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Original Research Article

A study to assess the knowledge and practice of initiation of immunisation in mothers of low birth weight Neonatal Intensive Care Unit (NICU) graduates in a tertiary care centre

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ABSTRACT

Background: Premature and low birth weight (LBW) infants are susceptible to infections including those which are preventable. The coverage of immunization in this subset of babies is poor. The present pilot study was an attempt to identify factors which lead to delay in initiation of immunization in this vulnerable group. The objective of this study was to assess knowledge and practice of initiation of immunization in mothers of low birth weight (<2 Kg) NICU graduates and effect of specific counselling on the practice of immunization.
Methods: A prospective pilot study was done between 1st April to 30th June 2016. In the first phase, mothers of LBW and preterm babies were assessed using 2 validated questionnaires on discharge and in High-Risk OPD. In the second phase, a different set of mothers were assessed similarly but counseled specifically by the principal investigator to initiate immunization irrespective of the weight and chronological age. Results were interpreted using the Fischer Exact test, Independent T-test and McNemar.
Results: Among 30 babies in the study, 16 (53.33%) were immunized, of which 6 (37.5%) babies had a timely initiation. Birth weight and duration of NICU stay significantly affected the time of initiation of immunization. There was a significant lack of knowledge in mothers of non-immunized babies. When counseled by the primary investigator, 85.8% and 50% of mothers agreed that immunization can be initiated at birth and even if birth weight is less than 2 kg respectively.
Conclusions: Immunization initiation was delayed in most of the preterm and low birth weight babies. Post counseling a favorable change was observed in mothers' knowledge but not practice.

Keywords: Immunisation, Knowledge, Low birth weight, Mothers, Practice, Preterm

INTRODUCTION

Preterm and low birth weight newborns are susceptible to a wide range of infections including those preventable by immunization. Immunization is one of the interventions which can protect these fragile infants from some of the serious infections. In addition, World Health Organization has identified universal immunization as one of the important strategies to achieve MDG 4. Taking into consideration these facts, the importance of timely immunization in preterm and low birth weight infants cannot be overemphasized.

Immunoglobulin G (IgG) is transferred transplacentally to the fetus and intrauterine levels of IgG in the developing infant correlate with gestational age.

As a result, the most premature babies have lower levels of IgG and so are most susceptible to infections.[1] To prevent morbidity and mortality due to vaccine-preventable diseases, the Advisory Committee on Vaccines and Immunization Practices (ACVIP) of Indian Academy of Pediatrics and the Advisory Committee on Infectious Diseases, American Academy of Pediatrics (AAP) have both recommended that premature infants receive immunization at the same chronological age as recommended for full-term infants with the qualified exception of hepatitis B vaccine.[2]

However, a number of studies have noted that some physicians and some parents of preterm infants mistakenly believe that birth weight, current weight, or the degree of prematurity plays an important role in initiation of immunization.[3-6] Consequently, preterm infants often receive their primary immunizations late even though they can mount adequate immune responses when vaccinated at the recommended chronological age.[4-8] This study was designed to identify the mothers' knowledge and practice of initiation of immunization, who had given birth to low birth weight babies. It also attempts to find how counseling can affect their knowledge and practice on initiation of immunization in preterm and low birth weight babies.

METHODS

A prospective study was designed to evaluate the knowledge and practice of initiation of immunization in mothers of preterm and low birth weight NICU graduates (<2000 gm) in a tertiary care center. The babies who were discharged from NICU between 1st April to 31st May 2016 were included. The study protocol was approved by the ethics committee. Informed consent was taken from all subjects. Babies in whom vaccination was not given due to an underlying disease state.eg Intravenous Immunoglobulin, immunocompromised were excluded from the study. The demographic details of the mothers were noted on a predecided proforma. This study was conducted in two phases. In the first phase, mothers included in phase 1 of study (mothers of babies who were discharged between 1st April to 31st April) were assessed on two occasions using questionnaires; on discharge (questionnaire A) and in high risk Out Patient Department (questionnaire B). Between these two assessments, routine pre-discharge advice including immunization advice was given by the NICU resident as per the hospital protocol. In the second phase also, a separate group of mothers (mothers of babies who were discharged between 1st May to 31st May) was assessed on two occasions using questionnaires; on discharge (questionnaire A) and in high-risk Out Patient Department (questionnaire B). In between these two assessments, mothers were counseled specifically by the principal investigator to initiate immunization irrespective of the weight and chronological age. All the babies enrolled in the study were followed up till initiation of immunization or 30th June 2016 whichever was earlier.

