

**FLUID INTAKE AND WEIGHT LOSS
DURING THE FIRST TEN DAYS OF LIFE
AND RISK OF BRONCHOPULMONARY
DYSPLASIA IN (VLBW) INFANTS**

Thesis

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Dedication

I dedicate this work

With love to my

daughter, my wife and my family

A decorative floral ornament at the bottom of the page, featuring a central pink flower with yellow and orange accents, surrounded by green leaves and smaller pink flowers.

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LIST OF ABBREVIATIONS

ABG	Arterial blood gasses.
AGA	Appropriate for gestational age.
APH	Antepartum hemorrhage.
B.W	Birth weight
BPD	Broncho pulmonary dysphasia.
CBC	Complete blood count.
CI	Confidence interval.
CLD	Chronic lung disease.
CPAP	Continue positive airway pressure.
CRP	C–reactive protein.
D.M	Diabetes mellitus.
D₁₀ W	Dextrose 10 % in water
D₅ W	Dextrose 5% in water
ELBW	Extremely low birth weight.
FIO₂	Fraction of inspiratory oxygen.
G.A	Gestational age.
H.S	Highly significant.
ICH	Intra cranial hemorrhage.
IUGR	Intra uterine growth retardation.
IVH	Intraventricular hemorrhage.
L/S ratio	Lecithin to sphingomilin ratio.
LBW	Low birth weight.
LGA	Large for gestational age.
MOD	Mode of delivery .
N.S	Non significant .

NBW	Normal birth weight .
NEC	Necrotizing enterocolitis .
NICU	Neonatal intensive care unit.
P	Probability .
Pa O₂	Pressure o ₂ .
PCO₂	Pressure co ₂ .
PDA	Patent ductus arteriosus .
PEEP	Peak end expiratory pressure .
PIP	Peak inspiratory pressure.
PPV	Positive pressure ventilation.
PROM	Premature rupture of membrane.
PT	Preterm.
RDS	Respiratory distress syndrome.
ROP	Retinopathy of prematurity.
S	Significant.
SD	Standerd deviation.
SGA	Small for gestational age.
SO₂	Oxygen saturation.
SOD	Super oxide dismutase.
SRT	Surfactant replacement therapy.
t	Student t test
VEGF	Vascular endothelial growth factor
VLBW	Very low birth weight.
X²	Chi square test.

INTRODUCTION

Infants were defined as suffering from Bronchopulmonary dysplasia (BPD) if they were on oxygen support ≥ 28 days. These newborns were then reassessed when they reached 36 weeks corrected GA (if GA < 32 weeks) or at hospital discharge (*Ehrenkranz et al., 2009*).

Those who were room air at the time of reevaluation were classified as having mild BPD. Those receiving less than 30% fraction of inspired oxygen (FiO₂) were classified as having moderate BPD and those on FiO₂ > 30% and/or continuous positive airway pressure (CPAP) and/or mechanical ventilation were classified as having severe BPD (*Ehrenkranz et al., 2009*).

BPD is still the most common cause morbidity among (VLBW) newborns, although the incidence, risk factors and severity of the disease have changed substantially since the introduction of new treatments and mechanical ventilation techniques (*Monte et al., 2009*).

Pathogenesis of BPD is multifactorial, including immaturity, barotrauma or volutrauma and oxygen toxicity (*Bancalari et al., 2003*).

Excessive ingestion of liquids and sodium in these high risk neonates during the early postnatal period has

been suggested as an additional risk factor for the development of BPD (*Hartnoll et al.*, 2000).

Body water content is very high in VLBW infant and a large proportion of the body water is in the extracellular fluid (ECF) compartment. During the first week of life, there is a physiologic contraction of the ECF which is associated with weight loss during the early neonatal period. This is achieved by fluid intake that is less than the amount of water excreted through the kidney in the form of postnatal diuresis and via insensible water loss. It is postulated that this physiologic process of ECF contraction may not occur if excessive fluid and/or sodium is given during the critical period (*Oh et al.*, 2000).

High fluid intake with persistent expanded ECF is associated with a higher incidence of symptomatic patent ductus arteriosus (PDA) and necrotizing enterocolitis (NEC), also there is suggestive evidence that PDA is associated with an increased incidence of (BPD) (*Oh et al.*, 2000).

Strategies and interventions that might reduce the incidence of BPD have been widely investigated. Recently, on a multicenter study, it was reported that administration of caffeine during the first days of life was capable of reducing (BPD) incidence in a population of VLBW newborns (*Schmidt et al.*, 2007).

AIM OF THE WORK

The aim of this work is to demonstrate the association between fluid intake and weight loss during the first 10 days of life and the risk of bronchopulmonary dysplasia (BPD) in VLBW infants.

Chapter (1)

PREMATURE AND LOW BIRTH WEIGHT INFANTS

Definitions:

The World Health Organization defined **preterm infants**, as live born infants delivered before 37 weeks from the first day of last menstrual period. Birth weight is governed by two major considerations, the duration of gestation and the intrauterine growth rate. **Low birth weight (LBW)** that is birth weight equal to or less than 2500 gm. may be caused by a short period of gestation, intrauterine growth retardation (IUGR) or both (*Graham, 2002*).

Very low birth weight (VLBW) infants are infants who weight less than 1500 gm, while **extremely low birth weight infants (ELBW)** are infants who weigh less than 1000 gm. Both of them are predominantly premature, but some are small for date at a later gestation (*Stoll and Kleigman, 2004*).

LBW infants can be grouped into three categories, firstly, infants with LBW who are prematurely delivered (before 37 weeks) and are appropriate for gestational age (Preterm- AGA). Secondly, infants with LBW who are born at 37 weeks or later, and inappropriately small for gestational age (SGA). Lastly, infants who are prematurely

delivered but whose weight is still inappropriately small for gestation age (Preterm -SGA) (*Lee and Cloherty, 2004*).

In developing countries, approximately 40% of LBW have intrauterine growth retardation, while in developed countries 30% of LBW have IUGR. Intrauterine growth retarded infant (I U G R), have a greater morbidity and mortality than appropriately grown gestational age infants (*Stoll and Kleigman, 2004*).

Incidence:

The incidence of prematurity is very difficult to be determined, until recently, all low birth weight babies were lumped together as being premature. The incidence of hospital births below 2500 gm, is approximately 9.6% in the United States, 6.0% in Great Britain, 0.0% in Sweden, 4% in France, and 10% in Japan. The low birth weight rate has increased because of an increased number of preterm births. 30% of LBW infants in the United States have IUGR and were born after 37 weeks. VLBW infants weigh less than 1500 gm and are predominately premature. In the United States, the VLBW rate is approximately 1.4% and their survival is directly related to birth weight (*Horber et al., 2002*).

In order to have the incidence of prematurity in Egypt, we should have national or semi-national survey and this