



Research Article

**EFFECTIVENESS OF SMALL GROUP-BASED NEONATAL CARE EDUCATION ON  
MATERNAL KNOWLEDGE: A PRE-TEST-POST-TEST STUDY**

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**Abstract:** Neonatal care is vital for both survival in the early days of life and long-term growth and development. Early interventions and educational programs can significantly impact neonatal health. The study aimed to assess the effect of newborn care education provided within small group-focused maternal education on maternal knowledge. The quasi-experimental study with a pretest-posttest design was conducted with 30 women at a “family, women's support and disability center” in a district of Istanbul. A 5-week educational program was implemented. In the program, information on pregnancy, birth and postpartum mother-baby care is theoretical and newborn care is given practically with an amigurumi doll. Data were collected using a sociodemographic information form and a pregnancy, motherhood and infant care information form. Both forms were applied before the training and the information form was applied again at the end of the training. The knowledge test's sensitivity, specificity, and cut-off values were determined. A maximum score of 46 was possible; scores of 31.5 and 39.6 or above on the pre- and post-tests, respectively, were considered sufficient. Data were analyzed at a 5% significance level. Participants had an average age of 30.7 years, most had high school or higher education, and were in their 19th week of pregnancy. The average pre-test score of 33.7 increased to 39.6 post-test ( $p=0.00$ ). Participants reported a satisfaction rate of 9.5/10. Knowledge about neonatal care improved, though decreases were noted in specific areas like bathing and breastfeeding techniques. This study reveals that small group-based antenatal education is effective in increasing the level of knowledge about pregnancy and childbirth process and ensuring mothers' satisfaction. The findings emphasize the importance of disseminating such structured education programs.

**Keywords:** Health education, neonatal care, nursing support, pretest-posttest study, sustainable development goals.

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## 1. Introduction

Newborn care is a critical determinant of neonatal health, growth, and survival. Globally, neonatal mortality remains a significant public health challenge, accounting for 47% of all under-five deaths in 2020 [1]. The first 28 days of life represent a period of heightened vulnerability, where appropriate care practices can significantly improve outcomes. Effective newborn care, encompassing breastfeeding, hygiene, immunization, and early identification of complications, is essential not only for survival but

also for optimal growth and development [2,3]. Maternal education plays vital role in ensuring adherence to these practices, with studies demonstrating that targeted training improves both maternal confidence and neonatal health metrics [4].

The role of structured maternal education, particularly small-group training sessions, has gained increasing attention in recent years [5-8]. Such programs create opportunities for personalized learning, peer interaction, and discussion of practical scenarios, which are particularly effective in equipping mothers with the skills necessary to care for their newborns [9]. Moreover, the integration of pre- and post-assessment tools within these programs provides measurable evidence of knowledge acquisition and program efficacy [10]. Despite their proven benefits, access to these educational interventions remains limited in many regions, particularly among vulnerable populations.

Turkey has made significant strides in maternal and child health, yet disparities persist, particularly in access to comprehensive prenatal and newborn care education [11-13]. This study aims to evaluate the impact of small-group, focus-based training on maternal knowledge regarding pregnancy, delivery, and newborn care. By highlighting the effectiveness of these interventions, this research seeks to inform policy and practice to enhance maternal and neonatal health outcomes, aligning with global goals such as the United Nations Sustainable Development Goal 3: ensuring healthy lives and promoting well-being for all ages [14]. These goals can be supported at the local level through the integration of newborn care training programs. In this context, innovative solutions such as community-based education centers and mobile health applications can contribute to reducing neonatal mortality rates and fostering the development of healthy individuals.

