

Hypocalcemia in Jaundiced Term Neonates Undergoing Phototherapy

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ABSTRACT

Objective: frequency of hypocalcemia in jaundiced term neonates undergoing phototherapy.

Methodology: A total of 150 term neonates of either gender who develop jaundice requiring phototherapy are included in this study presenting within first week of life whereas those term jaundiced neonates who are at known risk of developing hypocalcemia, infant of diabetic mother, neonates having history of birth asphyxia, septic neonates, those requiring exchange transfusion and those with hemolytic anemias were excluded from study. The patients were examined thoroughly (complete history and physical examination). Informed consent was obtained to include the data in study. Jaundiced neonate is applied phototherapy and after 48 hrs of phototherapy session, 5ml blood sample is drawn and sent to hospital laboratory for estimation of total serum calcium level. Hypocalcemia (i.e. Calcium level < 8 mg/dl after 48 hours application of phototherapy for jaundice neonatorum) was recorded and managed as per hospital protocol.

Results: Out of 150 cases, 46%(n=69) were in range of 1-3 days while 54%(n=81) were between the range of 4-7 days of life. The common age was 3.59±1.60 days. There were 53.33%(n=80) male while 46.67%(n=70) were female participants. Hypocalcemia was recorded in 20.67%(n=31).

Conclusion: We concluded that the frequency of phototherapy associated hypocalcemia is not very high, however, calcium levels should be monitored as it is a potential but very less studied complication in our clinical settings.

Keywords: Term neonates, jaundice, phototherapy, hypocalcemia

INTRODUCTION

Jaundice neonatorum, the yellowish discoloration of skin and sclera due to hyper-bilirubinemia is one of the most frequent conditions presenting in neonatology unit daily.¹⁻²

According to latest global reports and statistics, 60% of term neonates, gestational age >38 weeks are afflicted with jaundice in 1st 7 days of their life.¹

Hyperbilirubinemia is an issue of concern for physicians due to toxic effect of higher bilirubin level for the development of nervous system and cause impaired neurological and permanent neurodevelopmental handicap even in term newborns.²

Different modalities are used for the management of this issue including; phototherapy, exchange transfusion, Drugs e. g. Phenobarbitone, Metalloporphyrins, IV immunoglobulins and Clofibrate. Phototherapy being easily available and non-invasive therapy has widely been used since long. Its effect to reduce plasma bilirubin concentration is well documented and considered as effective for prevention of neurological sequel.⁴ Nowadays phototherapy has been widely adopted as initial therapy of choice for hyperbilirubinemia.

Phototherapy is mainly composed of blue visible light with a minor component of UV light at wavelength of 380-550 nm which reduces serum bilirubin level by converting bilirubin to excretable products by structural photo-isomerization and photo-oxidation and the principal site of this action is skin and capillary circulation under skin.

A study has shown possible relationship between phototherapy and several complications including; interference of maternal infant interaction, imbalance of

thermal environment and water loss leading to dehydration, diarrhea, disorders of circadian rhythm, skin rash, electrolyte disturbance i.e. hypocalcemia and bronze baby syndrome. Long term side effects which are very rare include allergic rhinitis, conjunctivitis, asthma, melanocytic nevus, skin cancers, patent ductus arteriosus and retinopathy of prematurity.⁴

Electrolyte disturbance i.e. hypocalcemia is a lesser known and less studied but potential complication of phototherapy. Phototherapy causes hypocalcemia by different proposed mechanisms; It decreases secretion of parathormone, urinary calcium excretion increases under phototherapy light, inhibits pineal secretion of melatonin which blocks the effect of cortisol on bone calcium.

The role of calcium is crucial for various biochemical processes like blood coagulation, neuromuscular excitability, cell membrane integrity, function and cellular enzymatic and secretory activity.

