The Effect of Newborn Care Education Program on Postnatal Period among Nepalese Primiparous Mothers: A Randomized Controlled Trial

ABSTRACT

Background: The health and survival of newborns depend on high levels of attention and care from others. The mother is the most important person who looks after and meets the physiological and psychological needs of the child, in the early years of life. Adequate knowledge about how to provide necessary care for an infant during the neonatal period can raise a mother's confidence regarding infant care and it can reduce false and traditional beliefs about neonatal care and neonatal morbidity and mortality rates.

Aim: To determine the effectiveness of newborn care education program on maternal and infant health by determining the infant health condition and measuring the maternal newborn care knowledge, anxiety and confidence level at 5-6 weeks of postpartum.

Design: A randomized controlled trial

Setting: A major maternity and women's hospital, Kathmandu, Nepal

Participants: One hundred and fourth three primparous mothers were randomly assigned to the intervention (n=69) and control group (n=74). Eligible participants were primiparous mothers who have given birth with single full-term health baby, and without history of obstetric, medical, and psychological problems.

Methods: The intervention group received structured newborn care education program and routine general newborn care education prior to discharge from postnatal unit. The control group received only the routine general newborn care education. Outcomes were measured by the Newborn Care Knowledge Questionnaire, State Trait Anxiety Inventory for Adults, and Karitane Parenting Confidence scale; prior to intervention and at 5 to 6 weeks postpartum. The infants health and care questionnaire were measured at postpartum only.

Results: The number of infants attending the health center due to some types of illness was significantly less in intervention group. Furthermore, the intervention group had significantly increased maternal newborn care knowledge and confidence, and reduced anxiety at 5-6 weeks postpartum as compared with control group.

Conclusions: This educational intervention increased maternal knowledge of newborn care and maternal confidence, and reduced anxiety in Nepalese primiparous mothers. Likewise, the number of infants attending the health center was decreased. This educational program could be integrated into the routine newborn care educational program to promote maternal and infant well-being in Nepalese society.

Keywords: educational intervention, maternal anxiety and confidence, newborn care, Nepal

What is already known about the topic?

- Maternal newborn care education programs are needed to improve the health and well-being of the mothers and the newborns.
- Maternal anxiety was predicted by newborn care knowledge
- The lack of confidence as new mothers and in their ability to care for their babies' caused postpartum anxiety and depression

What this paper adds

- This study found a structured newborn care educational program was effective in improving mothers and infant health.
- The structured newborn care education program increased maternal newborn care knowledge and confidence and decrease anxiety in postnatal mothers

The Effect of Newborn Care Education Program on Postnatal Period among Nepalese Primiparous Mothers: A Randomized Controlled Trial

1. Introduction

Newborn mortality is one of the world's most neglected health problems. Of the world's four million annual neonatal deaths (World Health Organization (WHO) and Save the Children, 2011), 98% of them occur in developing countries, where most newborns die at home while being cared for by mothers, relatives, and traditional birth attendants. The neonatal period is one of the most critical life stages, requiring a considerable amount of care and precision (Mozafari et al., 2007). Previous studies (Tarkka et al., 2002; Mujkic & Vuletic, 2004) have found that mothers need information related to infant care during the postpartum period. In addition, younger mothers require extra care and attention (Secco et al., 2002; Qunlivan et al., 2003). A mother's knowledge about how to provide necessary care during the neonatal period can raise the mother's confidence regarding infant care, and it can reduce false and traditional beliefs about neonatal care, thereby reducing neonatal morbidity and mortality rates (Doyle, 2004; Bowman, 2005). The most efficient way to improve public health is by promoting maternal awareness through education (Arzani et al., 2008).

In the early years of life, the mother is the most important person attends to the physiological and psychological needs of the child. Therefore, the mother requires accurate knowledge and appropriate actions to raise healthy children (Salam, 1995). The education provided to mothers about their own and their babies' care is effective in dissolving maternal anxiety and increasing feelings of adequacy (Aslan & Uzun, 2008). Researchers have found that mothers believe that having more individual time with a nurse during their postpartum hospitalization would better prepare them to care for themselves and their newborns at home (McKellar et al., 2002; Mantha et al., 2008).

The transition to motherhood is a challenging and stressful process in the life cycle of postpartum women, as they face new tasks associated with the maternal role and dramatic changes in their bodies. Anxiety is a psychological state, which persists two weeks or longer with a negative self-concept associated with self-reproach and self-blames anorexia, insomnia, and a change in activity level (Beck & Alford, 2009). Postpartum depression occurs in approximately 13% of new mothers (Gaynes et al., 2005). The prevalence rate of anxiety was 8.0% in the postnatal periods (Andersson et al., 2006; Ross & McLean, 2006). Previous studies among Nepalese women in urban areas have found similar rates of depression (12%), (Nepal et al., 1999; Regmi at al., 2002).

