AL-QANTARA
ISSN: 1988-2955
0211-3589

Volume 25, Issue 1, 2025
Received: 13 December 2024
Accepted: 13 January 2025

THE EFFECTIVENESS OF VIRTUAL VERSUS ACTUAL TRAINING PROGRAM FOR NEW MOTHER ON THE CARE OF NEONATE: A COMPARATIVE STUDY

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ABSTRACT

Background: *Evaluating the effectiveness of training programs is crucial for enhancing new mothers' knowledge and practices in neonatal care, ensuring better health outcomes for newborns.*

Objective*: The study aims to compare the effects of virtual and actual training programs on new mothers' level of knowledge and practice regarding neonatal care.* ***Methodology:*** *A quasi-experimental comparative design was used. The tool I consisted of a socio-demographic profile completed and quasi-experimental self-administered pre and post-tests on new mothers' knowledge about neonatal care before and after the virtual and actual training. Tool II involved a checklist of observations before and after the training.*

Results: *A statistically significant increase in the knowledge and practices in neonatal care among newly-educated women between the ages of 20 and 30 was noted. Significant differences were observed between Saudi and Egyptian mothers at $p < 0.05$ after the program.*

Conclusion: *Training programs using virtual and actual models helped the new mothers to develop actual knowledge in neonatal care. To promote good outcomes for newborns in the community, there is a need to implement educational initiatives to enhance continuity of care for mothers from hospital to home.*

Keywords: *New mothers, Newborns, Actual and Virtual Programmes*

INTRODUCTION

Neonatal health is still a significant problem in the world. About 2.5 million newborns still die annually within the first month of life, primarily in low/middle-income countries (Hug et al., 2019). Almost 75% of newborn deaths occur within the first week of life, which shows that intervention during the initial seven days would help to save a large number of infants. Research suggests that improvement in maternal knowledge and utilization of standard newborn care practices can go a long way in reducing neonatal morbidity and mortality rates. These include promoting skin-to-skin

contact/kangaroo mother care, promotion of exclusive breastfeeding, infection prevention such as hand washing/hand hygiene and umbilical cord care, and early identification of neonatal illness and response (Pillay, 2019).

The neonatal period is described as the first 28 days of life, characterized by severe physiological changes and caregiver-infant transcendent interactions. In this phase, the child requires consistent and quality care to develop well. Basic care includes immunization, proper feeding, and proper observation of developmental signs and developmental surpluses or deficits. New mothers, however, experience several difficulties in offering such care because of inexperience, inadequate knowledge, and increased stress after childbirth. These issues include infection control, breastfeeding, newborn sleeping, bathing, weight, safety, and knowing when to seek help (Visscher et al., 2015). Therefore, outlay from health care professionals, especially nurses, becomes crucial in directing the mother on how to go about such aspects effectively.

Moreover, the state of mind of new mothers is another focal aspect that determines neonatal management. The emotional and psychological conditions such as anxiety, stress and tension after the delivery can interfere with mom's nurturing. Support for new mothers not only helps to reverse these emotional concerns but also enhances mother-child attachment. A strong affectionate bond is necessary to resolve the child's emotional and psychological problems and acquire skills that could enable the mothers to deal with different challenges that may occur during the neonatal period (Y Moon et al., 2016). Key maternal education interventions stress the role of touch with the newborn, enhancing the mother's perception and assuming a positive attitude towards early action on neonatal illness.

Maternal education has numerous advantages, but few postnatal courses exist to improve mothers' knowledge and competencies. This lack of knowledge always results in inadequate care that forms the basis of neonatal health and well-being outcomes. Inadequate formal training to support these needs and properly structured training interventions can help mothers build the needed competencies for newborn care training. These programs are beneficial in reducing neonatal mortality in contexts where professional help is scarce, as in resource-poor environments (Pillay, 2019).

