Effects of Oxytocin and I.V. Glucose 5% Infusion During Labor on Neonatal Serum Sodium, Glucose and Bilirubin Levels

Thesis

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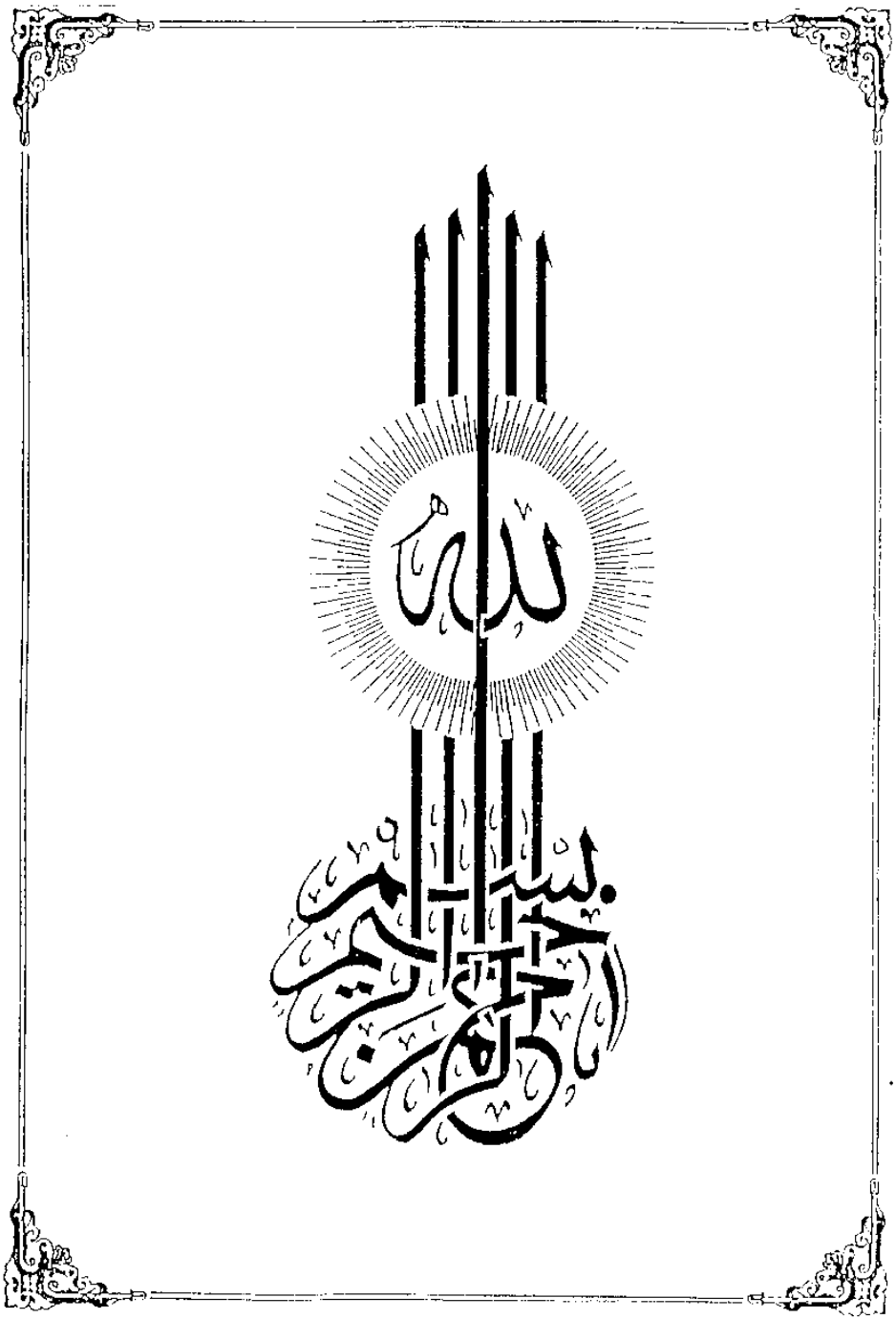

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Introduction

INTRODUCTION

During the past decade there has been a debate, on whether the incidence of neonatal jaundice is increasing and if it is whether the rise can be attributed to the growing number of induced and accelerated labors, a higher incidence of neonatal jaundice associated with the use of oxytocin has been found by some workers who have suggested that oxytocin might be a causal factor whereas others could not demonstrate any such association (Lange et al., 1982).

It seems that the possible effect of oxytocin, on serum bilirubin level of newborn infants depend on the dose of oxytocin used for the induction or acceleration of labor high dose or prolonged oxytocin infusion are associated with progressive increase in serum bilirubin level (Beezly and Alderman, 1975).

Neonatal and maternal hyponatremia have been described following oxytocin infusion during labor, this hyponatremia is caused by infusion of aqueous glucose, used as a vehicle for oxytocin or due to the antidiuretic effect of oxytocin or both (Singhi et al., 1985).

Aim of the work

Study the relationship between Oxytocin and I.V glucose 5% infusion during labor and serum bilirubin level, serum sodium and glucose in neonates and their clinical conditions.

Review of Literature

OXYTOCIN

HISTORY

In 1909, Blair Bell, a pioneer in so many areas of Obstetrics, was the first to employ extracts of the whole posterior lobe for the clinical stimulation of uterine activity, a few years later, Waston recommended its use for the induction of labor (Watkins, 1986).

In 1928, Kamm and Colleagues achieved the separation of oxytocin from the pressor ADH fraction of the posterior lobe, the next important advance was Theobald's recommendation that more precise control could be achieved by intravenous administration of dilute solutions of oxytocin (Watkins, 1986).

