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and normal zinc level to examine the change in serum zinc level before and after exclusion of phototherapy and the causes of neonates was born with decrease serum zinc level may be maternal causes. (Boskabadi 2021). Confirmad that The level of zinc in the umbilical cord blood was found to be lower in icteric infants (newborns with hyperbilirubinemia) suggesting that zinc deficiency in newborns can be a risk factor for neonatal hyperbilirubinemia.

Phototherapy is an effective therapeutic modality of treatment for neonatal pathological Hyperbilirubinemia. Zinc salts can decrease the duration of phototherapy via the precipitation of unconjugated bilirubin in the intestine. One cohort study revealed that zinc and bilirubin levels are inversely correlated in neonates with marked hyperbilirubinemia. (Mosayebi et.al. 2016). In our study there was: No significant difference between the studied groups regarding duration of neonatal phototherapy with mean 4.4± 1.0, 4.3± 0.9 this is against the study of Mosayebi et.al where the duration was 2.4± 0.6 days. (Mosayebi et.al., 2016).

Regarding admission zinc there was no significant correlations between serum zinc before phototherapy and total serum bilirubin level this is agreement with (Abd El- Magid 2021) et.al who show that there was negative correlation between serum bilirubin and serum Zinc level before phototherapy this result is in agreement with Ali et.al. who showed that there was a negative correlation between serum zinc and TSB. As well, Ali et.al reported that zinc deficiency in jaundiced neonates was statistically significant more than in healthy neonates (Ali Z et.al., 2016).

The mechanism could underlie the observed relation between zinc and bilirubin levels investigated previously as in vitro studies showing that zinc salts that precipitate unconjugated bilirubin at physiological pH, because the chemical structure of bilirubin has the potential to chelate with metal ions, such as zinc. This agrees with previous findings that showed an inverse relationship between the levels of unconjugated bilirubin and serum zinc (Dabour et.al., 2020).

In this study there was No significant correlations between admission Zinc and maternal age, birth weight, admission weight, head circumference, and length. These is agreement with Daniali et.al. (2020) who found that maternal age and anthropometric measures of neonates had no correlation with serum zinc concentration. However, normal birth weight was positively correlated with serum zinc level.

Some studies from developing countries like Tanzania (Rwebembera et.al., 2006) and India. (Elizabeth et.al., 2008) showed a positive correlation between zinc level and birth weight. However, there was not any association between serum zinc levels and birth weight in some studies. (Akman I et.al., 2005). reported that Zinc plays both the structural and enzymatic roles in many proteins. A part of teratogenic effects of zinc deficiency can be due to the changes in the activity of proteins in the embryo These controversial findings might be because of differences in the study design and in the populations studied.(Dabour, 2020 et.al).

Moreover, the role of other minerals and their conjugative or cumulative effects, as well as their interactions with zinc in this regard, should be investigated.

By considering that birth weight is one of the most important health indicators; confirmation of the association of this factor and zinc concentration, and depletion of zinc during pregnancy, it seems that of zinc concentration among pregnant mothers and administration of this element to zinc- deficient mothers is necessary and will have a dominant effect on maternal and fetus health (Daniali et.al., 2020), .

Zinc deficiency was 103.6± 7.9 in case group and 126.0± 4.0. in a control group these agreed with Reda Alia et.al who show that Serum zinc level (ug/dl) (mean±SD) 100± 36.56 in case group, and 128.62± 40.83 in a control group. This agreed with Al- Hajjiah Nasma (2019).

As in the present work, no significant association between neonatal jaundice and gestational age and parity these agree with Al- Hajjiah Nasma (2019) showed no significant association between neonatal jaundice and gestational age or parity (P> 0.05). Also, Boskabadi et.al. showed similar results. The same authors reported that there was no statistically significant association between level serum zinc and each of weight, sex, serum bilirubin, and maternal age which is consistent with Ali et.al. (2010). In the current study, breast feeding initiation day are equal in both group of study.w hile in (Ali, 2020) with significantly lower serum zinc levels among breast- fed when compared to formula fed neonates. deficient zinc in cases (57.9%) and deficient zinc in control (80%), (Boskabadi H. 2015). Thus, zinc supplementation is recommended for pregnant mothers (Ali et.al., 2018) study reported that Zinc deficiency was 88.4% in breast fed infants. A study conducted by (Wessels and Brown, 2012). demonstrated that about 37.3% of the global population is at risk of inadequate Zinc intake It is concluded that the prevalence of Zinc deficiency in exclusively breast fed may be put on Zinc Supplementation (Wessels and Brown, 2012).

