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COMPARISION OF NEURODEVELOPMENTAL OUTCOME OF TERM AND BORDERLINE PRETERM INFANTS AT - SIX MONTHS OF AGE

Neonatology

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ABSTRACT

Objective: To assess and compare the Neurodevelopmental outcome at six months of age in healthy term and late preterm (34/0-36/6 wks) neonates.

Design of study: - Prospective cohort study

Study setting- This study is conducted in Pt JNM Medical College and Dr B.R. Ambedkar Memorial Hospital, Raipur, Chhattisgarh

MATERIALS & METHODS Over a period of one year (May 2016 to April 2017), 177 healthy term and 177 late preterm neonates without any perinatal insult were included in the study. Gestational age was assessed using the modified New Ballard score and Neurodevelopmental assessment is done using Denver's II scale. At six months of age, three test in each domain of mile stone, nearest to and totally to the left of the age line (6 month) in the DDII chart were administered . Infants who were unable to perform at least two items nearest to and totally to the left of the age line were considered as neurodevelopmentally delayed. The data was tabulated using the SSPS version of Microsoft Excel. Both the groups preterm and terms were compared and Odds Ratio at 95% CI was calculated for each developmental test administered. Level of significance was calculated using bivariate logistic regression.

RESULTS Late Preterm neonates have higher odds of neurodevelopmental delay as compared to term neonates. (OR 4.14 at CI 95%)

CONCLUSION: The Neurodevelopmental outcome of healthy term babies is better than the late preterm at six months and provides opportunity for early intervention programming. Long term outcome requires further follow up.

KEYWORDS

INTRODUCTION

Out of total preterm births moderate and late preterm birth contributes 84.3% and late preterm contribute about 70%. In total late preterm birth (34 - <37 completed weeks) [1,2] account for 10% of total live births.[3,4,5] There is a growing concern that the late preterm may be at significant risk for brain injury and adverse long term neurodevelopmental outcome; as a significant proportion of brain growth, development, and networking occurs during the last six weeks of gestation. [6,7,8] These tissues are vulnerable to injury during this critical time period of development. Any insult may result in direct injury to developing tissues or disruption of critical pathways needed for neuronal and glial development.[9,10]

METHODS

This prospective time bound cohort study was conducted in Pt JNM Medical College and Dr B.R. Ambedkar Memorial Hospital, Raipur, Chhattisgarh during May 2016 to April 2017. We enrolled only the healthy neonates with no perinatal insult and normal ophthalmic and audiometric examination. All neonates born during the period of may 2016 to November 2016, meeting the inclusion and exclusion criteria and whose parents consented for study were enrolled. We enrolled 193 late preterm neonates and 200 term neonates after parent's consent for the study but 177 term and 177 preterm neonates completed the study.

INCLUSION CRITERIA:-

- late preterm neonates (born between 34 weeks gestational age to 36+6 days) who are healthy and did not require any resuscitation at birth

Exclusion criteria: - Neonates with any perinatal insult

All the neonates whose parents consented for study were examined within first six hours of birth. Gestational age at birth was assessed using the modified New Ballard score; babies were assessed for tone, cry (immediately after birth or not) size and shape for anterior fontenelle, breast feeding assessed.

All the neonates were examined daily in post natal wards till discharge. Reassessment at discharge for neurological assessment (DD- II) was done for both late preterm and term neonates and monthly follow up schedule was made for each neonate and parents were counselled for the same.

Second neurodevelopmental assessment was done using Denver's II developmental screening test [11] at six months of age for term and corrected age for late preterm. At six months of age, three test in each domain of mile stone, nearest to and totally to the left of the age line (6 month) in the DDII chart were administered. Infants who were unable to perform at least two items nearest to and totally to the left of the age line were considered as neurodevelopmentaly delayed.