The questionnaires used in the study were validated by the experts. The data was analyzed using SPSS version 20 for windows. The Fischer Exact test was used to compare variables between different groups, Independent T-test to compare means of two groups and McNemar test to compare pre and post counseling results.

RESULTS

Thirty neonates fulfilling the inclusion criteria were studied. In this study, average maternal age was 27.8±3.9 years. 6 (20%) mothers were working and 24 (80%) mothers were housewives. There were 9 (30%) mothers who had had studied till graduation and remaining 21 (70%) mothers were educated till higher secondary or less. Nobody was illiterate. Among the study group, 27 (90%) were Hindu and 3 (10%) subjects were Muslim. Twenty-four (80%) were primipara and 6 (20%) mothers were multipara. The mothers were divided into two groups: whose babies received immunization and those whose babies did not receive immunization.

Table 1: Sociodemographic profile of mothers included in the study.

Maternal characteristics	Distribution of maternal characteristics	Immunised (n=16)	Non-immunised (n=14)	P value
Age (years) (Mean±SD)		27.31 (3.9)	28.50 (4.3)	0.42
Occupation	Working	2 (12.5%)	4 (28.6%)	0.378
	Housewives	14 (87.5%)	10 (71.4%)	
Education	Graduates	3 (18.8%)	6 (42.9%)	0.236
	Higher secondary and less	13 (81.2%)	8 (57.1%)	
Religion	Hindu	15 (93.8%)	12 (85.7%)	0.586
	Muslim	1 (6.2%)	2 (14.3%)	
Parity	Primipara	11 (68.8%)	13 (92.9%)	0.175
	Multipara	5 (31.2%)	1 (7.1%)	

The distribution of demographic profile of mothers as per the immunization status of their babies is shown in Table 1. The subjects in both the groups were comparable in the demographic profile. Of the 21 male babies 13 (61.9%) received immunization, while out of 9 female babies, 3 (33.3%) were immunized. Twenty-one (70%) neonates were small for the gestational age (SGA). 9 (30%) were appropriate gestational age.

Table 2: Infant characteristics in the study group.

Infant population characteristics (mean)	Distribution of infant population characteristics	Immunised (n=16)	Non-immunised (n=14)	P value
Gender	Male	13 (81.25%)	8 (57.14%)	0.236
	Female	3 (18.75%)	6 (42.86%)	
Weight for age	SGA	11 (68.75%)	10 (71.43%)	0.813
	AGA	5 (31.25%)	4 (28.58%)	

Table 3: Profile of new-borns included in the study.

Infant characteristics	Immunized (n=16)	Non-immunized (n=14)	P value
Birth weight(kg)	1.49 (0.28)	1.2 (0.23)	0.005
Weight on discharge(kg)	1.51 (0.23)	1.43 (0.14)	0.225
Duration of NICU stay(days)	15.8 (7.92)	33.29 (14.5)	0.001
Gestational age at birth (weeks)	33.17 (1.91)	31.6 (2.54)	0.084
Gestational age at discharge (weeks)	35.6 (1.78)	36.8 (1.84)	0.115

Table 4: Response of mothers of neonates in the study to questionnaire A (on discharge).