Recommendation:

Our recommendation is to make more studies on relation of serum zinc and serum bilirubin in healthy and jaundiced neonates.

Conclusion:

Phototherapy has an impact on serum zinc level. this study indicated that zinc may have a close relation with neonatal jaundice.

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Table (8) Correlation between postdischarge serum Zinc levels and other maternal& neonatal variables

Variables	Postdischarge Serum Zinc Levels			
	Group (1) Low Zinc (N= 60)		Group (2) Normal Zinc (N= 60)	
	r	P- Value	r	P- Value
Age	0.080	0.543	−0.037	0.777
GA	0.167	0.203	0.057	0.664
Admission Age	−0.083	0.528	0.112	0.393
Birth Weight	0.145	0.268	0.279	0.310
Admission Weight	0.016	0.906	0.298	0.210
Head Circumference	−0.066	0.614	−0.035	0.790
Length	−0.033	0.802	−0.175	0.182
Hemoglobin	−0.176	0.178	−0.043	0.745
TLC	0.020	0.880	−0.081	0.536
Platelets	0.158	0.227	0.199	0.127
Total Bilirubin	−0.116	0.377	0.152	0.245
Direct Bilirubin	−0.040	0.762	0.168	0.198
Duration Of Phototherapy	0.020	0.881	0.216	0.097

Pearson correlation. r: Correlation coefficient.*Significant.

Table (8) shows that: No significant correlations between discharge Zinc and other maternal& neonatal variables.

Discussion:

The essential role of zinc has been shown in a wide range of cellular processes including electron transport, cell proliferation, reproduction, immune functions and defense against free radicals (Powell, 2000) as well as genetic stability and function. Approximately 25% of the zinc is found in the cell nucleus and a large amount of zinc supplied in vitro is incorporated in the nuclei (Ames and Wakimoto, 2002).

Zinc deficiency also downregulated several mitochondrial electron transport chain proteins. Several studies have shown that an impairment of mitochondrial electron transport chain components can increase oxidant release and oxidative stress (Atamna et.al., 2002). Zinc is a component of many proteins in the mitochondrial transport chain and deficiency could result in the release of oxidants (Ye et.al., 2001). Thus, mitochondrial disruption may account for the source of increased oxidative stress with zinc loss.

Approximately 10% of the United States population ingests< 50% of the RDA. The (Recommended Dietary Allowance) for zinc and are at risk for at least marginal zinc deficiency. Vegetarians and individuals consuming foods such as cereals and legumes containing zinc- binding phytates are at the highest risk for developing zinc deficiency. Through the use of genomics combined with functional assays, we observed that zinc deficiency induced oxidative stress, but at the same time compromised the cells' ability to deal with this stress. A large portion of the population possibly being at risk for developing cancer as a result of zinc deficiency underscores the importance of proper nutrition in its prevention (Wakimoto and Block, 2001).

This research was designed to assess the amount of serum zinc in neonates with indirect hyperbilirubinemia. Zinc (Zn) is considered a critical trace element with a range of biological effects depending on its structural and catalytic role in a large number of enzymes and "Zn- finger" proteins (Ali et.al., 2020).

Serum zinc deficiency can result in the development of deficient enzymes that act in the metabolism of bilirubin. (El- Mazary AA et.al., 2017). Zinc salts will potentially inhibit bilirubin and its enterohepatic circulation by precipitating unconjugated bilirubin in the intestine (Mosayebi et.al., 2018). Zinc may result in deficient synthesis of various enzymes that play a role in the metabolism of bilirubin, in particular the Z and Y proteins, resulting in neonatal jaundice (Abdel Aziz et.al., 2018).

With respect to demographic data of studied groups, In our study the percentage of male to female in zinc group was 41.7, 58.3 in low- zinc group and 48.3, 51.7 in normal- zinc group respectively this is against the Boskabadi et.al. (Boskabadi et.al., 2015) who reported that male to female ratio was (1.2: 1) and Sharaf et.al. who reported that male to female ratio was (1.3: 1) with male predominance, and with Ali et.al who reported that male to female ratio was 1.2 to 1. In fact, male newborns are always more susceptible to neonatal jaundice, although the cause remains unknown (Sharaf et.al., 2020).

