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**Effectiveness of Developmental Supportive Care Program (DSCP)
on the health status of preterm infants, knowledge, and practice
of care providers in a selected Neonatal unit of tertiary care
hospital.**

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ABSTRACT

Background

According to the WHO report 2018, globally, 15 million babies are born as preterm, and this number is rising. Preterm infants need special intensive care. Therefore, they are separated from their mother and the family and taken care of by trained personnel using modern high-tech technology. This separation and high-tech care will be a traumatic condition for preterm infants, which may alter the physiological and behavioral responses. The preterm infant's brain responds by pleasure experience of positive stimulation that enhances the strength of the connection between neurons. Any negative stimulation or absence of it will lead to apoptosis (neuronal cell death). The early stressful experience will have an impact on the physiological and behavioral maturation of all organs of the body. Preventing the stress level and promoting the health status of preterm infants are essential components of nursing care. Developmental supportive Care (DSC) is a better strategy to combat these consequences. This intervention will be a non-pharmacological and cost-effective technique that will assist in normalizing the health status of preterm infants.

The study aims to assess the effectiveness of Developmental Supportive Care Program (DSCP) on the health status of preterm infants, knowledge and practice of care providers

Method

The research approach was a quantitative approach to evaluate the effectiveness of the DSC program. In the first phase, the Pretest-post-test-control group design, 50 nurses (25 in each group) were included through purposive sampling. The DSC training module was developed, and DSC training was conducted for the nurses in the

intervention group to understand the concept of DSC. Tools were developed by the investigator to generate data, and which were validated and pretested. The reliability established for the structured knowledge questionnaire on DSC was ($r = 0.789$), DSC practice observation checklist of nurses: ($r = 0.793$), and DSC practice of mother of preterm infants ($r = 0.784$) and SCRIP score of preterm infants: ($r = 0.99$). Behavioral assessment of preterm infants (standardized tool, autonomic /visceral behavior ($r = 0.98$) and attention interaction ($r = 0.92$).

In Phase II, 160 preterm infants were randomized to intervention and control groups using block randomization techniques. After obtaining informed consent, mothers were empowered with the DSC concept using both pamphlets and hands-on experience. The health status of the preterm infants assessed with SCRIP (Cardio-Respiratory Stability of Preterm infants) score and salivary cortisol levels for physiological response and the behavioral response was evaluated by Standardized preterm behavioral assessment scale. This assessment was done at recruitment, after 24 hours, and on day seven of recruitment. The clinical outcome of preterm infants with or without DSC intervention was documented through inpatient records. It includes the Respiratory support status, initiation of establishment of complete breastfeeding, the incidence of infection, Retinopathy of Prematurity (ROP), hearing loss, and Intraventricular Hemorrhage (IVH). The study also assessed the growth parameter of preterm infants by recording weight and head circumference at recruitment. The assessment was repeated weekly in the first three weeks, on discharge, at 40th week, and 12 months corrected age. Development was assessed both in the intervention ($n = 59$) and control group ($n = 61$) using the BSID version III during the 12th month follow up.

Result

Out of 50 neonatal nurses, the majority (intervention: 16(64%) and control:18 (72%) group had a diploma in nursing qualification. The maximum in the intervention group: 21(84%) and control group: 23(93%) had less than five years of experience. Regarding the effectiveness of the DSC training program, the Repeated measures of ANOVA showed that [$F(1,48)=143, p<.001$], indicating that the effect of DSC training on the DSC knowledge score of neonatal nurses was significant. The post-test practice score among neonatal nurses and mothers in the DSC group was found to be a statistically significant improvement.

The effectiveness of DSC was elicited among the health status of 160 preterm infants, with mean gestational age in weeks, 30.12 ± 1.33 in the intervention group, and 30.05 ± 1.76 in the control group. The mean weight was 1257 ± 0.264 in the intervention group and $1256.06 \pm .25$ in the control group at recruitment. With regards to a physiological response, the repeated measures of ANOVA showed that there was a significant reduction in salivary cortisol level at 24 hours and on the 7th day compared to the control group, ($F(2,1.86)=19.17, p < .001$) and also showed significant improvement in Cardio-Respiratory Stability of Preterm Infants (SCRIP) score ($F(2,2.19)=8.74, p = <.001$). About autonomic/visceral and attention/interaction behavior, there was no statistically significant difference found. The repeated measures have shown, ($F(1,89) = 17.0, p=0.16$), and attention interaction behavior, ($F(13,07)=1.07, p= 0.17$) within and between groups.

The clinical outcome of preterm infants in the study shows that there was a significant difference found in a duration of hospitalization, initiation of breastfeeding and establishment of complete breastfeeding, and there was no significant difference

found in the length of ventilation, the occurrence of sepsis, Retinopathy of Prematurity, hearing loss and Intraventricular Ventricular Hemorrhage.

With regard to growth and development, the gain in weight and head circumference measurement from recruitment to one year of follow up at different time points showed that there was no significant difference found in the mean weight gain: ($F(t_{6,1.65})=.122, p=.94$), and head circumference: ($F(t_{6,2.57})=.67, p=.66$) between the groups. At one year of follow up the development assessment using the BSID III showed that there was a significant difference found in mean motor score in the DSC group: (93.13 ± 5.28) compared to the control group (90.85 ± 4.98), ($t_{2.43}, p < .05$). There was no significant difference found in cognitive score in the intervention (93.57 ± 4.28), control group: (93.38 ± 3.00), ($t_{1.80}, p=.07$) and the language score in the intervention group (93.57 ± 4.76) control group: (92.67 ± 3.77) ($t_{1.15}, p = 0.25$).

Conclusion

The current research on training and implementation of the Developmental Supportive Care (DSC) program proved that effectiveness in maintaining the physiological and behavioral response of preterm infants, improvement in the clinical outcome in terms of initiation and establishment of complete breastfeeding, and reduction in duration of hospitalization and found better developmental outcomes in infants were born before 32 weeks of gestation. During the study, DSC intervention group mothers have shown keen interest in involving with their infants for improved and enhanced care

Keywords: Developmental Supportive Care, Preterm infants, Neonatal nurses, Mothers, Health status, Effectiveness, Clinical outcome Growth, and Development.