Questionnaire A	Immunized (N=16)	Non-immunised (N=14)	p value
Have you heard about vaccination of newborns?	14 (87.5%)	10 (71.4%)	0.378
What vaccination does to the baby?			
a. Keeps baby healthy	4 (25%)	5 (35.7%)	
b. Baby falls less ill	1 (6.3%)	1 (7.1%)	
c. Both a + b	11 (68.8%)	8 (57.2%)	
Is vaccination initiated at birth?	12 (75%)	5 (35.7%)	0.035
Vaccination can be given even if baby is born early?	6 (37.5%)	3 (21.4%)	0.440
According to you, what is the ideal time of giving vaccine to a baby which is born early?			
1 month	1 (6.3)	-	
2 months	1 (6.3)	-	
No idea	14 (87.5%)	14 (100%)	
Vaccination can be given even if baby weighs less	6 (37.5%)	1 (7.1%)	0.86
According to you what should be the weight of the child before vaccination is started?			
No idea	7 (43.8%)	6 (42.9)	
1.5 kg	1 (6.3)	0	
2 kg	6 (37.5)	8 (57.1)	
2.5 kg	2 (12.6)	0	
Did NICU doctors advise you to vaccinate your baby?	15 (93.8%)	10 (71.4%)	0.157
Did NICU nurse advise you to vaccinate your baby?	13 (81.3%)	7 (50%)	0.120
Do you want to vaccinate your baby?	15 (93.8%)	12 (85.8%)	0.586
Do you think your baby is small for receiving vaccine?	8 (50%)	14 (100%)	0.003
Does vaccination have any side effects?	6 (37.5%)	9 (64.3%)	0.272
Do you think babies with less weight can have more side effects from vaccination?	8 (50%)	9 (64.3%)	0.484

The distribution of infant characteristics, among the immunized and non-immunized babies were studied (Table 2) and no statistically significant difference was found. Out of 30 neonates included in the study, 16 received immunization during the study period. 6 (37.5%) babies had timely initiation of immunization and 10 (62.5%) babies had delayed immunization.

Amongst the infant characteristic shown in Table 3, the mean birth weight of the neonates who were immunized was 1.49±0.28 kg and for those who were non immunized was 1.2±0.23 kg. This difference in weight between the two groups is statistically significant (p: 0.005). We also found that the duration of stay was significantly longer for non-immunized neonates (33.29±14.5 days) as compared to the duration of stay for immunized neonate (15.8±7.29 days) and this difference was statistically significant **(**p-0.001). The mean gestational age at immunization was 40.2±2.14 weeks. None of the other characteristics like weight on discharge, gestational age at birth and gestational age at discharge significantly influenced the immunization status of the new-born.

Table 5: Response of mothers of neonates in the study to questionnaire B (follow-up).

Questionnaire B	Immunized (N=16)	Non-Immunized (n=14)	P- Value
Have you heard about vaccination of newborns?	15 (93.8%)	12 (85.8. %)	0.586
What vaccination does to the baby?			
a. Keeps baby healthy	4 (25%)	2 (14.3%)	0.453
b. Baby falls less ill	1 (6.3%)	0 (0%)	
c. Both a + b	11 (68.8%)	12 (85.8%)	
Is vaccination initiated at birth?	13 (81.3%)	12 (85.8%)	0.980
Vaccination can be given even if baby is born early?	11 (68.8%)	6 (42.9%)	0.269
According to you, what is the ideal time of giving vaccine to a baby which is born early?			
No Idea	14	13	
1month	1	0	
Any	1	1	
Vaccination can be given even if baby weighs less	11 (68.8%)	5(35.7%)	0.141
According to you what should be the weight of the child before vaccination is started?			
Don't Know	5 (31.2)	1 (7.1)	
<2kg	3 (18.7)	6 (42.9)	
2 Kg	5 (31.2)	5 (35.7)	
2.5kg	2 (12.5)	0	
3kg	0	1 (7.1%)	
Any	1 (6.3%)	1 (7.1)	
Did OPD doctors advise you to vaccinate your baby?	15 (93.8%)	11 (78.6%)	0.315
Did you follow the advice about vaccination given to you?	13 (81.3%)	10 (71.4%)	0.675
Did you take your child to the hospital for giving vaccine?	11 (68.8%)	10 (71.4%)	0.989
Where did you take your child for giving vaccine?	6 (37.5%)	6 (42.9%)	0.990
Were you refused vaccination due to low birth weight?	13 (81.3%)	10 (71.4%)	0.675
Do you want to vaccinate your baby?	16 (100%)	12 (85.8%)	0.209
Do you think your baby is small for receiving vaccine?	6 (37.5%)	6 (42.9%)	0.033
Does vaccination have any side effects?	13 (81.3%)	10 (71.4%)	0.236
Do you think babies with less weight can have more side effects from vaccination?	16 (100%)	12 (85.8%)	0.626