The confidence of new mothers in their ability to provide infant care is important in facilitating their adaptation to and experiences of motherhood (Barclay et al., 1997). Maternal self-confidence is defined as the mother's perception of her own ability to take care of the child and to interpret the child's signals correctly (Zahr, 1991). A lack of confidence in the early postnatal period may negatively influence their ability to care for their infants (Warren, 2005; Poobalan et al., 2007). Past researches reported that maternal confidence was an important determinant of anxiety and stress associated with child rearing (Watanabe & Hoshi, 2004; Maruyama et al., 2006).

1.1. Background of Nepal

Nepal is one of the few developing countries lies between India and China; total 30 million populations (Index Mundi, 2012). The gross national product per capita is about $US 1,300 per annum (Index Mundi, 2012). The literacy rate among the youth (15 to 24 years) was 89.2% for males, and 78.40% for females (Index Mundi, 2012). It is not surprising that the maternal mortality rate in Nepal is high at 170/100,000, neonatal mortality rate is 24/1,000 births,

and that infant mortality rate is 34/1,000 birth (UNICEF, 2012). In rural Nepal, the vast majority (73%) of births takes place at home, and of these births, 55% are assisted by traditional birth attendants and relatives (Nepal Family Health Program & New ERA, 2010). Approximately half of the pregnant women had received four antenatal care visits, as recommended by the WHO; however, 85% of the women had had only one antenatal care visit (Joshi et al., 2014). According to Nepal's National Neonatal Health Strategy (2010), hypothermia was the fourth leading cause of neonatal death. In Nepal, there was no any structured discharge education plan for mothers' during postpartum. Moreover, there is no service offering postnatal home visits. Thus, it is necessary to enhance newborn care education prior discharge in Nepal.

2. Aims

The aims of this study were to determine the effectiveness of newborn care education program on maternal and infant health by determining the infant health condition and measuring the maternal newborn care knowledge, anxiety and confidence level at 5-6 weeks of postpartum.

The study hypothesis were

1. The study group would have statistically significant better level of infant health at 5-6 weeks postpartum when compared with the control group.

2. The intervention group would have statistically significant increase newborn knowledge and confidence at 5-6 weeks postpartum when compared with the control group.

3. The intervention group would have statistically significant decrease anxiety at 5-6 weeks postpartum when compared with the control group.

4. There would be positive association between newborn care knowledge and confidence, and inverse relation between newborn care knowledge and anxiety.

3. Methods

3.1. Design

The study was a randomized controlled trial. The participants were recruited from a major maternity and women's hospital, located in Kathmandu, Nepal. The outcome was measured at two points: prior to intervention at postnatal unit(pre-test) and at 5 to 6 weeks of postpartum (post-test) at postnatal/immunization follow-up appointments.

3.2. Participants, recruitment and randomization

The inclusion criteria were (1) inpatient primiparous mothers, (2) delivery of a healthy baby (i.e. full term, gestation age 37–40 weeks, baby weight 2.5 to 4 kg, Apgar score equal or above 8, and no any birth defects), (3) ability to read and understand the native (Nepalese) language, and (4) no history of obstetric, medical, or psychological problems. Exclusion criteria were postnatal mothers for whom birth had involved complications for their babies and/or themselves.

Total 200 primiparous mothers were recruited from the postnatal ward but 12 of them declined to be interviewed, without giving any reasons for their withdrawal. Of the left of 188 women, (95 in intervention and 93 in control group) participated in pre-test and finally, 143(69 in intervention and 74 in control) completed both pre-test and post-test measures.

The randomization sequence was generated by using a coin toss method, which is a basic type of simple random sampling. The participants were blinded to their group assignment, regardless of whether they were allocated to the control or intervention group. When the study concluded, the researcher informed the participants of their group allocation.

3.3. Development of structured newborn care educational program

The development of the structured educational program was based on WHO (2010)

guidelines for essential newborn care course, the reference manual of Save the Children; Care of newborn (Beck et al., 2004), an extensive review of the literature, and information about mothers' gaps in knowledge, which were identified in the aforementioned preliminary study conducted by the author (Shrestha., 2015) of the present study. The structured newborn care education was designed to be interactive and supportive rather than prescriptive in style so that mothers were motivated and encouraged to have appropriate care to theirs' babies.