In our study the mean gestational age in low zinc group was 38.8± 0.7 and in normal zinc group was 39.0± 1.2 that agreed with Ali et.al who reported that.

The mean gestational age in cases was 38.15± 1.19 week and in control group was 38.13± 1.11 week that was comparable to the study of Tan et.al. (Tan et.al., 2015) who reported GA of 38.48± 1.15 week in cases and 38.15± 1.03 week in control group.

The difference of gender, gestational age and age between cases and controls were statistically nonsignificant. This was in agreement with AlHajjiah Nasma [6] (Al-Hajjiah Nasma, N 2017), Boskabadi et.al. (Boskabadi H 2019) [3] and Tan et.al. [15] (Tan H. et.al 2000).

Most of cases and control group was delivered by LSC/S (lower segment caesarian section) 58.3, 70.0% respectively while 41.7 of cases and 30 of control was delivered SVD and this was in agreement with the study of Tavakolizadeh et.al. (Tavakolizadeh et.al., 2018).

before and after phototherapy serum zinc were significantly lower in low Zinc So, Zinc was not significantly decreased in group (2) after phototherapy No significant difference between the studied groups regarding Zinc reduction. This came in agreement with (Abd El- Magid et.al 2021) who revealed that the mean zinc levels before and after phototherapy showed no statistically significant difference (El-Mazary et.al., 2017).

Zinc prevents the lipid depolarization of the cell membranes and hypozincemia may modulate the erythrocyte membrane resulting in deficient synthesis of assorted enzymes that play a role in the bilirubin metabolism. Also hypozincemia may cause structural defects in the erythrocyte membranes resulting in hemolysis (Aziz et.al., 2018). It may result in deficient synthesis of assorted enzymes that play a role in the bilirubin metabolism, especially the Y and Z proteins and as a result could lead to indirect hyperbilirubinemia (Ali et.al., 2020).

In these study our samlples was neonates with low serum zinc level

correlations tested using Pearson test. The level of significance was taken at P value< 0.050 was significant, otherwise was non significant.

Results:

Table (1) Comparison regarding to maternal and neonatal demographic characteristics

Variables	Measures	Group-1 (no= 60)	Group-2 (no= 60)	P- Value
Age (Years)	Mean± SD	26.8± 3.4	25.9± 3.7	^0.134
	Range	19.0- 35.0	19.0- 38.0	
Consanguinity (+Ve)		9 (15.0%)	6 (10.0%)	#0.408
Mode Of Delivery	NVD	25 (41.7%)	18 (30.0%)	#0.183
	CS	35 (58.3%)	42 (70.0%)	
Neonatal Gender	Male	25 (41.7%)	29 (48.3%)	#0.463
	Female	35 (58.3%)	31 (51.7%)	
Ga (Weeks)	Mean± SD	38.8± 0.7	39.0± 1.2	^0.302
	Range	37.0- 40.0	37.0- 41.0	
Admission Age (Hr)	Mean± SD	43.0± 19.8	38.8± 22.9	^0.284
	Range	12.0- 96.0	10.0- 96.0	
Feeding	Breast	35 (58.3%)	32 (53.3%)	#0.822
	Bottle	16 (26.7%)	19 (31.7%)	
	Mix	9 (15.0%)	9 (15.0%)	
Breast Feeding Initiation Day	Mean± SD	1.3± 0.5	1.3± 0.5	^0.812
	Range	1.0- 2.0	1.0- 2.0	

^Independent t- test. #Chi square test.

Table (1) shows that: No significant difference between the studied groups regarding maternal and neonatal demographic characteristics; maternal age, mode of delivery, neonatal gender, gestational age at delivery, age at admission, feeding and breast feeding initiation day.

Table (2) Comparison regarding to neonatal anthropometric characteristics

Variables	Measures	Group (1) (N= 60)	Group (2) (N= 60)	P- Value
Birth Weight (Kg)	Mean± SD	3.5± 0.3	3.4± 0.3	0.215
	Range	3.0- 4.3	3.0- 4.0	
Admission Weight (Kg)	Mean± SD	3.4± 0.3	3.4± 0.3	0.501
	Range	3.0- 4.0	3.0- 4.0	
Head Circumference (Cm)	Mean± SD	34.6± 0.6	34.7± 0.8	0.150
	Range	33.0- 35.5	33.0- 36.0	
Length (Cm)	Mean± SD	47.6± 1.5	47.4± 1.2	0.354
	Range	45.0- 50.0	45.0- 50.0	

^Independent t- test.

