بسم الله الرحمن الرحيم

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Assessment of Thyroid Functions in Late Preterm Infants of Mothers on Antenatal Steroids

A Thesis

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Basma Bassam Bassam Hassan

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List of Abbreviations

Abbr.	Full-term
ACOG	**:** American College of Obstetricians and Gynecologists
ACS	**:** Antenatal corticosteroids
ACTH	**:** Adrenocorticotropic hormone
ANS	**:** Antenatal steroids
BMR	**:** Basal metabolic rate
CRH	**:** Corticotropin-releasing hormone
CS	**:** Caesarean section
D1	**:** Iodithyronine deiodinase
D2	**:** Type 2 deiodinase
DI3	**:** Monoamine deiodinase, type 3
DM	**:** Diabetes mellitus
DUE	**:** Dehydro-epiandrosterone
ELISA	**:** Enzyme linked immune sorbent assay
GR	**:** Glucocorticoid receptors
HTN	**:** Hypertension
IGF	**:** Insulin-like growth factors
IVH	**:** Intraventricular hemorrhage
LMP	**:** Last menstrual period
NIH	**:** National Institute of Health
NSAIDS	**:** Non-steroidal anti-inflammatory drugs
NTIS	**:** Non-thyroidal illness syndrome

NVD **:** Normal vaginal delivery

PROM **:** Premature rupture of membranes

RDS **:** Respiratory distress syndrome

SD **:** Standard deviation

SGA **:** Small for gestational age

SMFM **:** Society for Maternal Fetal Medicine

SPSS **:** statistical analyses were performed using

TBG **:** Thyroxine-binding globulin

TG **:** Thyroglobulin

TRH **:** TSH releasing hormone

TSH **:** Thyroid stimulating hormone

WHO **:** World Health Organization

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ABSTRACT

Background: Antenatal steroids (ANS) are used widely for women at risk of preterm delivery. Evidence on the effects of ANS on thyroid hormone function in preterm infants is limited. There is no evidence on comparative effects of no ANS, one dose of ANS (partial), or two doses of ANS (complete) on thyroid hormone function among preterm infants.

Aim of the study: To study the effect of antenatal steroids on thyroid functions in late preterm infants on third to seventh day of life.

Patients and Methods: Comparative Cross-Sectional study was conducted on 90 neonates admitted in NICU in the first week of life. They were divided according to exposure to antenatal steroids to three groups. First group: exposed to complete course of ANS. Second group: exposed to partial course of ANS. Third group: not exposed to ANS.

Results: The study showed that there was significantly higher serum T4 levels in group A (who exposed to complete course) compared to group B (partial course) and C (Third group). While, there were no significant differences in serum TSH, T3 levels between groups.

Conclusion: Antenatal corticosteroids can influence thyroid function in late preterm infants as serum T4 was significantly higher in infants exposed to complete course compared to those who were exposed to partial course or did not receive antenatal corticosteroids.

Keywords: antenatal steroids, thyroid function, preterm

Introduction

Preterm infants have an increased incidence of complications and mortality roughly proportional to the degree of prematurity. Infants born >34 weeks and <37 weeks are considered late preterm, infants born >32 weeks and < 34 weeks are considered moderate preterm, infants born >28 weeks and < 32 weeks are considered very preterm. Infants born < 28 weeks are considered extremely preterm **(Shapiro-Mendoza and Lackritz, 2012).**

The use of antenatal steroids (ANS) has been associated with reductions in serious adverse outcomes of prematurity **(Roberts et al., 2017).**

The administration of ANS is very effective intervention in improving neonatal respiratory outcome after preterm birth **(Travers et al., 2017).**The beneficial effect of ANS is dose-dependent, with maximal benefit associated with a complete course of ANS **(Chawla et al., 2016).**

Thyroid hormone is essential for the regulation of intrauterine homeostasis, and for the timely differentiation and maturation of fetal organs. These hormones play complex roles during fetal life. They serve to modulate the functional adaptation for extra uterine life during the perinatal period. Abnormalities of thyroid gland function result not only in the metabolic consequences of thyroid dysfunction, but in unique effects on the growth and maturation of these thyroid hormone-dependent tissues ***(Chung, 2014).***

Postnatal thyroid function of preterm infants differs from that of term Infants. Thyroid dysfunction is common among premature Infants (**Kaluarachchi et al., 2017)**. The dramatic rise in serum TSH 30 to 60 minutes following delivery is reduced in preterm infants as compared to term infants, generally in proportion to their degree of prematurity **(Murphy et al., 2004).**

After birth, neonate must rapidly convert from the fetal state of predominant thyroid hormone inactivation to a state of relative hyperactivity; this is initiated by abrupt increase in hypothalamic TSH releasing hormones (TRH) and pituitary TSH secretion. The cold-stimulated TRH-TSH surge is short lived and peaks at 30 minutes, with peak concentration as high as 60-70 mu/1, after that serum TSH concentration progressively decrease to normal infant level by 3 to 5 days, while serum free **T4** levels remain elevated for several weeks ***(Brown, 2012).***

Many factors affecting thyroid function as gestational age, gender, mode of delivery, birth weight, birth order, Apgar score at 5 minutes, the development of respiratory distress syndrome (RDS) requiring surfactant supplementation, history of surgical procedures which needed antiseptics containing iodine, antenatal administration of dexamethasone, cold exposure, use of morphine, dobutamine or dopamine on the day which thyroid function test was performed and nutritional status from the until tolerable feeding ***(Chung et al., 2009).***

Aim of the Work

To study the effect of antenatal steroids on thyroid functions in late preterm infants on third to seventh day of life.

Antenatal Corticosteroids

Administration of maternal antenatal corticosteroids (ACS) is a well-adopted practice for preterm pregnancies death, neonatal death, RDS, and intra ventricular hemorrhage (IVH) **(Mc Goldrick et al., 2020).**

Type and dose of antenatal corticosteroids

Two types of corticosteroids are used antenatal to facilitate lung maturation: betamethasone and dexamethasone. The cellular mechanisms of corticosteroids in facilitating lung maturation involve the induction of pulmonary beta-adrenergic receptors, acceleration of the development of type 1 and 2 pneumocystis, and up regulation of gene expression for the epithelial Na+ channel. This leads to increased surfactant production and excretion which allows for improvement in gas exchange and lung mechanics, and increased absorption of alveolar fluid prior to delivery **(Htun et al., 2021).**