How is insulin-like growth factor-1 correlated with retinopathy of prematurity?

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Background: Evaluation of insulin-like growth factor-1 (IGF-1) association with retinopathy of prematurity (ROP) is our object. **Materials and Methods:** This study was conducted on IGF-1 levels of 40 neonates <34 weeks gestational age and 2000 g at 1st week and 4–6 weeks after birth. All participants were evaluated for ROP after 31 weeks of gestation. **Results:** IGF-1 levels showed a significant difference between neonates ≤1500 and 1500–2000 g (1 and 4–6 weeks, $P = 0.008$, $P = 0.039$, respectively). No significant association was found between IGF-1 and ROP. **Conclusion:** Finding a meaningful association between IGF-1 and ROP requires consideration of factors affecting the IGF-1.

Key words: Insulin-like growth factor-1, preterm birth, retinopathy of prematurity

How to cite this article: Jafari N, Karimi Moghadam A, Taslimi Taleghani N, Hosseini Nezhad N, Motamed N, Jalilvand A. How is insulin-like growth factor-1 correlated with retinopathy of prematurity? J Res Med Sci 2021;26:111.

INTRODUCTION

Retinopathy of prematurity (ROP) is a multifactorial vascular retinal disease.[1] Recently it has been suggested that ROP may be associated with low levels of insulin-like growth factor-1 (IGF-1) in premature infants.[2] There is also an association between the severity of ROP and the duration of low levels of IGF-1.[3] Sepsis, acidosis, and malnutrition might exacerbate IGF-1 deficiency.[3] Since there are still many ambiguities about the factors affecting the IGF1 blood concentration and the ROP severity in premature infants,[3] the present study examines some of these factors.

METHODOLOGY

This prospective cohort study has been conducted on forty premature neonates with gestational age (GA) <34 weeks and a weight <2000 g with no significant anomalies or asphyxia after the informed consent obtained from the parents. The neonates who died or were not available were excluded from the study. We measured serum IGF-1 of our participants in the 1st and 4–6 weeks after birth. Infants who had been discharged before 4 weeks were referred for blood sampling after regaining informed consent from parents. Serum IGF-1 was measured using IDS IGF-1 ELISA UK kits technique. ROP examination at the age of 4 weeks (after 31 weeks of GA) performed by a team of retinal fellows. The record of the ROP examination results was relying on the latest international categorization.[4,5] In our center, within the first 48–72 h after birth, if the neonate has respiratory distress that needs oxygen >40%, he will receive the surfactant by a neonatologist. First, the

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Quick Response Code:

Website: www.jmsjournal.net

DOI: 10.4103/jrms.JRMS_501_20

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Submitted: 19-May-2020; **Revised:** 14-Oct-2020; **Accepted:** 11-Jul-2021; **Published:** 29-Nov-2021

normal distribution of continuous data was evaluated. To compare the data between two groups (neonates with ROP and without ROP), independent *t*-test was applied due to a normal distribution of the related data. A Fisher exact test was utilized to evaluate a potential association between nominal data. A significant level was reported if the related $P < 0.05$. For this study, the code of ethics (IR.ZUMS.REC.1398.202) was obtained from Zanjan University of Medical Sciences.

Ethical approval

This study was approved by the ethics committee of Zanjan University of Medical Sciences, Zanjan, Iran and informed consent was obtained from all parents.

RESULTS

In the present study, we divided the participants into two groups, one include 16 (40%) by different degrees of ROP, and the other 24 (60%) were not affected. There was no significant difference in GA, weight, duration of oxygen therapy, and RDS between the two groups. No significant correlation was found between IGF-1 levels and the incidence of ROP. Neonates weighing ≤1500 g had significant low IGF-1 levels during the 1st week of birth and 4–6 weeks after birth [Table 1]. ROP severity did not have a significant correlation with other clinical indexes in the two groups of neonates [Table 2].

Table 1: Insulin-like growth factor-1 levels in the 1st and 4-6 weeks after birth by birth weight and duration of oxygen therapy

	The mean and standard deviation of IGF-1 level			
	First week	*P*	4-6 weeks after birth	*P*
Birth weight (g)				
≤1500	9.60±4.40	0.008	20.02±11.41	0.039
>1500	13.81±6.71		28.08±10.62	
Duration of oxygen therapy (days)				
1–7	11.16±5.58	0.567	25±10.07	0.252
>7	10.15±5.44		20.70±12.73	

IGF-1=Insulin-like growth factor-1

DISCUSSION

This study examined the correlation between IGF-1 levels and ROP in preterm neonates with GA <34 weeks. The results did not show a significant correlation between IGF-1 levels and ROP. Simulation of influential and confounding factors such as intubation and oxygen intake in our two study groups is the strength of the present study. The Banjac and Bokan provided a survey that had the closest similarity to our study based on maturity and birth weight. They did not find any significant correlation between IGF-1 levels and ROP either.[6] Peirovifar *et al*., also did not find any significant difference in IGF-1 levels between the healthy neonates and those with ROP. They examined 71 neonates ≤32 weeks of GA at 6–8 weeks after birth for IGF-1. Also consistent with the results of our study, Peirovifar reported that IGF-1 levels in neonates with RDS were lower than in nonaffected neonates.[7] Jensen *et al*. found a significant relationship between ROP and IGF-1 levels in neonates with birth weight <1250 g, while we studied infants with <2 kg.[8]

CONCLUSION

Although we found an association between neonatal birth weight and the levels of IGF-1, our study did not show a significant relationship between GA and IGF-1 levels. Therefore, the relationship between ROP and IGF1 may be caused by the association between birth weight and IGF-1.

Acknowledgment

We sincerely thank Zanjan University of Medical Sciences, Zanjan, Iran, as well as the Center for the Development of Clinical Research in Ayatollah Mousavi Hospital and all the patients participating in this study.

Table 2: Severity of retinopathy of prematurity based on clinical indexes

Clinical variable	Category	ROP status				*P*
		Without ROP, *n* (%)	Mild (less than prethreshold), *n* (%)	Moderate (prethreshold), *n* (%)	Severe, *n* (%) (threshold)	
Gestational age (weeks)	≤30	14 (56)	5 (20)	0	6 (24)	0.361
	>30	10 (66.66)	3 (20)	1 (6.7)	1 (6.7)	
Duration of oxygen therapy (days)	1–7	12 (66.7)	4 (22.2)	0	2 (11.1)	0.728
	>7	12 (54.5)	4 (18.2)	1 (4.5)	5 (22.7)	0.879
Birth weight (g)	≤1500	15 (60)	4 (16)	1 (4)	5 (20)	0.217
	>1500	9 (60)	4 (26.7)	0	2 (13.3)	
Affected by RDS	No	11 (57.9)	6 (31.6)	0	2 (10.5)	0.361
	Yes	13 (61.9)	2 (9.5)	1 (4.8)	5 (23.8)	

RDS=Respiratory distress syndrome; ROP=Retinopathy of prematurity

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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