Table (2) shows that: No significant difference between the studied groups regarding neonatal anthropometric characteristics; birth weight, admission weight, head circumference and height.

Table (3) Comparison regarding to maternal and neonatal blood group

Variables	Group	Group (1) (N= 60)	Group (2) (N= 60)	#P- Value
Maternal	A+	37 (61.7%)	35 (58.3%)	0.951
	B+	3 (5.0%)	3 (5.0%)	
	O+	20 (33.3%)	22 (36.7%)	
Neonatal	A+	37 (61.7%)	35 (58.3%)	0.951
	B+	3 (5.0%)	3 (5.0%)	
	O+	20 (33.3%)	22 (36.7%)	

#Fisher's Exact Test.

Table (3) shows that: No significant difference between the studied groups regarding maternal and neonatal blood group.

Table (4) Comparison regarding to neonatal laboratory findings

Lab	Measures	Group (1) (N= 60)	Group (2) (N= 60)	P- Value
Hemoglobin (gm/dl)	Mean± SD	14.6± 1.5	14.3± 1.1	0.251
	Range	11.5- 17.4	12.4- 16.3	
TLC (x10^3/ml)	Mean± SD	9.7± 0.9	9.4± 0.8	0.134
	Range	8.3- 11.8	8.2- 11.3	
Platelets (x10^3/ml)	Mean± SD	469.5± 66.0	455.5± 70.4	0.264
	Range	314.0- 590.0	322.0- 650.0	
Total bilirubin (mg/dl)	Mean± SD	14.8± 1.9	14.2± 2.4	0.146
	Range	12.5- 18.1	13.4- 17.8	
Direct bilirubin (mg/dl)	Mean± SD	0.6± 0.3	0.6± 0.3	0.334
	Range	0.2- 1.5	0.1- 1.3	

^Independent t- test.

Table (4) shows that: No significant difference between the studied groups regarding neonatal laboratory findings; hemoglobin, TLC, platelets and total& direct bilirubin.

Table (5) Effect of phototherapy on serum zinc levels (microgram/dl)

Time	Measures	Group (1) (N= 60)	Group (2) (N= 60)	^P- Value (Groups)
Before Photo	Mean± SD	104.4± 7.7	126.6± 3.9	<0.001*
	Range	90.0- 120.0	121.0- 137.0	
After Photo	Mean± SD	103.6± 7.9	126.0± 4.0	<0.001*
	Range	89.0- 120.0	120.0- 137.0	
#Change	Mean± SD	−0.8 ± 0.9	−0.7 ± 0.9	0.352
	Range	−3.0- 0.0	−3.0- 0.0	
§p- value (times)		<0.001*	<0.001*	

#Change= Discharge- admission, negative values indicate reduction.
^Independent t- test (comparison between groups).§Paired t- test (comparison between admission and discharge).*Significant.

Table (5) shows that: before and after phototherapy serum zinc were significantly lower in low ZINC group (1). So, zinc was not significantly decreased in group (2) after phototherapy No significant difference between the studied groups regarding Zinc reduction.

Table (6) Comparison regarding duration of neonatal phototherapy (days)

Variables	Measures	Low Zinc (N= 60)	Normal Zinc (N= 60)	^P- Value
Duration of neonatal phototherapy (days)	Mean± SD	4.4± 1.0	4.3± 0.9	0.779
	Range	2.0- 7.0	2.0- 6.0	

^Independent t- test.

Table (6) shows that: No significant difference between the studied groups regarding duration of neonatal phototherapy (days).

