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Original Research Article

Maternal factors and feeding pattern in neonates admitted with dehydration

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ABSTRACT

Background: Some healthy breast-fed infants do not establish an adequate milk intake, continue to lose weight and may develop dehydration. The aim of the study is to find out the maternal factors and feeding pattern of neonates admitted with dehydration.
Methods: Hospital based prospective study on neonates (>34 week gestation and >2kg birth weight) with signs/symptoms of dehydration and >10% weight loss after birth admitted in the NICU, MBGH, RNT Medical college, Udaipur, Rajasthan, India for period of 12 months from July 2015-June 2016. Sick neonates with sepsis, birth asphyxia and congenital anomalies were excluded. One apparently healthy neonate and mother selected randomly for each study group dehydrated neonate. Ethical clearance and informed consent for the study was taken.
Results: 384 neonates with dehydration were enrolled. Most neonates (96.6%) with dehydration were admitted between Day 3-14 of birth. Dehydration was found in 2.5% caesarean section and 0.8% normal vaginal delivered neonates (p value<0.00001). Dehydrated neonates groups (n=384) was compared with non dehydrated healthy control group (n=384) neonates. Primiparous mothers (p value <0.00001), Pregnancy related complications (p value=0.02), delayed initiation of breast feeding (>1 hour) after birth (p value<0.00001), poor attachment during breast feeding (p value <0.00001), absent let down reflex (p value<0.00001), decreased (<8/day) breast feeding frequency (p value<0.00001), presence of nipple problems (p value<0.001) were more significantly present in dehydrated group as compared to control group. Socioeconomic status, education status and position of mother during breast feeding among mothers in dehydrated group were not significant. 379 neonates were discharged successfully, and 5 neonates expired.
Conclusions: Dehydration is a serious problem in breastfed neonates, and early initiation of breast feeding, with proper counselling of breast feeding practices with breast examination in antenatal as well as postnatal period can help in its prevention.

Keywords: Breastfeeding, Dehydration, Hypernatremia

INTRODUCTION

Healthy term neonates lose an average of 5-10% of their body weight during first 4-7 days of life, thereafter, provided that the milk intake is adequate, a steady pattern of weight gain of approximately 25 g/day is observed.[1] The weight gain may be established more slowly in breast-fed infants if for some reasons, breast-feeding is inadequate. Some breast-fed infants do not establish an adequate milk intake, continue to lose weight and may develop dehydration.[2]

Dehydration is potentially devastating condition. Recent studies have identified breast feeding malnutrition as a key factor in its patho-physiology.[3-5] Early postpartum hospital discharge may leave mother poorly prepared for

breast feeding and may contribute to increase neonatal morbidity because of dehydration.[6] The aim of the study is to find out the maternal factors and feeding pattern of neonates admitted with dehydration.

METHODS

This was a hospital based prospective study on term and near term neonates admitted with dehydration in the NICU of Balchikitsalaya, MBGH, RNT Medical college, Udaipur, Rajasthan, India for period of 12 months from July 2015 to June 2016. All healthy term and near term (>34 weeks of gestation) neonates with birth weight > 2 kg dehydration (with weight loss>10% of birth weight and its clinical manifestations) admitted in NICU of Balchikitsalaya, R.N.T. Medical college, Udaipur were included in the study. Sick neonates with history of birth asphyxia, sepsis, congenital anomalies and neonates <34 weeks of gestation and birth weight < 2kg and those refusing to give consent or withdrawing consent during study period were excluded.

The control group included one apparently healthy neonate and mother selected randomly while attending the post natal wards in our institution at same age range and time, for each study group dehydrated neonate. Detailed maternal history and feeding history using structured Performa were taken from the control group.

Each neonate was thoroughly examined. Weight was recorded using electronic weighing scale sensitive up to 10 grams of weight.

Dehydration was labelled on weight loss >10% of birth weight with signs/symptoms of dehydration like dry mucosa, fever, vigorous sucking/lethargy, decreased frequency of micturation. Status of hydration (skin turgor, fontanel, mucous membranes, urine output) were carefully evaluated. Neonates with septicemia were excluded. (Sepsis ruled out by clinical evaluation and sepsis screening).

Detailed neonatal information was recorded (age in days, sex, birth weight, admission weight) to calculate the percentage of weight loss after birth. Details of birth were recorded (birth weight, gestational age, mode of delivery, feeding history). Details of antenatal history in form of age, weight, educational status, socioeconomic status (assessed by kuppuswamy scale), gravida, parity, pregnancy complications (hypertension, Diabetes mellitus, anaemia, APH, PPH) were recorded. Maternal breast size, nipple condition (retracted, fissured), breast feeding position, let down reflex, time of first breast feeding, frequency of breast feeding, soft breast after feeding, time duration of each breast feed, attachment were recorded.