Table 4 is a self-explanatory table showing the responses of the mothers to questionnaire A. The numbers in this table corresponds to a response yes to the question unless otherwise specified. It was found that 6/30 (20%) of the mothers had never heard of immunization.

Moreover, 21/30 (70%) mothers felt that vaccination should not be given if the baby is born early. 28/30 (93.33%) were not aware of the ideal time of initiating immunization. Similarly, 23/30 (76.67%) mothers felt vaccination cannot be given if the baby weighs less. 3/30 (10%) were not willing to vaccinate their babies. 15 (50%) mothers felt that they were not advised regarding immunization. The mothers of babies who were not immunized did not know that vaccination can be initiated at birth (p - 0.035). Mothers of non-immunized babies felt that babies were small for receiving vaccination (p - 0.003)

Table 5 gives the number of yes responses given by the mothers to Questionnaire B at follow-up in the high-risk outpatient department. It was seen that there was a favorable percentage change in knowledge and attitude of mothers regarding immunization, but this difference was not statistically significant. As seen in Table 6, there was an improvement in response to all the questions post counseling by the principal investigator and it was statistically significant for question 3. After counseling from the principal investigator, 85.8% of mothers agreed that immunization can be initiated at birth. As seen in

question 5 a, post counselling, the mothers who agreed that immunization can be given at a birth weight less than 2 kg increased from 7.1% to 50% It was also found that 23 (76.7%) mothers were refused immunization due to low birth weight. Among them 11 (47.8%) mothers had been to private hospital and 12 (52.2%) mothers had been to general hospital for immunization. It was observed that there was a change in knowledge as percentage improvement in desirable response in pre and post counseling by the principal investigator. No significant change was noted in the practice of initiation of immunization following specific counseling by the principal investigator.

Table 6: Effect of specific counselling on mothers and their improvement of knowledge for immunization.

Questionnaire	Before counselling	After counselling	Change in response % (p-value)
	Response: yes		
Have you heard about vaccination of new-borns?	10 (71.4%)	13 (92.9%)	21.5 (0.375)
What vaccination does to the baby?			
a. Keeps baby healthy	6 (42.9%)	3 (21.4%)	21.5 (0.250)
b. Baby falls less ill	1 (7.1%)	-	-
c. Both a + b	7 (50%)	11 (78.6%)	38.6 (0.125)
Vaccination is initiated at birth?	5 (35.7%)	12 (85.8%)	50.1 (0.016)
Vaccination can be given even if baby is born early?	5 (35.7%)	8 (57.2%)	21.5 (0.375)
According to you, what is the ideal time of giving vaccine to a baby which is born early			
Don't know	14 (100%)	12 (85.8%)	-
Any weight	-	2 (14.3%)	-
Vaccination can be given even if baby weighs less.	1 (7.1%)	6 (42.9%)	35.8 (0.05)
According to you what should be the weight of the child before vaccination is started?			
2 kg	9 (64.3)	5 (35.7)	28.6 (0.125)
Don't know	4 (28.6)	1 (7.1)	21.5 (0.250)
<2 kg	1 (7.1)	7 (50%)	42.9 (0.03)
Any weight	-	1 (7.1%)	-
Do you want to vaccinate your baby?	13 (92.9%)	13 (92.9%)	0 (1.0)
Do you think your baby is small for receiving vaccine?	12 (85.7%)	8 (57.2%)	28.5 (0.125)
Does vaccination have any side effects?	8 (57.2%)	5 (35.7%)	21.5 (0.25)
Do you think babies with less weight can have more side effects from vaccination?	9 (64.3%)	5 (35.7%)	28.6 (0.125)