Table (7) Correlation between serum Zinc levels on admission and other maternal& neonatal variables

Variables	Admission Zinc			
	Group (1) Low Zinc (N= 60)		Group (2) Normal Zinc (N= 60)	
	r	P- Value	r	P- Value
Age	0.095	0.471	-0.049	0.708
GA	0.165	0.207	0.040	0.764
Admission Age	−0.069	0.601	0.076	0.565
Birth Weight	0.138	0.294	0.274	0.034
Admission Weight	0.003	0.980	0.289	0.025
Head Circumference	−0.042	0.751	−0.045	0.735
Length	−0.044	0.740	−0.115	0.383
Hemoglobin	−0.156	0.235	−0.039	0.770
TLC	0.043	0.743	0.007	0.956
Platelets	0.157	0.232	0.260	0.045
Total Bilirubin	−0.117	0.375	0.153	0.243
Direct Bilirubin	−0.026	0.842	0.120	0.362
Duration Of Phototherapy	0.005	0.969	0.182	0.165

Pearson correlation. r: Correlation coefficient.*Significant.

Table (7) shows that: No significant correlations between admission Zinc and other maternal& neonatal variables.

Ballard score (Ballard et.al 1991).

e. Clinical examination: to exclude any disease or congenital anomalies may affect growth.

f. Anthropometric Measurement: weight, length, head circumference (HC).

Methods:

1. Detailed History Taking Including:
   a. Perinatal history (including: prenatal, natal, postnatal history). Socio- demographic history (including: social class, housing and education level).
   b. Maternal medication and obstetric history, Mode of delivery and outcome of pregnancy, consanguinity. Age of initiation of breast feeding, hyperbilirubinemia in previous sibling.
   c. Estimation Of gestational age; Estimation of gestational age based on obstetric estimation, postnatal dates. All neonates underwent a gestational age examination using Ballard score.
   d. Clinical examination: to exclude any disease or congenital anomalies may affect growth.
   e. Anthropometric Measurement: weight, length, head circumference (HC). Recording of duration of staying on phototherapy and time of discharge for each case.
2. Laboratory Investigation:
   a. CBC with differential including: (Hemoglobin (gm/dl), White blood cells (103), Platelets (x103).
   b. Reticulocyte Count.
   c. Total bilirubin (mg/dl).
   d. Direct bilirubin (mg/dl).
   e. Crp.
   f. Maternal and fetal blood group and RH typing.
   g. Direct Combs Test.
   h. Free T3, T4 and TSH.
   i. Serum Zinc:
      - Diluting serum samples (100µl) 50- folds in 1% HNO_3, it makes a total volume of 5ml. The calibrator, control and sample were prepared and run on the equipment. Using software, the calibration curve were generated and automatically the results were calculated.
      - Zinc concentrations were measured with flame atomic absorption spectrophotometry using trace- element free procedures. Normal level of serum zinc level is (80- 120µg/ dL) (Ryu Aydemir, 2020).
   j. Microwave Digestion: Samples were digested in an acid solution using Anton- Paar microwave digestion system (Multiwave PRO) using 5ml of 65% HNO_3 as acid reagent.

Determination of metal ions was done using the Agilent 5100 Synchronous Vertical Dual View (SVDV) ICP- OES, with Agilent Vapor Generation Accessory VGA 77. All samples were digested to have acceptable matrix for measuring and to provide acceptable and consistent recovery compatible with the analytical method (DeJarnett et.al., 2018). For each series of measurements intensity calibration curve was constructed composed of a blank and three or more standards from Merck Company (Germany). Accuracy and precision of the Strontium ions measurements were confirmed using external reference standards from Merck, and standard reference material and quality control sample from National Institute of Standards and Technology (NIST), were used to confirm the instrument reading.

(DeJarnett et.al., 2018)

Ethics:

Informed consent was taken from the parents.

Statistical Methods:

The collected data were coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 22.0, IBM Corp., Chicago, USA, 2013. Quantitative normally distributed data described as mean± SD (standard deviation) and minimum& maximum of the range after testing for normality using Shapiro- Wilk test, then compared using independent t- test for unpaired variables, and paired t- test for paired variables. Qualitative data described as number and percentage and compared using Chi square test, and Fisher's Exact test for variables with small expected numbers. While

Introduction:

Neonatal jaundice or neonatal hyperbilirubinemia results from elevated total serum bilirubin (TSB) and clinically manifests as yellowish discoloration of the skin, sclera, and mucous membrane. The term jaundice derives from the French word "Jaune", which means yellow. It is the most commonly encountered medical problem in the first two weeks of life and a common cause of readmission to the hospital after birth (Ullah et.al., 2016). Approximately 60% of term and 80% of preterm newborns develop clinical jaundice in the first week after birth. In most cases, it is a mild, transient, and self- limiting condition and resolves without treatment referred to as "physiological jaundice". However, it is imperative to distinguish this from a more severe form called "pathological jaundice". Failure to identify and treat this entity may result in bilirubin encephalopathy and associated neurological sequelae (Ansong- Assoku et.al., 2022).