There are signs that virtual training programs can become an effective solution for training workers and improving their qualifications because of the constant changes in the technology field. These programs are convenient since moms can get training materials irrespective of the place they are in or the time they spend in the hospital. Virtual training helps maintain constant interaction with participants, which benefits researchers and ensures that mothers are constantly being guided and receiving feedback. Besides, it serves as an avenue through which the researchers can share their information with a wider society, especially those who cannot attend many physical trainings because of proximate or other barriers. On the other hand, clinical and more specific training in affiliated facilities appears to be more beneficial since those mothers can explain, demonstrate, and then practice principles, with the healthcare workers providing feedback as needed. Such an approach is prospective in comparing the efficiency of these training modalities in increasing maternal knowledge and essential neonatal practices (Hug et al., 2019).

The importance of such a comparative approach is based on the fact that this should reveal the advantages and shortcomings of each training method. For example, virtual training can help meet the requirements of mothers who have short-stay hospitals or those who need continued training after discharge. Practical training is more manageable for mothers in the hospital for a long time and requires authentic training. Through assessment of these methods, it is possible to compare the effectiveness of the two in improving maternal competencies and further neonatal health performance. Establishing training programs that correspond to the various populations and their requirements is crucial.

New mothers experience challenges in handling neonates for activities like holding, burping, and correctly positioning when the child is sick breastfeeding challenges, and protection of the infant and washing the baby. Moreover, the patients' ignorance of the developmental milestones and indication of illnesses had made their caregiving role even more challenging. These challenges confirm the need to have intensive training sessions which incorporate not only the contents but also

confident and ability on how the new issues as new mom can be handled. Thus, possessing such capabilities, training programs can help mothers prepare and act in the NICU environment successfully and efficiently (Visscher et al., 2015).

The use of Virtual and practical programs as a twin approach to meet the many challenges of new mothers has great potential when applied. Another advantage is convenience, and access to virtual training allows mothers to study at their own pace and can always come back and review the material again. It also allows the research organizers to keep speaking with participants via phone calls, emails, or other means of communication, such as offering support and feedback throughout the process. For instance, practical training allows mothers to practice acquired knowledge directly and under the close supervision of healthcare professionals. Such direct one-on-one contact provides mothers with the needed correction and directions in improving their newborn's health, increasing their self-efficacy and efficiency in practising neonatal care measures (Y Moon et al., 2016).

The degree of success of these two training modalities can offer a profound understanding of each other's efficiency level in enhancing maternal knowledge and practices. This sort of comparison not only enriches the creation of training interventions but also supports the customization of interventions delivered to the targeted groups by the healthcare providers. Thus, when researchers fully understand the relative benefits of virtual and practical training, they can select the best delivery models for maternal education to enhance newborn well-being. Therefore, the study aims to compare the effects of virtual and actual training programs on new mothers' level of knowledge and practice regarding neonatal care.

Research Hypothesis

H1: The training programme will facilitate significantly qualifying the identified differences in new mothers' knowledge and practice in newborn care.

Research Methodology

Research Design and Setting

This study employed a quasi-experimental, comparative design to evaluate a training intervention's impact on new mothers' training regarding newborn care. The research was conducted in the Maternity and Childhood Hospital in Najran, Saudi Arabia, and El Demerdash Hospital in Egypt. These settings made it possible to get a diverse population for doing a comparative study.

Sample

The participants of the convenience sample included 400 new mothers and their healthy newborns. Before enlisting the participants, their informed consent was sought, and each participant agreed to participate in the program.

Data Collection Tools

The data was collected with two instruments. The first was a questionnaire divided into two sections: The first part included questions on the socio-demographic characteristics of the respondents, including age, education, occupation, income, and nationality; the second part examined the respondents' knowledge of newborn care in the pre and post-program period. The second tool was an observation checklist that assessed the mothers' skills in practising newborn care before and after attending a training session. Expert reviews were conducted to enhance the content validity of the tools and assess their readability, clarity, relevance, and comprehensiveness. The reliability was established using Cronbach's alpha coefficient, which has a value of 0.86, reflecting moderate internal consistency.