The findings of this study contribute to a growing body of evidence supporting structured maternal education as a vital tool for improving neonatal care practices. Furthermore, newborn care education directly supports the achievement of Sustainable Development Goals (SDGs), particularly SDG 3, by reducing neonatal mortality and ensuring healthy lives. Promoting education on newborn care also intersects with SDG 4 (Quality Education) and SDG 5 (Gender Equality), as it empowers mothers with knowledge and skills while addressing gender-based disparities in health education [14]. To ensure sustainability, these programs should incorporate scalable models, such as digital tools and community-based initiatives, to extend their reach and impact. By addressing gaps in maternal knowledge and providing actionable insights, this research underscores the importance of targeted educational programs in achieving sustainable and equitable health outcomes for mothers and their newborns. In light of this information, our study aimed to determine the effect of newborn care education provided within small group-based maternal education on mothers' knowledge.

### **1.1. Research Hypotheses**

- Antenatal education programs lead to an increase in pregnant women's knowledge about prenatal, intrapartum and postnatal period.
- Small group format education in antenatal education programs is effective in increasing knowledge.

## **2. Methods**

### **2.1. Study Design**

This study is a quasi-experimental and pre-test-post-test study.

### **2.2. Participants**

The study population included all pregnant women registered at a “family, woman support and disabled center”, between April 2023 and June 2023. The center is affiliated to the district municipality

and is free and open to all residents of the district. Therefore, there is no registration at the center. Women are notified of planned training programs through the municipality's message platform (text message). Those who come on the first day of the education are registered on an education basis. The sample size was determined based on testing the difference between means in dependent groups (paired samples t-test). The calculation considered a significance level of  $\alpha=0.05$ , statistical power  $(1-\beta)=0.80$ , and a medium effect size (Cohen's  $d=0.6$ ) reported in similar educational intervention studies in the literature [7,8-10]. According to the G\*Power analysis, a minimum of 24 pregnant women is required with these parameters. No sampling method was used; all registered women who fully participated in the pregnancy education program and met the inclusion criteria were included. The inclusion criteria were being pregnant, aged over 18, fluent in Turkish, literate, and attending all sessions of the seminar. On the first day of the program, 44 women registered, but over the course of 5 weeks, 30 women fully participated.

### 2.3. Data Collection Tools

In the study, a sociodemographic information form and a pregnancy, motherhood, and infant care information form developed by the researchers in line with the literature were used. [5-8, 12,13].

**Sociodemographic Form:** Included data on participants' age, education, employment status, number of children, pregnancy status, and prior pregnancy experiences.

**Pregnancy, Childbirth, and Newborn Care Knowledge Form:** Comprised true/false statements about pregnancy, childbirth, postpartum, breastfeeding, and baby care. The form had 46 questions across five sections. Correct answers were scored as 1, and incorrect answers as 0. The final version was created after expert review for content validity. Scores ranged from 0 to 46. Sensitivity, specificity, and cut-off values were determined through statistical analysis. A pre-test score of 31.5 and a post-test score of 39.5 or above indicated sufficient knowledge.

### 2.4. Data Collection

Data were collected face-to-face by the researchers after obtaining relevant permissions and ethical approval. The training was provided to all pregnant women simultaneously in the meeting room. The training was provided by a different researcher each week. Other researchers were also present in the meeting room during the education sessions. Before training, participants created pseudonyms and filled out the sociodemographic form and the pre-test pregnancy, childbirth, and neonatal care knowledge form during the introduction week. The training program, based on the "Pregnancy Education Class Instructor Manual" [15], lasted five weeks, with sessions held once a week for two hours.

- Week 1: Reproductive physiology, pregnancy monitoring, and immunization.
- Week 2: Pregnancy-related changes and daily life during pregnancy.
- Week 3: Common pregnancy issues and solutions.
- Week 4: Labor, postpartum period, neonatal care, attachment, breastfeeding, and its importance. The education was knowledge-based. The neonatal care section was both theoretical and practical (using an amigurumi doll model).
- Week 5: Postpartum period, mother-baby communication, and daily life post-birth.

After each session, participants' questions were addressed individually. Following the five-week program, right after the final training session the post-test knowledge form was completed, and feedback was collected.