Serum calcium levels less than 8mg/dl are defined as neonatal hypocalcemia. It may increase the cellular permeability to sodium ions and increases cell membrane excitability.² It can cause irritability, tremors, muscle cramps, seizures, laryngospasm, increased extensor tone, clonus, jitteriness and apnea in newborns. It may lead to long term complications i.e. physical disability, mental retardation, and educational failure.¹

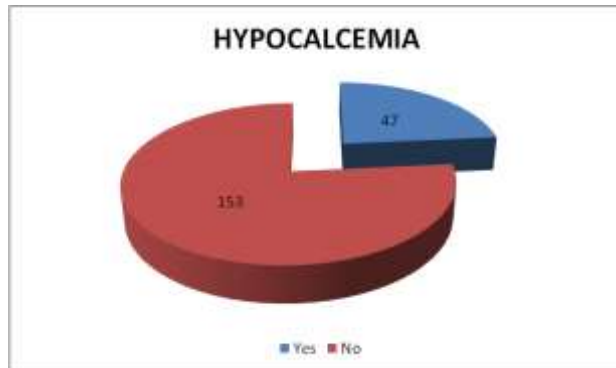
Rationale of study is to check prevalence of hypocalcemia in jaundiced term neonates undergoing phototherapy. Phototherapy induced hypocalcemia is a potential but very less studied complication in our clinical settings as no local study has yet been done to determine

its prevalence, extent of severity and requirement of any intervention for its prevention and treatment as hypocalcemia is completely preventable and treatable. Results of this study determine prevalence of hypocalcemia in our population, its degree of severity and introduction of calcium supplementation in neonates who have to undergo phototherapy as treatment of jaundice. Indian study 2012 shows development of hypocalcemia in 66.6% term neonates [21 and Iranian study 2013 showed 10%]³ prevalence of phototherapy induced hypocalcemia, so conflicting results in different populations raise the need of study in our population.

Qualitative variables like gender and hypocalcemia was discussed in frequency or percentage (%) form. Quantitative variables like age (days, birth weight) and calcium level was discussed in form of Mean+sd.

RESULTS

The data of 150 cases shows 46%(n=69) were in range of 1-3 days while 54%(n=81) were between the range of 4-7 days of life. The mean age was 3.59+1.60 days and mean birth weight was recorded as 3256.74+352.68 grams. There were 53.33%(n=80) male while 46.67%(n=70) were female participants. Hypocalcemia was recorded in 20.67%(n=31).



DISCUSSION

In this study, out of 200 cases, mean age as 3.11+1.68 days whereas male cases were in majority by calculating 58%(n=116) and 42%(n=84) were females, mean birth weight was recorded as 3256.74+352.68 grams while calcium levels were 8.19+1.52. The frequency of hypocalcemia was 23.50%(n=47).

We compared our results with an Indian study 2012 shows development of hypocalcemia in 66.6% term neonates [21 and Iranian study 2013 showed 10%]³ prevalence of phototherapy induced hypocalcemia, so conflicting results in different populations raise the need of study in our population. Our findings are different from Indian study, as they recorded a very high frequency of hypocalcemia.

Another study by Mashal Khan and others⁵ recorded hypocalcemia in 22.76% cases receiving phototherapy.

An Iranian study revealed that 7% of neonates (term) had hypocalcemia after the phototherapy is done.⁶ Another

study reported the 15% and 8.7% respectively.⁷⁻⁸ Jain BK and others are evident that 30% of neonates are recorded with hypocalcemia after receiving phototherapy.⁹ However, another study recorded a significant higher rate of this morbidity i.e. 66.6%² which is in contrast of other studies mentioned above. However, Medhat and others confirmed these figures by recording hypocalcemia in 75% of term neonates after receiving phototherapy session.¹⁰

A 2014 study by Bahbah et al at Egypt studied only 50 neonates at term undergoing phototherapy for the management of jaundice whereas 25 cases were controls with physiological jaundice and no phototherapy done. They are of the view that after 48 hrs of phototherapy 26% neonates had hypocalcemia.¹¹

In summary, it is revealed that evaluation of calcium levels should be necessarily done after >48 hrs of phototherapy and if it is found higher then they may be treated accordingly. It seems that prevalence of phototherapy associated hypocalcemia is not so high in our population but needs further larger studies for estimation of this prevalence rate.

CONCLUSION

We concluded that the frequency of phototherapy associated hypocalcemia is not very high, however, calcium levels should be monitored as it is a potential but very less studied complication in our clinical settings.

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