STATISTICALANALYSIS

- The data was tabulated using the SSPS version of Microsoft Excel and expressed as percentage .
- Both the groups preterm and terms were compared and Odds Ratio at 95% Confidence Interval was calculated for each developmental test administered.
- Level of significance was calculated using bivariate logistic regression .
- Fischer's exact test or Chi square test was used to analyze the significance of difference between frequency distribution of the data.
- P value <0.05 was considered as statistically significant.

OBSERVATIONS AND RESULTS

Comparison of neurological characteristics at birth like tone, cry, anterior fontanelle, grasping and smile were found to be normal in all subjects in term as well as late preterm group and n**eonatal reflexes with respect to breast feeding of term and late preterm neonates at birth**- We found that sucking was comparably good in both term and late preterm neonates. Frequency of swallowing and attachment was found to be poor in significantly higher frequency in late preterm subjects (p<0.0001 and p=0.002 respectively)

Neurodevelopmental assessment of both study groups at 6 months of chronological age for term and corrected age for late preterm neonates

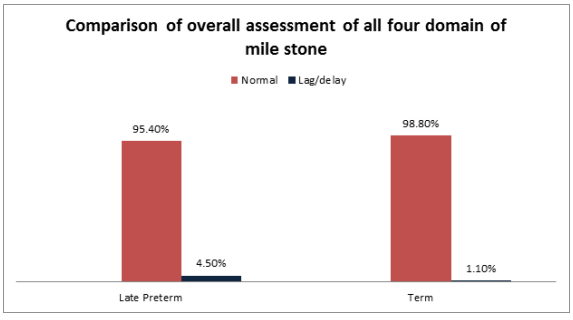
		Gross motor		Fine motor		Social		Language	
Mile stones		Roll over	Pull to sit without head lag	Reaching for object	Regard raisin	Work for toys	Regard own hands	Response to voice	Turn to rattling sound
Term n= 177	P	175 (98.8%	175 (98.8%	175 (98.8%	175 (98.8%	175 (98.8%	175 (98.8%	175 (98.8%	175 (98.8%
	NP	2(1.1%)	2(1.1%)	2(1.1%)	2(1.1%)	2(1.1%)	2(1.1%)	2(1.1%)	2(1.1%)

Late preterm n= 177	P	171 (96.6%)	169 (95.4%)	171 (96.6%)	170 (96.1%)	171 (96.6%)	169 (95.4%)	172 (97.1%)	169 (95.4%)
	NP	6 (3.%)	8 (4.5%)	6 (3.3%)	7 (3.9%)	6 (3.3%)	8 (4.5%)	5 (2.8%)	8 (4.5%)

P=Performed , NP =Not Performed

Comparison of overall assessment of all four domain of mile stone for Neurodevelopmental outcome at 6 months in both groups(term and late preterm neonates)

Groups	Normal	Lag/delay	Odd's ratio (CI)	Risk ratio (CI)
Late preterm	169 (95.4%)	8 (4.5%)	4.14 (0.9-18.5)	4 (0.9-19.7)
Term	175 (98.8%)	2 (1.1%)		



DISCUSSION

We in our study tried to assess the risk posed by late preterm birth towards various neurological problems in the later age.

Performance of various tasks viz roll over, pull to seat without head lag, regard raisin and reaching for objects, work for toys and regard own hands, turn to voice test and turn to rattling sound made out of vision on each side were administered at 6 months of age in both term and late preterm infants and found that overall the late preterm birth was found to cause risk of lag in performance of various activities with odds ratio of 4.14 and risk ratio of 4.