DISCUSSION

One of the major reasons for delayed immunization in low birth weight babies is a lack of knowledge among the mothers and health care providers.[9] As there is no literature on prospective evaluation of knowledge of mothers and their subsequent counseling on immunization initiation in preterm and low birth weight babies, direct comparison with other studies could not be done. This study showed that there is no statistically significant relationship between the factors such as mother's age, knowledge, the level of education, employment status on immunization practices similar to a study conducted by Angelillo et al.[10] However, a study by Omole et al demonstrated a positive correlation between knowledge and practice of mothers and immunization of the baby as a contrast to our findings.[11] Hobcraft et al found mother's employment is generally associated with increase child mortality so it is plausibly related to incomplete immunization. We also found that working mothers had more nonimmunized babies.[12] In a survey in slums of Lucknow city used cluster sampling with 17 infants (12-23 months old) per cluster, a total of 510 infants, showed Muslim religion as a major cause of non-immunization among the study group.[13] UNICEF survey in 2010 showed immunization is higher in Hindu as compared to Muslim. In the present study immunization was higher among Hindu babies 55.55% as compared to Muslim i.e. 33.33%. Among the babies of primigravida mothers, 45.83% initiated immunization while among the babies of multigravida mothers 83.3% had initiated immunization. This might be due to the fact that multigravida females had more knowledge and experience about immunization which they might have received during previous pregnancy. We found 61.9% males were immunized as compared to only 33.33% of females. Corsi et al demonstrated that girls had significantly lower immunization coverage ($p<0.001$) than boys for BCG, DPT, and measles.[14] This was greatest in three northern Indian states with strong son preference in these areas.[15,16] The gender inequalities in access to preventive care in India noted here are likely to

reflect, at least in part, the societal preference for male babies in India.[17] In this study 14/30 (46.67%) babies were not immunized and among the 16 immunized babies, 62.5% had delayed immunization. Similarly, Davis et al in a population-based study showed low birth weight children were at significantly greater risk of immunization delays during the first year of life.[18] We found that there was a lack of knowledge among the mothers with regards to initiation of immunization in preterm and low birth babies. Qutaiba B et al showed inadequate knowledge regarding immunization in 48.5% of the study population group.[19] A study done in Mangalore demonstrated that 30% of mothers had poor knowledge while 44% had average knowledge regarding immunization.[20] In the present study, 63.3% mothers stated that vaccination is beneficial to the baby.

The majority of parents (90%) agreed to vaccinate their baby. These results were similar to a study by Zagmis et al wherein 89% of the parents agreed to vaccinate their babies.[21] There was a statistically significant correlation between the duration of NICU stay and birth weight with the initiation of immunization as studied by Davis et al and Langkamp et al.[18,3] Vohr and Oh demonstrated that LBW children previously hospitalized in their NICU received the first 3 doses of diphtheria and tetanus toxoids and pertussis (DTP) on a delayed schedule.[22] Magoon et al also found delays in both DTP and polio immunizations in LBW children who had been hospitalized in NICU.[7]

As this study was a pilot study, limited to mothers coming in the high-risk Outpatient Department after getting discharged from a single tertiary neonatal care center, hence the results cannot be generalized to all the mothers of preterm low birth weight babies. The number of subjects was limited in the study. Future researches on the topic are needed from different places of the state and country and with larger numbers.

CONCLUSION

Initiation of immunization was delayed in most of the low birth weight babies. There was a lack of knowledge and practice among mothers of low birth weight babies regarding initiation of immunization.

There was a favorable change observed in mothers' knowledge post-counselling though the practice regarding initiation of immunization did not change much. None of the maternal factors like age, parity, level of education, the gender of the child, socioeconomic status, and religion significantly affect the initiation of immunization.

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