Program Design and Implementation

The training program followed a three-phase methodology: preparation, planning and execution. Consent was sought when preparing for the study, and the required resources were mobilized during the preparation phase. Participants were divided into two groups: one virtually trained and the other attending in-hospital sessions. The program was implemented from October to December 2021 whenever the participants were available for a session. The implementation phase was initiated with knowledge pre-assessment, and basic knowledge was created based on infection control, signs of disease in neonates, and developmental care. Practical activities included hand washing, feeding, and putting to sleep using teaching aids in videos and pictures.

Evaluation
The effectiveness of the training program was assessed through the post-assessment, which was conducted using the same instruments as the pre-assessment. This made it easy to compare the participants' knowledge and practices pre- and post-intervention.

Pilot Study
A pilot study was conducted using 5% of the overall sample size (approximately 20 mothers) to assess the reliability of the research instruments and the feasibility of the proposed research procedures. Observations from the pilot study were used to modify the questionnaire and the study design to make the final methodology acceptable and credible.

Ethical Considerations
Each participant gave verbal consent upon understanding that their identity would not be disclosed to any third party and that they were free to withdraw from the study at any time.

Statistical Design
The statistical data was analyzed with the help of the Statistical Package for Social Sciences (SPSS) 24.0 version of the statistical software. An independent samples t-test was employed to investigate the significant differences between the two groups. The correlation coefficient test was done, and for all analyses, a $p \leq 0.05$ was taken as significant, while a $p \leq 0.001$ was taken as highly important.

Results
Table 1 shows significant knowledge and practice level differences among Saudi and Egyptian new mothers after implementing virtual and actual training programs. Among Saudi mothers aged 20–30, 99.6% demonstrated satisfactory knowledge, and 98.5% displayed adequate practices post-training, with statistically significant differences ($p < 0.05$). Similarly, for Egyptian mothers aged 20–30 years, 96.3% exhibited satisfactory knowledge, and 92.5% displayed adequate practices ($p < 0.05$). Mothers aged 30–40 also showed improvements in both groups, with significant knowledge and practice levels ($p < 0.05$). Education level was critical, as university-educated mothers showed significantly higher knowledge and practice adequacy in both cohorts ($p < 0.05$). Occupational status further influenced outcomes, with working mothers in both groups demonstrating superior knowledge and practices compared to non-working mothers, also achieving statistically significant differences ($p < 0.05$). These findings emphasize the effectiveness of virtual and actual training programs in enhancing maternal knowledge and practices, with demographic factors playing a notable role in these improvements.

AL-QANTARA
ISSN: 1988-2955
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Table 1. The relation between demographic characteristics of Saudi new mothers, Egyptian new mothers and their total knowledge and practice after program implementation (N=400)

Items		Actual Saudi new mothers				χ^2 P-value	Virtual Egyptian New Mothers				χ^2 P-value
		Knowledge		**Practice**			**Knowledge**		**Practice**		
		Satisfactory	Unsatisfactory	Adequate	Inadequate		Satisfactory	Unsatisfactory	Adequate	Inadequate	
Age by years											
	20-30(270)	269	9	266	4	2.02<0.05	260	10	259	21	3.21<0.05
	30-40(130)	123	7	122	8	4.01<0.05	120	10	121	9	3.11<0.05
Education level											
	Primary (50)	44	6	39	11	4.01>0.05	47	3	43	7	5.01>0.05
	Secondary (110)	46	9	98	12	5.01>0.05	108	2	104	6	6.31>0.05
	University (240)	111	3	231	9	2.01<0.05	233	7	228	12	2.91<0.05
Occupation											
	Working (230)	209	21	222	8	3.21<0.05	223	7	**224**	**6**	4.07<0.05
	Non-working (170)	159	11	161	9	5.01<0.05	157	13	**165**	**15**	3.87<0.05

