ORIGINAL ARTICLE

PRETERM BIRTH ASSOCIATION WITH CEREBRAL PALSY

Srinivasa Rao Tatavarti[1], Vidyullatha Arimilli[2]

HOW TO CITE THIS ARTICLE:
Srinivasa Rao Tatavarti, Vidyullatha Arimilli. "Preterm Birth Association with Cerebral Palsy". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 18, May 04, 2015; Page: 2476-2479.

ABSTRACT: INTRODUCTION: Cerebral palsy (CP) is a group of permanent movement disorders that appear in early childhood. Preterm birth is the birth of baby before 37 completed weeks, a full term birth is birth at 37 to 42 weeks of gestation. **AIM:** To show the extent of association of preterm deliveries as a risk factor in development of cerebral palsy. **MATERIALS AND METHODS:** This retrospective cohort study was conducted by eliciting history from the mothers of 99 cerebral palsy children who were treated in Rani Chandra Mani Devi Hospital, Visakhapatnam, Andhra Pradesh, India. Detailed history was taken from the mothers of 99 cerebral palsy children who were treated in this hospital. History regarding the period of gestation at which the child was born (preterm or full term), any previous history of pre.
KEYWORDS: Preterm birth – Periventricular leukomalacia – Hypoxic ischaemic encephalopathy - Lung surfactant - Cerebral palsy.

INTRODUCTION: STATISTICS: From this study it was observed that out of the 99 children affected by cerebral palsy, 33 were born pre term and 66 were born full term. Of these 33 cerebral palsy children who were born pre term, about 51% were born at 28 wks gestation, 24% were born at 32wks, 9% each were born at 30 wks and 24 wks and 3% each were born at 26 wks and 36 wks. Among the mothers of 33 children born pre term, 6 mothers; and 1 mother of 66 full term born children had a previous history of pre-term delivery estimating to an odds ratio of 14.44 with confidence limits 1.659 (lower) and 125.762 (upper). Out of 33 mothers of pre-term children, 5 mothers had previous history of abortions; and 2 mothers out of 66 full term born infants had previous history of abortions with an estimated odds ratio of 5.71 and confidence intervals ranging from 1.05 (lower) to 31.25 (upper).

DISCUSSION: Preterm birth is the birth of baby before 37 completed weeks, a full term birth is birth at 37 to 42 weeks of gestation.

As per the fact sheet by WHO,[1] updated in November 2014, every year, an estimated 15 million babies are born preterm (before 37 completed weeks of gestation), and this number is rising. Of 65 countries with reliable trend data, all but 3 countries show an increase in preterm birth rates over the past 20 years. Possible reasons for this include better measurement, increases in maternal age, underlying maternal health problems such as diabetes and high blood pressure, greater use of infertility treatments leading to increased rates of multiple pregnancies, and changes in obstetric practices such as more caesarian births before term.

Across 184 countries, the rate of preterm birth ranges from 5% to 18% of babies born. Preterm birth complications are the leading cause of death among children below 5 years of age, responsible for nearly 1 million deaths in 2013.Three-quarters of them could be saved with current, cost-effective interventions. Globally, prematurity is the leading cause of death in children under the age of 5. India is the leading country with greatest number of pre-term births, with nearly half these children developing cerebral palsy.

In the normal human fetus, several organ systems mature between 34 and 37 weeks, fetus reaches adequate maturity by the end of this period. The lungs and brain are the last organs to mature in the womb. Generally, preterm babies are premature and term babies are mature. Preterm babies near 37 weeks usually have no problems if their lungs have developed adequate surfactant, which helps the lungs to remain expanded between breaths. Lungs need surfactant, to lower the surface tension of the alveoli in the lungs which prevents their collapse. This is very important for premature babies trying to expand their lungs after birth. Surfactant is a mixture of proteins, lipids, and Glycoproteins (Lecithin, sphingomyelin). Lecithin makes the surfactant more effective.

During the lung development acinar formation, differentiation of type I and type II epithelial cells occurs at 16-24 wks. gestation; surfactant production by type II alveolar cells

occurs at 24-36 wks.; and appearance of true alveoli, septation and expansion of air spaces occurs from 36 wks gestation onwards.