The structured newborn care educational components were: feeding/elimination, newborn crying/sleeping, maintain warm/bathing, cord care, signs of cord infection, hand washing and immunization which are based on essential newborn care. The newborn care education program was finalized by consulting four experts in midwifery in Nepal and minor modifications were made based on their advice.

Moreover, the researcher developed a brochure as an educational material which would reinforce the educational session. The design was beautiful through use of appeal photos. It was easy to understand, interesting, familiar and realistic, clearly presented and had suitable visuals by used of attractive colors. The written material was at/ or below a 5th grade reading level.

3.4. Intervention

The control group received routine general newborn care education by on-duty nurses prior to discharge. Upon completion of the study, the researcher issued educational brochure to the mothers and explained the information contained therein.

The intervention group received routine general newborn care education and the structured newborn care educational program. The educational session was conducted by trained nurses by one-to-one bedside interaction; around 10-15 minutes. Additional, the participants also received

one postnatal follow-up telephone support from the researcher at two weeks postpartum to reinforce the information provided during the educational sessions.

The intervention was consisted of a 10-15 minutes one to one educational session with trained nurses before discharge and one telephone follow-up within the 2 weeks of postpartum. The education was provided based on adult learning theory, which proposes that adults are motivated to learn when their need to know is aroused. Four nurses were trained to provide health education by the first author.

3.5. Outcome Measures

Newborn care Knowledge Questionnaire (NKQ)

Maternal knowledge of newborn care was measured by the NKQ. It includes four section (body temperature, breastfeeding, infection prevention, and immunization) containing 23 items, each requiring a single response. Correct answers are assigned 1 point, and incorrect answers are assigned 0 points. The participant's newborn care knowledge score is calculated by summing the item scores. The highest possible score is 23 and higher score indicate adequate newborn care knowledge. The NKQ (Nepalese version) was shown to be valid and reliable in the preliminary study (Shrestha et al., 2014; 2015). Cronbach's alpha for the NKQ (Nepalese version) was 0.76 in the preliminary study.

State-Trait Anxiety Inventory for Adults (STAI-AD)

Postpartum maternal anxiety was measured by using Nepali versions of the STAI-AD, originally developed by Spielberger et al. (1983). The STAI-AD has been translated into more than 30 languages including for cross-cultural research and clinical practice. It is scored on a 4-point Likert-type scale; scores range from 1 (no) to 4 (totally). The range of possible scores is 20 to 80 points, and higher scores indicate greater anxiety. Cronbach's alpha was 0.86 in this study.

Karitane Parenting Confidence Scale (KPCS)

Maternal confidence was assessed using the KPCS (Crncec et al., 2008), which is a self-report questionnaire designed to measure parents' subjective confidence in their parenting abilities, or their 'perceived parenting self-efficacy'. The scale was developed within an Australian context for use with mothers and fathers of infants aged 0–12 months. The KPCS comprises 15 task-specific items, each scored on a 4-point scale, with higher scores indicating higher levels of parenting confidence. For the purpose of this study, the original scale was translated into Nepali language after obtaining permission from the Karitane research trust. The translation process was conducted carefully by bilingual experts, and the blind back-translation method was used as recommended. The draft questionnaire was examined by experts in midwifery, and modifications were made based on their advice. The translated tool was pretested with 10 postnatal mothers of the same hospital and modified as needed. Cronbach's alpha for the Nepali version KPCS was 0.86, indicating good levels of internal consistency.

3.6. Ethical Considerations

Ethical approval was obtained from the University, Nepal Health research Council and the study venue. All the participants were assured that their participations were entirely voluntary, and that they were free to withdraw from the study at any time without sanctions. All of them were informed of the study's purpose and procedures, the use of the data collected. Additional, they were assured that their data would be kept confidential and used only for research purposes.

3.7. Data Analysis

The SPSS 17.0 software package was used for statistical analysis. Descriptive statistics was used to summarize demographic data. The normality of data was analyzed by using the Shapiro-Wilk test which, showed that it was not normally distributed. Thus, non-parametric test

was used for data analysis. Test statistics used in this research were the chi-square test to compare questionnaire responses between groups in cross tables; the Wilcoxon matched-pairs signed-ranks test to compare pre- and post-intervention changes; and the Mann-Whitney U test to compare the two groups' responses to the same questions. P values of 0.05 were considered significant for differences between the intervention and control groups.

4. Results

Table 1 presents the participants' demographic, obstetric and related data and there were no significant difference between intervention and control groups. There were also no significant differences between the two groups in their baseline measures (Table 2).