## 2.5. Ethical Aspects of the Study

Approval was obtained from the Human Researches Ethics Committee of İstinye University (Date:07.03.2023, Number: 2023-51) and the family women support and disability center where the study was conducted (Date:16.01.2023). Participants provided informed consent, and the study adhered to the Helsinki Declaration.

## 2.6. Data Analysis

Data were analyzed using statistical software (SPSS v26). Descriptive statistics such as mean, median, standard deviation, minimum, and maximum values were calculated for continuous variables, while frequencies and percentages were used for categorical variables. Normality tests determined appropriate statistical tests, including Chi-square, Kruskal-Wallis, and Mann-Whitney U. Post-hoc analysis and Dunnett's T3 test were used to determine significance. A paired samples t-test was used to analyze differences between pre-test and post-test results. Statistical significance was set at a 95% confidence level ( $p < 0.05$ ).

## 3. Results

The study was completed with 30 pregnant women with an average age of 30.7 years and an average gestational age of nineteen weeks. The distribution of participants' descriptive characteristics and their comparison with the pre-test scores on the “Pregnancy, Childbirth, and Newborn Care Information Form” are presented in Table 1, and the post-test scores are presented in Table 2. Half of the pregnant women were high school graduates, 80% were not working, 53.4% had children and 43.8% of them had 2 children.

**Table 1.** Participants' descriptive characteristics and comparison with the pre-test knowledge score on the “Pregnancy, Childbirth, and Newborn Care Information Form”

| Characteristics        |                          | Mean±Sd  | Min-Max (Med) | +Form Scores<br>Pre-Test |
|------------------------|--------------------------|----------|---------------|--------------------------|
| Age                    |                          | 30.7±5.1 | 24-41 (28.5)  | *1.535<br>0.207          |
| Age at Marriage        |                          | 23.5±2.7 | 16-28 (24)    | *1.938<br>0.111          |
| Age at First Pregnancy |                          | 25.5±3.3 | 17-31(26)     | *3.794<br>0.008          |
| Gestational Week       |                          | 19±8.9   | 1-38(19)      | *3.376<br>0.013          |
|                        |                          | n        | %             |                          |
| Educational Level      | Primary/Secondary School | 6        | 20            | **1.167<br>0.558         |
|                        | High School              | 15       | 50            |                          |
|                        | University or Higher     | 9        | 30            |                          |
| Child status           | Yes                      | 16       | 53.4          | ***-0.651                |
|                        | No                       | 14       | 46.6          | 0.515                    |
| Child number           | 1                        | 4        | 25.0          | **2.495                  |
|                        | 2 <sup>b</sup>           | 7        | 43.8          | 0.048                    |
|                        | 4 <sup>c</sup>           | 5        | 31.2          | ++b>a=c                  |
| Chronic Illness        | Yes                      | 7        | 23.3          | ***-2.652                |
|                        | No                       | 23       | 76.7          | 0.008                    |
| Number of pregnancies  | 1                        | 14       | 46.7          | **0.601<br>0.748         |
|                        | 2                        | 7        | 23.3          |                          |
|                        | 3 and above              | 9        | 30            |                          |

Table 1. Continued.

|                                    |                              | n         | %          |                                 |
|------------------------------------|------------------------------|-----------|------------|---------------------------------|
| Previous type of birth             | Vaginal Birth <sup>a</sup>   | 5         | 16.6       | <b>**6.364</b>                  |
|                                    | Cesarean                     | 11        | 36.7       | <b>0.041</b>                    |
|                                    | First Pregnancy <sup>c</sup> | 14        | 46.7       | <b>++b&gt;a</b><br><b>++a=c</b> |
| Support from a health professional | Yes                          | 6         | 20.0       | <b>***-1.494</b>                |
|                                    | No                           | 24        | 80.0       | <b>0.135</b>                    |
| <b>TOTAL</b>                       |                              | <b>30</b> | <b>100</b> |                                 |