Considering the brain development in the fetus, genes contribute about 60%, uterine environment contribute about 30% and nutrition of the mother about 10%. Though the genes contribute to 60% of brain development, its healthy development depends on certain factors important of which are nutrition of the mother, wellbeing of the mother. Certain neurological conditions and causes associated with cerebral palsy such as damage to the brain's white matter, known as periventricular leukomalacia (PVL) are closely linked to preterm delivery.

Preterm babies are at risk of neurological problem like apnea of prematurity, hypoxic-ischemic encephalopathy (HIE), developmental disability, transient hyperammonemia, retinopathy of prematurity (ROP), cerebral palsy and intra ventricular hemorrhage. Severe bleeds in the brain results in brain damage or even death. Lack of maternal thyroid hormones at a time when immature thyroids of the pre-term baby cannot meet post natal needs, can lead to neuro developmental problems.

Children born preterm are more likely to have white matter brain abnormalities, which results in cognitive dysfunction. White matter connectivity between different areas of the brain particularly between anterior and posterior regions is important in learning. Hence preterm children are at a greater risk for developing learning disabilities.

Brain and lung are the last organs to develop and the development is completed near to term. Hence if the baby is born pre term, the development of both lung and brain are incomplete, functionally immature, which results in breathing problems of the premature child and damage to the premature brain. Dr. Eveline Himpens meta-analysis,[2] concluded that "Extremely preterm births i.e., delivery before 28 week's gestation, have 129 times the CP (Cerebral Palsy) risk as full-term newborns. Study by Dr. Angela Lanfranchi[3] on 15,000 pre-term babies concluded that there was an increased incidence of cerebral palsy among children born prematurely.

In the study by J.L. Van der Hayden et al,[4] authors identified 307 patients, of whom 118 women had a subsequent pregnancy. Of 99 women with complete outcome data, 35 women (35%) had a preterm delivery and they concluded that if the woman had a preterm delivery, the risk of a preterm delivery in future pregnancies is 35%, which is approximately 3 to 4 times higher compared with the risk in a general population.

In the study by Ghislain Hardy, MD et al[5] on 17,916 women, they concluded that there is a significant increase in the risk of preterm delivery in women with a history of previous induced abortion. This association was stronger with decreasing gestational age.

Mothers with a previous history of preterm delivery have 14.4 times higher risk of subsequent pre term delivery, previous history of abortions, have 5.7 times risk of pre-term delivery than mothers without such history, thereby adding further to the risk of pre-term birth in turn contributing to increase in cerebral palsy incidence.

At root level of the primary health care system, knowledge of these risk factors and their grave impact on the fetus in the causation of cerebral palsy must be imparted to the basic health providers. A record of that pregnant woman who have known risk factors should be maintained and well addressed in the monthly review meetings. The field staff of the primary health care system should encourage the pregnant woman to attend Primary health centre, for regular antenatal checkups so as to screen the high risk cases and referral of the risk cases well in advance of the risk period of previous preterm delivery or abortion, to the higher centre for expert supervision and timely intervention. A delay in delivery for few weeks or few days of a preterm baby will lead to gross difference in the developmental aspect. If this is scrupulously followed the cerebral palsy due to preterm births, can be prevented apart from attending to other maternal risk factors if any which helps in reducing the overall maternal and fetal morbidity and mortality.

RESULTS: From this study it is to conclude that the proportion of association of pre-term births to cerebral palsy is 33 out of 99 i.e., about 33.33%, highest association being with birth at 28 wks. Gestation (51%). Mothers with a previous history of preterm delivery have 14.4 times higher risk of subsequent pre-term delivery; previous history of abortions, have 5.7 times risk of pre-term delivery than mothers without such history, thereby adding further to the risk of pre-term birth baby.

CONCLUSION: From this study it was concluded that the pre-term birth plays a major role as a risk factor in the development of cerebral palsy with mothers having previous prê- term delivery and previous abortions adding further to this risk. At root level of primary health care system referral of the risk cases well in advance of the risk period of previous preterm delivery or abortion, to the higher centers for expert care can to some extent prolong the gestation period which plays crucial role in the maturity of the fetus thereby lessening the chances of developing cerebral palsy due to pre-term birth.