Figure 1 shows a significant improvement in maternal knowledge of newborn care practices following the training program (independent t-test = 3.21, p-value < 0.000). Before the intervention, the majority of Saudi (in-hospital) and Egyptian (virtual) mothers exhibited limited to moderate understanding of critical practices such as proper handwashing, using disposable tissues, maintaining a clean and smoke-free environment, effective surface cleaning, hygienically laundering baby items, and protecting children from common infections, including colds, flu, and gastrointestinal illnesses. Post-training assessments demonstrated a remarkable shift, with most participants achieving a high level of knowledge across all evaluated domains. These findings underscore the program's effectiveness in enhancing maternal awareness and skills, affirming the value of both in-hospital and virtual training approaches, supported by diverse educational tools, in promoting optimal newborn care practices.

Figure 1. Comparison between knowledge of actual Saudi and virtual Egyptian new mothers about protecting newborns from infection before and after the program

Figure 2 shows a highly significant enhancement in the knowledge of Saudi (in-hospital) and Egyptian (virtual) new mothers regarding the recognition of early signs of developmental concerns in newborns following the training program (independent t-test = 2.01, p-value < 0.01). Before the intervention, most participants demonstrated limited to moderate awareness of critical indicators such as poor feeding, excessive sleeping (over 16 hours per day), lack of limb movement, failure to track faces or respond, absence of gurgling sounds visually, and diminished startle or auditory responses. Post-training evaluations showed a marked improvement, with a significant proportion of mothers achieving high levels of competence in identifying these warning signs. These results underscore the program's success in empowering mothers with essential knowledge and skills for early detection of developmental issues, highlighting the effectiveness of both in-hospital and virtual training modalities in enhancing maternal readiness and promoting newborn health.

Figure 2. Comparison between knowledge of actual Saudi and virtual Egyptian new mothers about common problems before and after the program

Figure 3 shows a highly significant enhancement in the knowledge of Saudi (in-hospital) and Egyptian (virtual) new mothers regarding the recognition of common health concerns in newborns after completing the training program (independent t-test = 2.01, p-value < 0.001). Before the intervention, the majority of participants exhibited limited to moderate understanding of critical neonatal health issues, including abdominal distention and colic, vomiting, bluish skin and jaundice, diarrhea, constipation, cough, difficulty breathing and apnea, ear infections, and skin or oral rashes. Post-training evaluations demonstrated a substantial improvement, with a significant proportion of mothers achieving a high level of competence in identifying these conditions. These results underscore the program's success in equipping mothers with the essential knowledge to detect early warning signs of neonatal health problems, highlighting the efficacy of both in-hospital and virtual training approaches in promoting maternal readiness and improving newborn health outcomes.

Figure 3. Comparison between knowledge of actual Saudi and virtual Egyptian new mothers about signs of sick newborns before and after the program

Figure 4 demonstrates significant improvements in maternal knowledge regarding newborn developmental needs following program implementation, with a statistically significant difference ($p < 0.05$). Among Saudi mothers, 96% correctly recognized that newborns can focus with both eyes and follow a moving object from side to side, indicating a substantial enhancement in understanding visual developmental milestones. Similarly, 92% of Egyptian mothers acknowledged that all newborns lose weight immediately after birth, reflecting increased awareness of normal developmental patterns. These findings highlight the effectiveness of both actual and virtual training programs in improving maternal knowledge of developmental needs, contributing to better neonatal care practices and outcomes.

Figure 4. Comparison between knowledge of actual Saudi and virtual Egyptian new mothers about developmental needs before and after the program

Figure 5 illustrates significant improvements in hygiene care practices among Saudi and Egyptian new mothers following the implementation of training programs, with a highly significant statistical difference ($p < 0.000$). Among Saudi mothers, 93% highlighted the importance of genital care, reflecting an enhanced understanding of hygiene practices. Similarly, 95% of Egyptian mothers emphasized the significance of cleaning baby nails and the umbilical cord, showcasing improved practices. These findings demonstrate the effectiveness of both virtual and actual training programs in elevating maternal practices related to newborn hygiene, contributing to better neonatal health outcomes.