The aim of detecting and treating severe neonatal jaundice is to prevent bilirubin encephalopathy and its chronic sequel (Karimzadeh et.al., 2020).

Such complications increase the importance of finding further treatment for this disease. Phototherapy and exchange transfusion were the treatment of choice in such cases: however, both of these approach have several disadvantages (Qattea, et.al., 2021).

Micronutrients and minerals levels like Zinc, Copper, and Magnesium might affect the process of bilirubin binding proteins or excretion (Aziz, et.al., 2018).

Zinc is one of the most abundant trace elements in humans. Zinc is functional for the activity of a number of proteins (i.e., enzymes, membrane proteins, gene- regulatory proteins, and hormonal receptors) involved in most major metabolic pathways. Zinc interacts with proteins in different ways: by promoting enzymatic processes; by maintaining structure stability, or by favoring interactions with other molecules (i.e., proteins, nucleic acids) (Mehri, 2020). the relation between zinc and bilirubin.

Zinc is an essential micronutrient for human body that mainly absorbed in small intestine. (Hossain et.al, 2020) It is necessary for various enzymatic reaction, cell growth, apoptosis and bilirubin metabolism. (Andree et.al, 2018) Zinc also act as an antioxidant and contribute to protection of oxidative stress for maintaining cellular function.

(Marreiro et.al, 2017) Zinc have the ability to regulate the lipid metabolism by activate the peroxisome proliferator- activated receptor- α (PPAR- α) and that may modulate the erythrocyte membrane (Himoto AND Masaki T., 2020) zinc deficiency is responsible for advanced liver disease like cirrhosis, idiopathic hyperbilirubinemia by the mechanism of decreased serum albumin synthesis, increase oxidative stress, diminished hepatic extraction, portosystemic shunts, and losses in urine (Kozeniecki, et.al, 2020) Zinc deficiency in neonatal hyperbilirubinemia may cause the disturbance of bilirubin synthesis due to deficient synthesis of some enzymes and also causes for the destruction of erythrocyte membrane that leads to hemolytic jaundice. (Hossain et.al, 2020).

Metallothioneins (MTs) are the most abundant cysteine- rich proteins containing zinc. These proteins have an important antioxidant activity and stabilize cell membranes only in the presence of zinc (Krężel and Maret, 2017).

Hypothesis:

Our hypothesis states the effect of phototherapy on serum Zn level in term neonates with hyperbilirubinemia. and to evaluate the correlation between the level of serum zinc and neonatal hyperbilirubinemia.

Aim of the study:

This study aimed to determine relation between Zinc serum level and phototherapy in term neonates with hyperbilirubinemia.

Ethical Considrations:

Informed consent was be taken from the parents.

Patient And Methods:

This study include 120 full term neonates during the first week of life with good general condition who visited Almaza neonatal hospital with high level of indirect hyperbilirubinemia indicating admission. They were hospitalized and underwent phototherapy based on guidelines of AAP, 2004 for the treatment of neonatal hyperbilirubinemia during the period from April 2018 till October 2018.

Selection Criteria For Precipitant:

1. Inclusion criteria: Full term neonates with good general condition who visited Almaza hospital only because of indirect hyperbilirubinemia, comprised of gestational age more than 38 weeks, birth weight>2500 gram and Their postnatal ages were less than 7 days total serum bilirubin>12.
2. Exclusion criteria: Premature infant, intrauterine growth restricted (IUGR) infant, congenital anomalies that may affect growth. All cases of, sepsis, severe respiratory disease requiring mechanical ventilation, congenital anomalies were excluded.