REFERENCES:

1. World Health Organization [homepage on the Internet] Preterm birth Fact sheet No 363. [Accessed September 10, 2014]. Available from: http://www.who.int/mediacentre/factsheets/fs363/en/
2. Himpens E, Van den Broeck C, Oostra A, Calders P, Vanhaesebrouck P. Prevalence, type, and distribution and severity of cerebral palsy in relation to gestational age: a metaanalytic review. Developmental Med Child Neurology 2008; 50: 334-340.
3. Dr. Angela Lanfranchi: Complications: abortion's impact on women (Toronto, ON: de Veber Institute, 2013: p – 433.
4. J. L. Van der Heyden: Subsequent pregnancy after preterm prelabor rupture of membranes before 27 weeks' gestation. AJP Rep. 2013 Oct; 3(2): 113–118.
5. Ghislain Hardy, MD, Alice Benjamin, MD, Haim A. Abenhaim, MD, MPH: "Effect of Induced Abortions on Early Preterm Births and Adverse Perinatal Outcomes", February, the Journal of Obstetrics and Gynaecology. 2013; 35(2): 138–14.

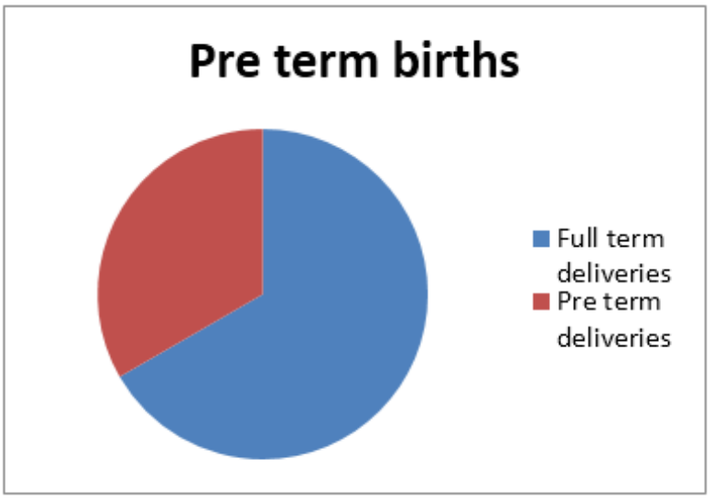

Fig. 1: Pre term births-proportional association with CP.

Total mothers of children born preterm = 33.
Total mothers of children born full term = 66.

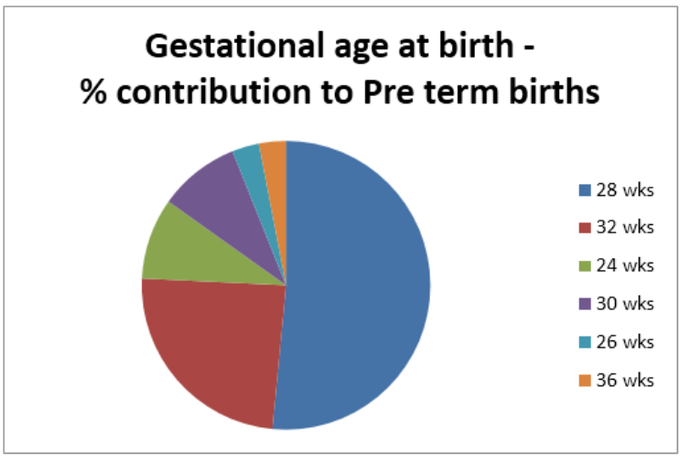

Fig. 2: Gestational age at birth - % contribution to preterm births

ORIGINAL ARTICLE

AUTHORS:

1. Srinivasa Rao Tatavarti
2. Vidyullatha Arimilli

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Orthopaedics, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India.
2. Assistant Professor, Department of Paediatrics, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Srinivasa Rao Tatavarti,
Flat – 302, Sector – 8,
Ozone Apartment,
Mup Colony, Visakhapatnam,
Andhra Pradesh - 530017, India.
E-mail: tsrsgc@gmail.com

Date of Submission: 20/04/2015.
Date of Peer Review: 21/04/2015.
Date of Acceptance: 24/04/2015.
Date of Publishing: 29/04/2015.