In 1957, Du Vigneaud synthesized oxytocin, this was the first successful synthesis of biologically active peptide (Watkins, 1986).

In 1954, a Nobel Prize was awarded to Du Vigneaud for these studies, it was demonstrated that a single peptide structure could have more than one biological action (Devlin, 1986).

CHEMICAL NATURE

Oxytocin is a polypeptide containing-9-aminoacids, the amino acid sequences are:
Cys-Tyr-Ile-Gen-Asn-Cys-Pro-Leu-Gly NH_2 (Guyton, 1991).

SYNTHESIS

Oxytocin is synthesized in neural cells of specific hypothalamic nuclei. Large peptide precursors are formed which are cleaved to smaller peptides called neurophysins, each specific for vasopressin and oxytocin, the complex of vasopressin-neurophysin and oxytocin-neurophysin streams down the axon of nerve cells to the posterior lobe of pituitary, they are stored in non-covalent association in vesicles and are released by appropriate stimuli (Devlin, 1986).

ACTION

(1) Uterus:

Oxytocin is a powerful stimulant to the pregnant uterus especially towards the end of gestation. Therefore many obstetricians believe that this hormone is at least partially responsible for affecting birth (Guyton, 1991).

During pregnancy, an enzyme (amino-peptidase) appears that is capable of rapidly destroying this hormone (Mayers et al., 1980).

Non pregnant and early pregnant uteri are relatively but not absolutely refractory to oxytocin, as pregnancy advances into the third trimester, the uterus becomes increasingly responsive to oxytocin (Watkins, 1986).

(2) Breast:

Oxytocin plays an important role in lactation. It causes milk to be expressed from the alveoli into the ducts so that the body can obtain it by suckling (Guyton, 1991).

(3) Renal Effect:

Synthetic oxytocin appears to induce antidiuresis without changing the excretion of urinary electrolytes. Some authors reported that oxytocin causes fall in renal plasma flow and glomerular filtration rate in pregnant women at term but others doubt that oxytocin influences renal hemodynamics (Munsick, 1970).

(4) Cardiovascular System:

Oxytocin appears to have a transient relaxing effect on the smooth muscles, resulting in decrease in systolic and diastolic blood pressure, flushing and increase in brain blood flow (Mayres et al., 1980).

SYNTHETIC PREPARATIONS OF OXYTOCIN

1- Buccal Tablets - 100 and 200 units.

2- Lingual Tablets - 10 units.

3- Nasal Solution - 100 units/ml.

4- Nasal spray - 40 units/ml.

5- Injectable - 2, 5, 10 units/ml.

(Mayers et al., 1980).

ROUTES OF ADMINISTRATION

It can be given by any parenteral route including intranasal application (Mayers et al., 1980).

Oxytocin is effective when given, intravenous, intramuscular, intranasal, buccal, but it is not effective orally, the half-life of intravenous infused oxytocin is very short perhaps 3 minutes (Pritchard et al., 1985).

The best method of administration is by an automatic pump which adjust to the intrauterine pressure, but can be given by ordinary infusion (Govan et al., 1986).

USES OF OXYTOCIN

(1) Induction of Labor:

Watson was the first one used oxytocin in induction of labor, the response to oxytocin depends upon the duration of pregnancy, the favourability for induction, the dose rate of oxytocin infusion. The sensitivity of the pregnant uterus increases throughout pregnancy, the maximum sensitivity is not reached until a few hours before the

onset of spontaneous labor, there is also variability in sensitivity from patient to patient (Theobald, 1971).

(2) To Speed Labor:

Ten I.U. of oxytocin are thoroughly mixed with one liter of aqueous solution usually 5% glucose in water or, preferably, a balanced salt solution, more dilute solutions can be prepared by doubling the amount of diluent or halving the amount of oxytocin, the mixture (10 units per liter) is easy to prepare, safe, effective and likely to cause the least confusion in preparation and administration, since the oxytocin solution is 10 mu/ml, its rate of flow is easily calculated, the mother should never be left alone while the oxytocin infusion is running, the uterine contractions must be evaluated continually and the flow shut of immediately if they exceed 1 minute in duration or if the fetal heart rate decelerates significantly (Pritchard et al., 1985).

(3) Post-Partum Hemorrhage:

Most often 30 units of oxytocin in 1000 ml of lactated Ringer solution or normal saline proves effective when administered intravenously at approximately 10 ml per minute simultaneously with effective massage of the uterus (Pritchard et al., 1985).

CONTRAINDICATIONS OF OXYTOCIN

Oxytocin should rarely be given to undelivered women of high parity, a trial of labor in the presence of cephalopelvic disproportion or abnormal presentation, and of marked uterine over distension such as gross hydramnios, a large singleton fetus, or multiple fetuses or hypertonic uterus also there must be no evidence of mechanical obstruction, uterine scar as C.S. or extensive myomectomy and cervical scoring (Pritchard et al., 1985).

COMPLICATIONS OF OXYTOCIN

A. Maternal Complications:

1- Rupture of uterus:

Currently the most common cause of rupture is previous C.S. and the next common cause is probably stimulation of labor with oxytocin, unfortunately, administration of oxytocin in the first or second stage of labor has been a rather common cause of traumatic rupture especially in women of high parity (Awias and Lebherz, 1970).

2- Uterine atony and atonic post-partum hemorrhage:

It is more liable to occur especially in multipara, overdistended uterus and exhausted myometrium by vigorous labor, prolonged or pharmacologically stimulated labor (Pritchard et al., 1985).