency of neonatal hypoglycemia in LGA infants was found to be 16.7% in our study. Additionally, the mean blood glucose levels were significantly lower in LGA infants than in the AGA infants. These findings are consistent with the findings of one of the largest reports, but hypoglycemia was defined in that study as a capillary glu-

cose level lower than 30 mg/dl (10). Schafer-Graf et al. reported a 16% neonatal hypoglycemia rate in LGA infants, and found the results of the 1-hour maternal oral glucose tolerance test as the only predictor of neonatal hypoglycemia in the newborn (10).

In our study, the frequency of neonatal hypoglycemia was examined in LGA infants of non-diabetic mothers. Maternal glucose status was determined mainly based on documentation obtained from hospital charts, where mothers were asked about their diabetes history. Performing OGTT only in a small minority (5%) of the mothers is a limitation of the study. Nevertheless, our results are consistent with previous reports. This low ratio was related with low level of social-economic status of the pregnant women, because they were only admitted to the hospital for the time of the delivery.

The mean blood glucose levels were low in LGA infants, and they may be predisposed to hypoglycemia. Since hypoglycemia is an important metabolic disorder, with potentially serious consequences (including neurological complications), blood glucose levels should be screened routinely in all LGA infants.

Despite these, and previous findings, no consensus exists among medical professionals regarding the benefits of testing LGA infants of non-diabetic mothers for hypoglycemia on a routine basis (2,3,10).

In conclusion, hypoglycemia in LGA infants is not rare. Further studies are needed to evaluate the maternal and neonatal risk factors for hypoglycemia in the newborn, as well as the frequency of hypoglycemia in LGA infants.

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