Odd's ratio for lag in preterm subjects was found to be 4.14 which indicates a significant risk of developmental lag in LP subjects; our results were similar to Petrini *et al* however though mentioned increased risk of developmental delay in LP, they found hazard ratio to be 1.25. Whereas hazard ratio was found to be 3.33 for cerebral palsy, which also presents as developmental delay in early infancy.[12]

Woythaler *et al* observed increased stunting and wasting in LP children at the age of 12 and 24 months. Author also observed significantly lower mental raw score as well as psychomotor raw score in LP subjects. Mental development index and psychomotor development index was also found to be significantly lower in LP subjects.[13]

These results are consistent with recent reports that raised concerns about the neurodevelopmental outcomes of late preterm infants. Chyi *et al*.[14]

Morse *et al* also demonstrated increased risk for late preterm infants to have developmental delay or disability.[15]

Lacunae of our study was relatively smaller sample size compared to most other studies. A causal association between late preterm birth and poor neurodevelopmental outcome cannot be established since various confounding factors which can affect neurodevelopment were not taken into account in this study. Long term follow up is needed to conclusively establish neurodevelopmental delay.

Hence it is recommended that various post natal factors should be studied and adjusted odds ratio after multivariate analysis should be calculated to establish the association

We concluded that the neurodevelopmental status of healthy term babies is better than the preterm even those who are born Late Preterm between 34 to 37 weeks. Early identification of these infants provides an opportunity for early intervention planning.

REFERENCES

1. Marlow N: Full term; an artificial concept. Arch Dis Child Fetal Neonatal Ed. 2012, 97: F158-10.
2. ACOG committee opinion No. 404. Late-preterm infants. 2008. Obstetrics and Gynecology, 111, 1029-1032.
3. Blencowe , Cousens S, Oestergaard M, Chou D, Moller A, et al. National, Regional, and Worldwide Estimates of Preterm Birth Rates in the Year 2010 With Time Trends Since 1990 for Selected Countries. Obstetric Anesthesia Digest 2013, 333: 142.
4. Khashu M, Narayanan M, Bhargava S, Osiovich H. Perinatal outcomes associated with preterm birth at 33 to 36 weeks' gestation: a population-based cohort study. Pediatrics. 2009;123: 109-13.
5. Ramachandrappa A, Jain L. Health issues of the late preterm infant. Pediatric Clinics of North America 2009. 56: 565–577.
6. de Graaf-Peters, V. B, Hadders-Algra, M. 2006. Ontogeny of the human central nervous system: what is happening when? Early Human Development, 82, 257–266.
7. Xu, G, Broadbelt, K. G, Haynes, R. L, Folkerth, R. D, Borenstein, N. S, Belliveau, R. A, Kinney, H. C. 2011. Late development of the GABAergic system in the human cerebral cortex and white matter. Journal of Neuropathology and Experimental Neurology, 70, 841–858.
8. Clouchoux, C, Guizard, N, Evans, A. C, du Plessis, A. J, Limperopoulos, C. 2011. Normative fetal brain growth by quantitative in vivo magnetic resonance imaging. American Journal of Obstetrics and Gynecology, 173, e1–8.
9. Adams-Chapman, I. 2006. Neurodevelopmental Outcome of the Late Preterm Infant. Clinics in Perinatology, 334, pp.947-964.
10. Wang ML, Dorer DJ, Fleming MP, Catlin EA. Clinical outcomes of near-term infants. Pediatrics. 2004;1142: 372–376
11. Frankenburg, William K.; Dobbs, J.B. 1967. "The Denver Developmental Screening Test". The Journal of Pediatrics. 71 2: 181–191
12. Petrini JR, Dias T, McCormick MC, Massolo ML, Green N, Escobar GJ. Increased risk of adverse neurological development for late preterm infants. Journal of Pediatrics 2009, 154, 169–176.
13. Woythaler, M. A, McCormick, M. C, Smith, V. C. 2011. Late preterm infants have worse 24-month neurodevelopmental outcomes than term infants. Pediatrics, 127, e622–629.
14. Chyi, L. J, Lee, H. C, Hintz, S. R, Gould, J. B, Sutcliffe, T. L. 2008. School outcomes of late preterm infants: special needs and challenges for infants born at 32 to 36 weeks gestation. Journal of Pediatrics, 153, 25–31.
15. Morse SB, Zheng H, Tang Y, Roth J. Early school age outcomes of late preterm infants. Pediatrics. 2009;1234.