Sd: Standard deviation; min: minimum; max: maximum; Med: median; <sup>+</sup>Pregnancy, Childbirth, and Neonatal Care Knowledge Form; \*Chi-square test; \*\*Kruskal Wallis test; \*\*\*Mann Whitney U Test; ++Post-hoc analysis: Dunnett's T3 test; p<0.05

**Table 2.** Participants' descriptive characteristics and comparison with the post-test knowledge score on the “Pregnancy, Childbirth, and Newborn Care Information Form”

| Characteristics                    |                              | Mean±Sd   | Min-Max (Med) | <sup>+</sup> Form Scores<br>Post-Test |
|------------------------------------|------------------------------|-----------|---------------|---------------------------------------|
| Age                                |                              | 30.7±5.1  | 24-41 (28.5)  | <b>*5.122</b><br><b>0.001</b>         |
| Age at Marriage                    |                              | 23.5±2.7  | 16-28 (24)    | <b>*1.193</b><br><b>0.347</b>         |
| Age at First Pregnancy             |                              | 25.5±3.3  | 17-31(26)     | <b>*1.757</b><br><b>0.147</b>         |
| Gestational Week                   |                              | 19±8.9    | 1-38(19)      | <b>*4.065</b><br><b>0.005</b>         |
|                                    |                              | n         | %             |                                       |
| Educational Level                  | Primary/Secondary School     | 6         | 20            | <b>**2.935</b>                        |
|                                    | High School                  | 15        | 50            | <b>0.230</b>                          |
|                                    | University or Higher         | 9         | 30            |                                       |
| Child status                       | Yes                          | 16        | 53.4          | <b>***-1.151</b>                      |
|                                    | No                           | 14        | 46.6          | <b>0.250</b>                          |
| Child number                       | 1                            | 4         | 25.0          | <b>**1.953</b>                        |
|                                    | 2 <sup>b</sup>               | 7         | 43.8          | <b>0.109</b>                          |
|                                    | 4 <sup>c</sup>               | 5         | 31.2          |                                       |
| Chronic Illness                    | Yes                          | 7         | 23.3          | <b>***-1.207</b>                      |
|                                    | No                           | 23        | 76.7          | <b>0.228</b>                          |
| Number of pregnancies              | 1                            | 14        | 46.7          | <b>**0.244</b>                        |
|                                    | 2                            | 7         | 23.3          | <b>0.969</b>                          |
|                                    | 3 and above                  | 9         | 30            |                                       |
| Previous type of birth             | Vaginal Birth <sup>a</sup>   | 5         | 16.6          | <b>**1.887</b>                        |
|                                    | Cesarean                     | 11        | 36.7          | <b>0.389</b>                          |
|                                    | First Pregnancy <sup>c</sup> | 14        | 46.7          |                                       |
| Support from a health professional | Yes                          | 6         | 20.0          | <b>***-1.754</b>                      |
|                                    | No                           | 24        | 80.0          | <b>0.079</b>                          |
| <b>TOTAL</b>                       |                              | <b>30</b> | <b>100</b>    |                                       |

Sd: Standard deviation; min: minimum; max: maximum; Med: median; <sup>+</sup>Pregnancy, Childbirth, and Neonatal Care Knowledge Form; \*Chi-square test; \*\*Kruskal Wallis test; \*\*\*Mann Whitney U Test; ++Post-hoc analysis: Dunnett's T3 test; p<0.05

The distribution of participants' scores from the pregnancy, motherhood, and baby care knowledge form and their satisfaction scores are shown in Table 3. Pregnant women's satisfaction with education was 9.5 out of 10 points. It was determined that satisfaction with the education affected the pre-test score (p=0.006). While the pre-test score of the pregnant women was 33.7 points, the post-test score increased to 39.6 points after the training. A statistically significant difference was found between

pre and post-test scores ( $p=0.000$ ). The pre-test score was affected by the first pregnancy ( $p=0.008$ ), gestational week ( $p=0.013$ ), number of children ( $p=0.048$ ), presence of chronic disease ( $p=0.008$ ) and previous mode of delivery ( $p=0.041$ ). The age of the pregnant woman ( $p=0.001$ ) and gestational week ( $p=0.005$ ) affected the post-test score.