Each neonate was hydrated and treated as per standard protocol. Data were analysed with student t test and chi square test.

RESULTS

A total of 384 neonates with dehydration were enrolled during study period of 1 year. Among them, 234 were male (60.9%) and 150 (39.1%) were female. Of the 384 babies, 210 (54.7%) were born out of normal vaginal deliveries and 174 (45.3%) neonates were born by caesarean sections. During the study period of 1 year from July 2016 to June 2016, total number of deliveries in PDZH, Udaipur were 17965. Out of which 5414 (30.13%) were caesarean deliveries and 12551 (69.86%) were NVD. Out of 5414 neonates born by caesarean sections, 110 (2.5%) neonates were admitted with dehydration in our inborn NICU. Out of 12551 neonates born out of normal vaginal deliveries, 138 (0.8%) neonates were admitted with dehydration.

Dehydration was more common in neonates born by caesarean section as compared to NVD (P value<0.00001). Among 384 neonates enrolled in the study, 289 (75.3%) neonates with dehydration had weight loss of 10-15% after birth, remaining 95 (24.7%) had weight loss of more than 15% after birth. Among 210 NVD babies, 150 (71.4 %) babies had weight loss of 10 - 15 % after birth and remaining 60 (28.6%) babies had weight loss of more than 15%. Maximum weight loss of 27.73% was observed in one neonate born out of NVD. Among 174 LSCS babies, 139 (79.9 %) babies had weight loss of 10 - 15 % after birth and remaining 35 (20.1%) babies had weight loss of more than 15%. Maximum weight loss of 31.82% was observed in one neonate born by caesarean section. In the dehydrated group, 216 (55.6%) babies were born to parents of lower socioeconomic status (kuppuswamy class 4 and 5), 168 (43.8%) babies were born to parents of middle and upper class (kuppuswamy class 1, 2 and 3). In the control group, 194 (50.5%) babies were born to parents of lower socioeconomic status (kuppuswamy class 4 and 5), 190 (49.5%) babies were born to parents of middle and upper class (kuppuswamy class 1, 2 and 3). There is no difference in socioeconomic status of dehydrated and control group neonates (P value=0.11). Among study population, 94 (24.5%) mothers were illiterate to educated till primary school and 290 (75.5%) mothers had educational qualification between middle school to professional. Among control group, 109 (28.4%) mothers were illiterate to educated primary school and 275 (71.6%) mothers had educational qualification between middle school to professional. There was no difference of educational status in mothers of dehydrated and control group neonates (P value=0.21). 245 (63.8%) mothers in dehydrated group were primiparous and in control group of 384 mother neonate dyad, 177 (46.1%) mothers were primipara. Primiparous mothers were more commonly present in dehydrated group as compared to control group, p value<0.00001. Among study population, 84 (21.8%) mothers had one or other pregnancy related complications like pregnancy induced hypertension (19.5%), eclampsia (0.5%), premature rupture of membranes (1.8%). In control group, 59(15.4%) mothers

had one or other pregnancy related complications like pregnancy induced hypertension (11.3%), eclampsia (1.3%), premature rupture of membranes (2.9%). Pregnancy related complications were more commonly observed among mothers of neonates admitted with dehydration as compared to control group. (Dehydration was more commonly seen in mothers with pregnancy related complications) (P value=0.02).

Regarding feeding history, among 384 neonates, 142(36.98%) were breast fed within first hour of life and 242(63.02%) babies were breast fed after 1 hour of birth. In the control group of 384 neonates, 260(67.7%) were breast fed within 1 hour of life and 124(32.3%) were breast fed after 1 hour of life. Delayed initiation of breast feeding after birth (> 1 hour) was more frequently present in neonates with dehydration as compared to control group neonates (P value<0.00001). Among neonates born out of NVD, 108 (51.4%) initiated breast feeding within one hour of birth while among LSCS babies only 34 (19.6%) initiated breast feeding within one hour of birth. In 102 (48.6%) NVD babies and 140 (80.4%) caesarean babies, breast feeding was delayed more than one hour of birth. The delayed initiation of breast feeding was more frequently present in dehydrated neonates delivered by caesarean sections as compared to dehydrated neonates born out of normal vaginal delivery (P value <0.00001). Out of 384 neonates in study population, 170 (44.3%) of babies were breast fed in lying down position by the mothers and 214 (55.7%) of babies were breast fed in both sitting and lying down position in the control group, 156 (40.6%) were breast fed in lying down position by the mothers and 228 (59.4%) of babies were breast fed in both sitting and lying down position. There was no significant difference in position of mother while breast feeding in dehydrated and control group (p value 0.306). 158 (41.1%) babies had poor attachment during breast feeding and in control group, 82 (21.4%) babies had poor attachment during breast feeding. Poor attachment during breast feeding was more commonly present among neonates with dehydration as compared to control group neonates (P value <0.00001). Those neonates who were poorly attached (latching) could not breast feed effectively and received less amount of breast milk, contributing to neonatal dehydration. 206 (53.6%) mothers had no let down reflex and in control group, 51 (13.3%) mothers had no let down reflex. The absence of let down reflex was more commonly seen in dehydrated group than control group (p value <0.00001). 338(88.02%) babies were given less than 8 feeds a day and in control group, 170 (44.3%) babies were given less than 8 feeds a day.