- The patients were classified into two groups:
  a. Group (1): 60 jaundiced newborn in the first week of life. Who were hospitalized and were underwent phototherapy and had normal zinc level.
  b. Group (2): 60 jaundiced newborn in the first week of life who were hospitalized and were underwent phototherapy and had low zinc level.
- The patients were subjected to the followings:
  a. Perinatal history (including: prenatal, natal, postnatal history). Socio- demographic history (including: social class, housing and education level).
  b. Maternal medication and obstetric history, Mode of delivery and outcome of pregnancy, consanguinity.
  c. Detailed history: type of feeding (bottle feeding, breast feeding), Age of initiation of breast feeding, hyperbilirubinemia in previous sibling.
  d. Estimation Of gestational age Assessment of gestational age using

A Study of Zinc in full term Neonates with Hyperbilirubinemia and under phototherapy

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Summary

Background: Neonatal hyperbilirubinemia is a common problem occurring in nearly (5- 25)% neonates. In the past few years sixty to eighty percent of newborn presented with jaundice in the first week of life. One third of them need admission for treatment of hyperbilirubinemia.

Aim: This study aimed to determine relation between Zinc serum level and phototherapy in term neonates with hyperbilirubinemia.

Patients& Methods: This study included 120 full term neonates during the first week of life with good general condition who were visit Almaza Neonatal hospital with high level of indirect hyperbilirubinemia indicating admission. They were hospitalized and were underwent phototherapy based on guidelines of (AAP 2004) for the treatment of neonatal hyperbilirubinemia during the period from April 2018 till October 2018. They were divided equally into two groups with 60 jaundiced newborn according to serum zinc level. Patients in the first group were with normal zinc level while the others in the second group suffer from low zinc level.

Results: before and after phototherapy serum zinc were significantly lower in low ZINC group. So, zinc was not significantly decreased in normal zinc group after phototherapy No significant difference between the studied groups regarding Zinc reduction.

Conclusion: Phototherapy has an impact on serum zinc level. This study indicated that Zinc may have aclose relation with the neonatal jaundice.

Key words: Zinc, Full term Neonates, Hyperbilirubinemia, phototherapy.

دراسة الزنك فى الاطفال حديثى الولادة

الذين يعانون زيادة نسبة بيليروبين الدم وتحت العلاج الضوئى

الخلفية: تعتبر زيادة نسبة بيليروبين الدم فى الاطفال حديثى الولادة مشكلة شائعة تحدث فى ما يقرب من (٥- ٢٥)% من الاطفال حديثى الولادة. فى السنوات القليلة الماضية، كما انه أصيب حوالى ٦٠ إلى ٨٠% من الأطفال حديثى الولادة بالصفراء فى الأسبوع الأول من العمر. يحتاج ثلثهم الى دخول المستشفى وتلقى العلاج.

الاهدف: هدفت هذه الدراسة إلى تحديد العلاقة بين مستوى مصل الزنك والعلاج الضوئى عند الاطفال حديثى الولادة المكتملين المصابين بزيادة نسبة بيليروبين الدم.

المرضى والطرق: تضمنت هذه الدراسة ١٢٠ من الاطفال حديثى الولادة خلال الأسبوع الأول من العمر مع حالة عامة جيدة والذين زاروا مستشفى ألماظة لحديثى الولادة مع ارتفاع مستوى نسبة بيليروبين الدم الغيرمباشر. تم إدخالهم إلى المستشفى وخضعوا للعلاج الضوئى بناء على إرشادات (AAP 2004) لعلاج زيادة نسبة بيليروبين الدم عند الأطفال حديثى الولادة خلال الفترة من أبريل ٢٠١٨ حتى أكتوبر ٢٠١٨. تم تقسيمهم بالتساوى إلى مجموعتين ١٢٠ مولودا مصابا الصفراء وفقا لمستوى الزنك فى الدم. كان المرضى فى المجموعة الأولى عددهم ٦٠ مولودا يعانون من انخفاض مستوى الزنك بينما يعانى الآخرون فى المجموعة الثانية مستوى الزنك طبيعى.

النتائج: قبل وبعد العلاج بالضوء كان مستوى مصل الزنك اقل بشكل ملحوظ فى مجموعة ذات مستوى منخفض من الزنك. لذلك، لم ينخفض الزنك بشكل كبير فى مجموعة الزنك الطبيعية بعد العلاج الضوئى.

الخلاصة: العلاج الضوئى له تأثير على مستوى الزنك فى الدم، وقد أشارت هذه الدراسة إلى أن الزنك قد يكون له علاقة وثيقة مع الاصابة بمرض الصفراء عند الاطفال حديثى الولادة.

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