**Table 3.** Distribution of participants' scores on the “Pregnancy, Childbirth, and Newborn Care Information Form

| Characteristics                   | Mean±Sd  | Min-Max (Med) | *Form Scores                 |                |
|-----------------------------------|----------|---------------|------------------------------|----------------|
|                                   |          |               | *Pre-Test                    | *Post-Test     |
| Satisfaction with Training (0-10) | 9.5±1    | 7-10(10)      | <b>3.954</b><br><b>0.006</b> | 1.628<br>0.180 |
| Pre-Test Score                    | 33.7±5.2 | 29-46(32)     | <b>9.793</b>                 |                |
| Post-Test Score                   | 39.6±2.8 | 35-45(39.5)   | <b>0.000</b>                 |                |

Sd: Standard deviation; min: minimum; max: maximum; Med: median; \*Pregnancy, Childbirth, and Neonatal Care Knowledge Form; \*Chi-square test;  $p<0.05$

#### 4. Discussion

In this study, the effect of small group-based neonatal care education on mothers' knowledge levels about pregnancy, birth and newborn care was examined. When the knowledge levels before and after the training were compared (pre-test mean score: 33.7 points and post-test mean score: 39.6 points), a statistically significant increase was observed in the knowledge scores of the participants. This finding supports the positive impact of small group education on the learning process. It is thought that especially the education given in an interactive environment contributed to the participants' access to information in a more permanent way. When the literature was reviewed, it was reported that similar to our study, trainings conducted in focus groups or small groups were effective [16-18]. Similarly, in a study conducted with adolescent pregnant women in Turkey, it was reported that antenatal education had positive effects on prenatal and postnatal adaptation and that the group receiving education had a higher level of adaptation in the postpartum period [19]. This finding suggests that mothers who received education were able to manage the transition to birth and motherhood in a healthier way. A systematic review evaluated the effects of antenatal education in small groups on obstetric and psychosocial outcomes. The review suggests that such trainings may have the potential to improve parenting skills, build self-confidence and reduce health service utilization. However, it was also stated that no general conclusion could be reached due to methodological differences. This also indicates that it is important to continue studies on this subject after birth, as they began during the maternal period. It has shown that there is a need for studies using different types of research that examine this process [20].

In our study, while the number of education groups was higher at the beginning, the number of participants decreased over time and only 30 pregnant women completed the training completely and 53.4% of those who completed the training had children. In another study conducted in our country, it was found that 62.7% of women who regularly attended pregnancy schools gave birth normally and 59.72% breastfed for more than 6 months. It was reported that the duration of breastfeeding decreased with increasing educational attainment, while women who were not working breastfed for longer [1]. In our study, only a posttest was conducted at the end of the training, and similar results were obtained. This is because most participants preferred normal delivery and an increase in their knowledge level regarding newborn care was observed.

Participants' satisfaction with the training was found to be quite high (mean 9.5/10). This shows that the training was effective when it was interactive, practical and presented in a small group format. Similarly in the literature, it is stated that small group education facilitates learning by increasing interaction between individuals [7,13,22].

Although this study included general antenatal education, the marked improvement in knowledge of newborn care suggests that participants benefited most from the practical and focused aspects of the education. Neonatal care education not only increases mothers' confidence, but also has measurable effects on the growth and development of newborns [23-25]. Proper breastfeeding techniques covered in the training ensure adequate nutrition during the critical first months of life, directly affecting growth parameters such as weight gain, height and head circumference [25]. In addition, hygiene and immunization education reduces the risk of infection, contributing to improved health outcomes and uninterrupted growth [4,26].