The number of mothers attending the health center due to some illness of their babies (i.e. fever, common cold, diarrhea, and cough) was lower in the intervention group compare to control group, and the difference was significant between the two groups ($\chi 2 = 1.37$, df =1, $p = 0.04$). The percentages of skin to skin contact, breast feeding, and colostrum feeding were increased in the intervention group compare to control group but no statistical significant between them (Table 3).

The intervention group's pre- post-test scores on maternal knowledge of newborn care ($t = -5.7$; $p < 0.01$), anxiety ($t = -4.43$; $p < 0.01$), and confidence ($t = -2.41$; $p = 0.01$) were significantly different. The control group showed no significant differences in pre-test and post-test measures of maternal anxiety and confidence ($t = -0.12$; $p = 0.91$); ($t = -1.88$; $p = 0.06$), but it showed a significant difference in newborn care knowledge ($t = -3.63$; $p < 0.01$). It seems that the educational intervention had positive effects on maternal knowledge of newborn care, confidence, and anxiety in the intervention group, compared to the control group (Table 4).

Table 5 shows that the average score of newborn care knowledge and confidence was increased and anxiety was decreased at 5-6 weeks postpartum in intervention group compare to control group. Additional, there were significant differences between the two groups, which revealed that the women in the intervention group gained more knowledge and confidence and decrease anxiety after the educational intervention compared with the women in the control group.

The baseline NKQ was negatively correlated with the STAI ($r = -0.78$, $p < 0.01$), but positively correlated with KPCS ($r = 0.52$, $p < 0.01$). This result indicated that participants with adequate knowledge of newborn care had mild anxiety and a high level of maternal confidence. Moreover, there was a negative association between anxiety and maternal confidence ($r = -0.63$, $p < 0.01$).

5. Discussion

This study demonstrated the impact of newborn care education program on maternal and infant health. The evaluations of the intervention revealed that structured educational program about newborn care (one-to-one discussions between mothers and trained nurses) given prior to discharge, lasting approximately 10 to15 minutes, had a significant effect on the mothers' knowledge of newborn care, anxiety, and confidence, and the health outcomes of their infants. Educational interventions for mothers are commonly viewed as a key strategy to promote their knowledge and practice of childcare skills. Effective educational programs regarding newborn care for mothers are needed so they can provide effective care for their babies. Therefore, client education and encouragement are the first step to promote patients' understanding of the recommended therapies and behavior changes, and to increase their likelihood of following them (Alm-Roijer et al, 2006; Kayaniyil et al., 2009; Boyde et al., 2011; Brown et al., 2011).

Furthermore, individual education is one of the most influential education methods by medical personnel (Bodur, et al., 2003).

It is more appropriate to provide information about newborn care to women during their hospitalization after the delivery, than at other times, especially in Nepal. Mothers do not have sufficient information about newborn care during the antenatal period in Nepal. Moreover, there is no service offering postnatal home visits, so the mothers' hospitalization after delivery is the most appropriate time to provide information in a comfortable environment. Women are more receptive to this information at that time than they are before the birth of their children. Previous studies also support the provision of information about postnatal depression to women during their hospitalization after delivery (Heh & Fu, 2003; Ho et al., 2009).

It is evident from this study that educating mothers about newborn care positively affected their knowledge of newborn care, anxiety and confidence, which leads us to conclude that education, is an effective tool. For primiparous mothers, especially, it is necessary to provide information, counseling, and reassurance during the prenatal and postnatal periods to cope with dynamic changes and to develop self-confidence in providing infant care after childbirth (Yildiz, 2008).

In this study, the decrease in the number of infant attending the health center due to some type of illness was significantly difference in the intervention group compared to the control group. This result suggests that our structured newborn educational program supported the reduction in infant morbidity. The study conducted by Ceber et al. (2013) concluded that when the quality of health care for the mothers and newborns is supported with education during the postpartum period, their health status will be affected positively in the future. Education about minor illnesses decreased the number of visits to the children's health clinic and decreased

parents' intentions to consult a doctor (Robbins et al., 2003). There was a strong positive association between maternal education and the child's health (Gakidou et al., 2010). The percentage of skin to skin contact, breast feeding, frequency of giving baby bath and colostrum feeding were increased in the intervention compared with the control group, yet these differences were not statistically significant. It might be due to the short duration between the administration of the two measures and it may take a longer time to change health behavior.