Table 1: Maternal factors and feeding patterns.

Characteristics	Dehydrated group n=384	Control group n=384	P value
Mode of delivery (inborn) NVD/LSCS	110/138	*5414/12551	0.00001
Socio economic status: Kuppuswamy class (4+5)/ (1+2+3)	216/168	194/190	0.11
Education status: (illiterate-primary)/(middle-professional)	94/290	109/275	0.21
Primiparity	245	177	0.00001
Pregnancy related complications	84	59	0.02
Delayed initiation of Breast feeding > 1 hour	242	124	0.00001
Position of Mother during breast feeding: Lying down/lying down and sitting	170/214	156/228	0.30
Poor attachment during breast feeding	158	82	0.00001
Absent let down reflex	206	51	0.00001
Decreased frequency (<8/day) of breast feed/day	338	170	0.00001
Presence of Nipple problems	106	70	0.001

*number of deliveries (NVD/LSCS) in inborn setting of PDZH, RNT MC, Udaipur, Rajasthan, India

Neonatal dehydration was more frequently seen among neonates who received less than 8 breast feeds per day (P value < 0.00001). 106 (27.6%) mothers had flat/retracted nipples while in control group of 384 mother neonate dyad, 70 (18.2%) mothers had flat/retracted nipples.

The presence of abnormal nipples like flat/retracted/fissured/ were more frequently observed in neonates with dehydration as compared to control group neonates (P value =0.001). All the findings have been briefed in Table 1.

Out of 384 babies in study population, 379 babies were discharged and 5 babies expired during hospital stay. Mortality was 1.3%. 310 (80.7%) babies were discharged on exclusive breast feed. 34 (8.8%) babies were discharged on top feed and 35 (9.1%) babies were discharged on mixed feed i.e. breast feeding plus top feed.

DISCUSSION

A total of 384 Term and near-term neonates were admitted with dehydration. Most of the neonates with dehydration were admitted between 3 to 14 days of birth (96.6%).

Dehydration was more common in neonates born by caesarean section as compared to NVD (P value<0.00001). This may be because of delayed initiation of breast feeding in most of the caesarean delivered babies due to post operative painful conditions and post anaesthesia state. Some studies also showed caesarean section as an important risk factor for dehydration as it is related to failure of effective breast lactation.[7-10]

We found that number of babies with higher weight loss after birth were more in normal vaginal deliveries as compared to caesarean section deliveries. This may be because of early discharge of neonates after normal vaginal delivery and then late reporting for any problem including excessive weight loss, fever, refusal to feed, lethargy and sometimes more complicated forms like seizures, DIC and IVH.

In this study, socioeconomic status of dehydrated group and control group was observed and There was no difference in socioeconomic status of dehydrated and control group neonates (p value=0.11). Reviewing the literature, there is no study comparing prevalence of dehydration in newborn with socioeconomic class. In present study, incidence of dehydration is equally distributed in socioeconomic class 1, 2, 3, 4, 5 (modified kuppuswamy scale). The socioeconomic status of neonates does not play an important part in neonatal dehydration.

On assessing the educational status of mother in both groups, there was no difference of educational status in mothers of dehydrated and control group neonates (P value=0.21). The educational status of mother did not play any role in prevalence of neonatal dehydration. Hanoudi BM in his study observed no significant difference of educational level of mothers in both group of controls and dehydrated group.[8]

Primiparous mothers were more commonly present in dehydrated group as compared to control group, P value <0.00001. (Dehydration was more commonly seen in neonates of primparous mothers).

Primiparous mothers are anxious and they most often are poorly motivated and prepared for breast feeding their infants. Therefore, these mothers should receive proper counselling and more reassurance and practical advice in the technique of breast feeding and should be trained about how to correctly position the baby, appropriately attach it to the breast and observe that suckling is successful.[11,12]

Pregnancy related complications were more commonly observed among mothers of neonates admitted with dehydration as compared to control group. (Dehydration was more commonly seen in mothers with pregnancy related complications, P value=0.02). Boskabadi H et al had demonstrated in their study the same findings.[13] Pregnancy complications during antenatal and postnatal period may affect effective breast feeding to the neonates and hence more prone to neonatal dehydration.