The high levels of satisfaction (mean:  $9.5 \pm 1.0$ ) in our study suggest that mothers value the practical and relevant information provided in the newborn care modules. This finding is in line with Lee et al. (2020) who reported that interactive and culturally adapted newborn care education significantly increased maternal satisfaction and readiness [27]. For example, one study showed that mothers who participated in newborn care education were more likely to exclusively breastfeed for the recommended six months, which is directly linked to optimal growth and development in infants [10]. Furthermore, a longitudinal study in Bangladesh highlighted that infants whose mothers received targeted newborn care training showed significantly better growth measures at six months compared to infants whose mothers did not receive such education [26]. However, there was a decrease in the level of knowledge in some knowledge areas, such as practical topics such as baby bathing and breastfeeding techniques. This may be related to the fact that these topics are skills that require more practice and the time allocated to this section, and suggests that more practical content should be added to these areas in future training programs.

Given the significant improvements observed, this study emphasizes the need to prioritize neonatal care education within broader antenatal programs. While antenatal education lays the foundation for healthy pregnancies, targeted neonatal care education directly affects neonatal health by empowering mothers with practical, actionable information [3,28]. Integrating newborn care education into routine maternal health programs, particularly in small group settings, can ensure that mothers are adequately prepared for the challenges they may face in the early postpartum period. These interventions also have long-term effects on child development, as health early in life is closely linked to future growth and cognitive outcomes [2].

In this context, our study is not only limited to individual health gains, but is also directly related to global health goals. In particular, SDG 3 (Healthy Individuals) and SDG 4 (Quality Education), which are among the Sustainable Development Goals (SDGs) of the United Nations, are of great importance in terms of supporting maternal and newborn health and disseminating education in the early period, which is the focus of our study. Such structured, small group trainings provided to mothers appear to both increase health literacy and contribute to reducing gender-based health inequalities. In addition, the fact that women who receive training behave more consciously in infant care also serves SDG 5 (Gender Equality) by contributing to public health in the long term [14,29].

#### **4.1. Limitations and Strengths of the Study**

The limitations of the study include its quasi-experimental design, single-center implementation, and sample size of 30 pregnant women. The collection of data through self-report forms may lead to information bias. Furthermore, since knowledge levels were measured in the short term, long-term behavioral changes could not be evaluated.

One of the strengths of the study is that it is one of the few studies evaluating the effectiveness of small group-based prenatal education. The five-week structured education program provided both theoretical and practical content, resulting in a significant increase in mothers' knowledge levels and a high level of satisfaction. The standardized education content based on national guidelines strengthens

the replicability of the study; the findings provide scientific support for the importance of promoting small group education that supports maternal and infant health.

## 5. Conclusion

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### Ethical statement:

The study was approved by the Human Researches Ethics Committee of İstinye University (Approval date:07.03.2023, Approval number: 2023-51). Informed consent was obtained from the women to participate in the study.

### Conflict of interest:

The authors must notify of any conflicts of interest.

### Authors' Contributions:

**A.S:** Concept, Design, Supervision, Materials, Data Collection and Processing, Analysis and Interpretation, Literature Review, Writing, Critical Review. (%30)

**E.B.K:** Concept, Design, Supervision, Materials, Data Collection and Processing, Literature Review, Writing, Critical Review. (%25)

**E.C:** Concept, Design, Materials, Data Collection and Processing, Literature Review, Writing, Critical Review. (%15)

**M.K:** Concept, Design, Materials, Data Collection and Processing, Literature Review, Writing, Critical Review. (%15)

**T.K:** Concept, Design, Materials, Data Collection and Processing, Literature Review, Writing, Critical Review. (%15)

All authors read and approved the final manuscript.

### Generative AI statement:

The authors declare that no Gen AI was used in the creation of this manuscript.

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