Figure 5. Comparison between the practice of actual Saudi and virtual Egyptian new mothers about hygiene care for their newborn before and after the program

Figure 6 demonstrates significant improvements in practices related to breastfeeding challenges, problems, and support among Saudi and Egyptian new mothers following program implementation, with a highly significant statistical difference ($p < 0.001$). Among Saudi mothers, 80% reported a clear understanding of the importance of exclusive breastfeeding, reflecting enhanced knowledge and confidence in addressing breastfeeding challenges. Similarly, 88% of Egyptian mothers demonstrated improved awareness of the need for sufficient milk supply to support breastfeeding. These findings highlight the effectiveness of both virtual and actual training programs in empowering new mothers to manage breastfeeding issues effectively, thereby promoting better neonatal nutrition and health outcomes.

Figure 6. Comparison between the practice of actual Saudi and virtual Egyptian new mothers regarding breastfeeding challenges, problems and support before and after the program

Figure 7 highlights significant improvements in safe sleeping practices among Saudi and Egyptian new mothers after program implementation, with a highly significant statistical difference ($p < 0.01$). Among Saudi mothers, 87% adopted the practice of keeping soft bedding, such as blankets, pillows, bumper pads, and soft toys, out of the baby's sleeping area, demonstrating enhanced awareness of safe sleep environments. Similarly, 84% of Egyptian mothers reported the importance of using a firm sleep surface, such as a mattress in a safety-approved crib, reflecting improved knowledge of safe sleeping practices. These results emphasize the effectiveness of the training programs in promoting safe sleeping habits to reduce risks associated with unsafe sleep environments for newborns.

Figure 7. Comparison between the practice of actual Saudi and virtual Egyptian new mothers about safe sleeping before and after the program

Discussion

An education programme for new mothers regarding newborn care is compulsory and intended to enhance the information they acquire and make them skilful. The program focuses on the newborn, even at the time of birth, within the first day of birth, or before discharge from a health facility. This study contrasted the new mother's success in the pre-and programme with the new Saudi and Egyptian mothers' success in the practical and the virtual models.

Regarding the demographic characteristics of new Saudi and Egyptian mothers, the total knowledge and practice after programme implementation have significant differences, at 0.05, in significance for those 20-30 years of age and those with a university education. In line with these findings, Thukral et al. (2015) observed that after learning from a practical programme, the level of increase in knowledge and skills concerning newborn care among two groups of Kenyan and Indian participants was aligned with factors such as age, education and economic background (Thukral et al., 2015). According to Jourabian et al. (2021), there was a significant improvement in knowledge and skill in the intervention groups on newborn care when the programme was launched (Jourabian et al., 2021). Furthermore, according to Weiner and others (2011), there was a significant relationship between maternal education and post – test scores (Weiner et al., 2011).

Regarding newborn care practices to be adopted by new mothers, a large proportion of Saudi mothers knew genital care. On the other hand, many New

Egyptian mothers who practice hygiene noted caring for and cleaning baby nails and umbilical stump. According to these percentages, many Saudi mothers reported exclusive breastfeeding, and a large number of new Egyptian mothers reported increased awareness of milk supply. These findings are similar to Subramanian et al.'s (2020) work that showed about three-quarters of the mothers in their sampling achieved better adherence to newborn care practices when provided with postnatal education on exclusive breastfeeding, hand hygiene, keeping babies warm/skin-to-skin contact, care of umbilical cord and handling baby's stools/urine (Subramanian et al., 2020).