Most of the neonates in dehydrated group were exclusively breast fed and these neonates received inadequate quantity of breast milk either because of multiple factors like poor positioning, poor attachment, nipple abnormality, absent let down reflex, delayed initiation of breast feed, decreased feeding frequency.

Early initiation of breast feeding within one hour of birth has been recommended. Assessing this factor in the study showed that delayed initiation of breast feeding after birth (> 1 hour) was more frequently present in neonates with dehydration as compared to control group neonates (P value<0.00001). Also, the delayed initiation of breast feeding was more frequently present in dehydrated neonates delivered by caesarean sections as compared to dehydrated neonates born out of normal vaginal delivery (P value <0.00001). For all normal newborns (including those by caesarean section) skin-to-skin contact should be initiated in about 5 minutes of birth in order that baby initiates breastfeeding in an hour of birth. The method of 'Breast crawl' can be adopted for early initiation.[14] In case of operative birth, the mother may need extra motivation and support. Skin-to-skin contact between the mother and new born should be encouraged by 'bedding in the mother and baby pair'.

On observing the position of mother during breast feeding in both group, there was no significant difference in position of mother while breast feeding in dehydrated and control group (p value 0.306) and the mothers in both group were able to breast feed the neonates irrespective of their position.

Poor attachment during breast feeding was more commonly present among neonates with dehydration as compared to control group neonates (P value <0.0001). Those neonates who were poorly attached (latching) could not breast feed effectively and received less amount of breast milk, contributing to neonatal dehydration. Each and every mother should be properly counselled and educated regarding the breast feeding in antenatal and postnatal periods. Mothers after delivery should be given practical advices regarding proper attachment and techniques for breast feeding.

The absence of let down reflex was more commonly seen in dehydrated group than control group (p value <0.00001). It was noted that for >50% of mothers with dehydrated neonates there was a delay in the let-down reflex which was due to inadequate ongoing breast

stimulation and drainage. Several factors contribute to inadequate breast stimulation and drainage including difficulty in latching onto the breast, maternal technical difficulties, and breast problems.

Neonatal dehydration was more frequently seen among neonates who received less than 8 breast feeds per day (P value < 0.00001). Baby should be fed "on cues". The early feeding cues include sucking movements and sucking sounds, hand to mouth movements, rapid eye movements, soft cooing or sighing sounds, lip smacking, restlessness etc. Crying is a late cue and may interfere with successful feeding. Babies should be breastfed at least 8 to 10 times in 24 hours till lactation is established (1 to 2 weeks) indicated by frequent urination, stooling and adequate weight gain.[14]

The presence of abnormal nipples like flat/retracted/fissured/ were more frequently observed in neonates with dehydration as compared to control group neonates (P value <0.001). Anatomical breast problems with breast-feeding difficulties such as flat, inverted or big nipples are the major causes of huge engorged breasts, which results in poor milk removal from the breast. It is highly recommended that breast examination during pregnancy (nipple shape and breast growth) and after delivery (breast engorgement, inverted or cracked nipples and mastitis) should be considered as a routine clinical practice to lower the risk of breastfeeding problems.

These factors like delayed initiation of breast feed, poor attachment to breast, decreased frequency of breast feeds in a day, improper positioning, absent let down reflex, breast and nipple abnormality and in addition to these, factors like primiparity and caesarean sections cumulatively lead to inadequate and unsuccessful breast feeding in the neonates and hence these neonates were more commonly affected by neonatal dehydration.

CONCLUSION

Dehydration in exclusively breast feeding healthy neonates is common in first few days after birth. Some breast-fed infants do not establish an adequate milk intake, continue to lose weight and may develop dehydration. Most of the neonates presented with dehydration between Day 3 to day 14 of life. Dehydration was more common in neonates born by caesarean section as compared to NVD but severity of dehydration (weight loss after birth) was more in neonates born out of normal vaginal deliveries as these neonates were discharged earlier and did not have proper follow up after discharge. Daily weighing of neonates in first few weeks after birth is an important tool for objective assessment of adequate breast feeding to neonates. Neonates (63.8%) born to primiparous mothers were more prone to neonatal dehydration as these mothers were anxious and poorly motivated towards breast feeding. Socioeconomic and educational status of mothers did not prove to be factor in neonatal dehydration. Delayed initiation of breast feeding, poor attachment, absent let down reflex, decreased feeding frequency and nipple anomalies (retracted/fissured/sepsis) lead to dehydration. Proper counselling and practical advices in breast feeding especially to primiparous mothers is must to combat neonatal dehydration and its fatal complications. Breast examination during antenatal as well as postnatal period, proper counselling on breast feeding with proper follow up of neonates and proper weight recording as per IMNCI protocol on day 0, 3, 7, 14, 21, 28 and 42 will go a long way in reducing the problem of dehydration/early detection of problem of dehydration in neonates.

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