Significant differences were found between the intervention and control groups in their maternal knowledge of newborn care, anxiety, and confidence at 5-6 weeks of postpartum. These findings indicate that the structured educational program on newborn care was able to increase maternal knowledge and confidence and to decrease maternal anxiety. The findings are consistent with previous studies (Ngai et al., 2009; Ozkan & Polat, 2011). The routine hospital-based educational program had minimum benefits compared to our educational intervention. A similar finding was supported by a pervious study (Shieh et al., 2010). An educational program, including postnatal depression information provided by nurses during the mothers' hospitalization after childbirth was effective in decreasing depression three months postpartum in the intervention group compared to the control group (Ho et al., 2009). The intervention of discharge nursing education can enhance the skill and confidence of mother in caring for newborns (Warren, 2005).

This structured educational intervention increased the post-test scores on the newborn care knowledge, anxiety and confidence. There were significant changes in the intervention group but no changes in the control group, except on their newborn care knowledge scores similar to a previous study (Kavlak & Sirin, 2007). Mercer and Walker (2006) stated that interactive reciprocal nursing interventions are the most effective in enhancing mother-infant

interactions and maternal knowledge about infant care. Mothers should essentially be supported by providing education and consultancy to increase maternal knowledge and confidence in providing newborn care. This type of education also is expected to improve the health of mothers and babies. Past researches showed a positive association between maternal depression and adverse infant health outcomes (Anoop et al., 2004; Harpham et al., 2005).

Structured education program has increased knowledge and confidence level in experiment group more than in the control group at posttest and found significant statistically. However, the control group had also showed a slightly increased in their scores on newborn knowledge and confidence. It can be explained that the mothers in control group might get information (families, friends, health persons) when they needed with their own effort after birth. And they might have increased their knowledge of newborn care and their maternal confidence through their daily care of their babies after they were discharged. Studies conducted by Goto et al. (2008) and Shieh et al. (2010) also found that maternal confidence was associated with child-rearing experiences.

There was an inverse relationship between anxiety and maternal knowledge of newborn care and confidence, whereas, there was a positive relationship between maternal knowledge of newborn care and confidence. Likewise, there was negative association between anxiety and confidence. Women who have insufficient knowledge will experience higher levels of anxiety and lower levels of maternal confidence. A study conducted by Sercekus & Mete (2010) reported that education decreased anxiety. Lower levels of knowledge about newborn care predicted higher levels of anxiety (Shrestha, et al., 2014). Lande et al. (2004) suggests that an increase in a mother's educational level improves the quality of infant care; therefore, continuing education and guidance are necessary requirements for maternal and newborn health.

5.1. Limitations and Future Research

One of the strengths of this study is that it was a randomized controlled trial although the assignments of participants to study conditions were made by a coin toss method rather than by a computer-generated selection. Some limitations of this study include its small sample size with only primiparous mothers, short duration, normal postpartum (without any complications for mothers and babies), without a past history of psychological problems. We also limited the study sample to healthy mothers and infants. The participants were selected from a central hospital in Kathmandu due to human resource constraints, which limits the generalizability of the results. Individual discussion with nurses regarding newborn care was a great opportunity for postnatal mother even though the discussion periods was short and have limitation in teaching materials and methodology. This study did not take into account of the cost of the intervention.

A larger sample size with primiparous and multiparous mothers, selected from different hospitals and health centers in different regions, would have helped to provide a more accurate understanding of the effects of the structured educational program on mothers and infant health. Further studies may be done to study the impact of various teaching methodologies and their effect on long term sustainability of impact.

5.2. Recommendation and Implication of Study

This research is even more convinced that structured newborn education program is the key to improving maternal and infant health in Nepal. All the health persons educated nationwide about the importance to provide newborn care education to the parents of newborns as part of the routine postpartum education prior to hospital discharge.

This program has the potential benefits in promoting maternal and infant health and furthermore increased maternal knowledge, confidence and reduced anxiety regarding newborn

care. It could be incorporated in the routine newborn care education program. Thus the hospital can implement and sustain this education program in effective way without having huge efforts.

5.3. Conclusions

The present study is the first randomized controlled trial in Nepal to evaluate the impact of a structured educational program on newborn care in promoting maternal and infant health. In this study, the number of infants attending the health center was decreased which suggests that this structured newborn educational program supported the reduction in infant morbidity. This educational intervention increased maternal knowledge of newborn care and maternal confidence, and reduced anxiety in Nepalese primiparous mothers. The structured education program on newborn care could be integrated into the routine newborn care educational program to promote maternal and infant well-being in Nepalese society. It is suitable for clinical use because this structured educational program was in practical base and can be delivered by midwives after receiving some training about newborn care. This type of education is also expected to improve the overall health of mothers and infants, which should reduce the neonatal and maternal mortality and morbidity rates in Nepal.

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Conflict of interest

None

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