The findings of this study have revealed that significant changes in practice did occur statistically, as envisaged after the successful implementation of the programme for safe sleeping on each item. Many new Saudi mothers said they used practices such as ensuring that the baby's sleep area had no soft Bedding items like blankets, pillows, bumper pads and soft toys. On the other hand, many new Egyptian mothers adapted to the recommendation of having a firm sleep surface, such as a mattress in an approved crib. The following findings represent Ali's (2020) research where mothers also increased their knowledge in certain parts of the programme, including elements regarding avoiding co-bedding for twins overheating prenatal care, avoiding smoking, and prone and side lateral infant positions (Ali, 2020). The overwhelming majority of the mothers knew enough about risk factors and protective measures against SIDS after the program, at $p < 0.001$ statistically significant level compared with the pre-programmed level.

This study established the extent of change in knowledge as it regarded newborn protection from infection after the programme; a high percentage of Saudi mothers affirmed the strict adherence to avoiding sick individuals. Many new Egyptian mothers also cleaned the surfaces. When assessing the level of post-programme knowledge improvements concerning developmental needs, all the Saudi mothers who participated in this research rated high on the knowledge checklist, stating that the newborns can focus with both eyes and can follow a moving object from the side. In addition, looking at the newly arrived Egyptian women who gave birth, a significant proportion admitted that all newborns shed some weight in the first twenty-four hours. Regarding knowledge enhancement after having the programme regarding the signs of a sick newborn, a high percentage of Saudi mothers responded affirmatively to a cough. At the same time, 90 per cent of new Egyptian mothers recognized ear infections in their children. These findings align with Weiner et al. (2011), who noted that mothers' neonatal care knowledge rose in the post-test, especially concerning infection prevention, umbilical cord and warmth care, neonatal needs and danger signs (Weiner et al., 2011).

Conclusion

This study demonstrated significant improvements in maternal knowledge regarding newborn care following the implementation of training programs, with notable advancements in areas such as infection prevention, developmental needs, and recognizing signs of illness. Saudi mothers adhered to avoiding contact with sick individuals and demonstrated an enhanced understanding of newborn developmental milestones, such as the ability to focus with both eyes and follow moving objects. Similarly, Egyptian mothers demonstrated a better understanding of key practices such as washing surfaces, knowing the pattern of newborns' weight loss, and identifying signs of danger such as ear infections. These results described a significant increase in knowledge about infection prevention, umbilical cord and thermal care, and recognizing danger signs after the program. These findings highlight the lack of educational initiatives that prepare new mothers for childcare responsibilities and the need to introduce systematic courses into the postnatal care services provided to new mothers worldwide.

Future Recommendation & Implication

This study emphasizes program development on virtual training to increase awareness and existing skills among newly delivered mothers in newborn care. Therefore, the authors recommended that virtual training could be implemented in the richness of postnatal care services with face-to-face interventions to increase diversity. These programs should include hygiene, feeding, thermoregulation, growth, development, and early signs of neonatal illness because knowledge has been seen to reduce neonatal morbidity and mortality. Further, if these programs are available freely or at a subsidized

price, the turnout rate will likely increase, especially for less privileged individuals. Healthcare policymakers and providers should strive to expand these intervention approaches and adapt them to different cultural and socioeconomic settings. Thus, further studies should focus on evaluating these programs on actual maternal and neonatal health, their efficiency and costs, and how information technologies can help better communicate the messages conveyed. Incorporating structured education within routine postnatal care can facilitate the early standardization of newborn care practices worldwide and increase continuity of care between facility and home to enhance newborn health.

Declarations and Statements

Acknowledgment: The authors thank the deanship of scientific research at Najran University for funding this work under the Najran Region research program Funding program grant code (NU/-/MRC/10/329).

Funding: This research received no specific grant from public, commercial, or not-for-profit funding agencies.

Ethical Approval: Not applicable

Conflict of interest: The authors do not have any conflict of interest.

Data availability statement: Data is available within the manuscript and will be provided at the editor's request.

Author Contributions: The authors have equally contributed to writing, designing, compiling, and editing the final manuscript

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