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Educational Intervention Regarding Mother's Awareness, Feeding Practices, And Complications Among Children with Cleft Lip and Cleft Palate

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ABSTRACT

Background: Cleft lip and palate (CLP) are two of the most prevalent congenital anomalies globally, and identifying feeding and care challenges will only exacerbate these difficulties. Mothers with CLP-affected infants often do not possess enough knowledge and skills to provide optimal care to reduce feeding complications, resulting in escalating nutritional problems, aspiration, regurgitation through the nose, and choking.

Objective: This project aimed to examine the efficacy of a structured educational intervention to influence maternal awareness, feeding practice, and feeding complications in children with CLP.

Methods: The study used a quasi-experimental one-group pre-test post-test design. In total, 76 mothers with infants diagnosed with CLP were purposively sampled (mothers of infants aged less than 1 year) from Ayesha Bashir Hospital, Gujrat. To establish pre-intervention maternal awareness, feeding practices, and complications, the researchers used structured questionnaires and observational checklists. To address maternal knowledge about optimal feeding practices, an educational intervention was delivered in the form of six sessions of education using informational brochures, handouts, and videos with further information on specialized feeding techniques (e.g., ESSR and Kumagai). A post-intervention assessment was conducted to determine whether changes were demonstrated.

Results: Following the intervention, maternal knowledge went from 59.6% (poor) at baseline to 70.3% (average) in the first follow-up. Feeding practice results were recorded at 58.5% (incompetent) to 69.4% (borderline competent). Difficulties feeding dropped from a mean score of 0.57 to 0.30. The results demonstrate that the educational program successfully improved mothers' knowledge and decreased the difficulties with feeding.

Conclusion: Structured educational strategies have a powerful impact on maternal feeding practices and reduce feeding complications in infants born with a CLP. Ongoing support and follow-up are important to help maintain the benefits of the learning.

Keywords: *Cleft Lip, Cleft Palate, Feeding Practices, Educational Intervention, Maternal Awareness, Feeding Complications.*

1. INTRODUCTION

Cleft lip with cleft palate (CLP) are common congenital anomalies that consist of a cleft (gap or opening) in the upper lip and/or the roof of the mouth caused by inappropriate fusion of facial tissue during embryonic development[1]. These abnormalities are present at birth and often necessitate surgical intervention for correction[2]. Globally, CLP affects approximately 1 in every 700 live births, making it one of the most prevalent craniofacial malformations[3]. In Pakistan, the burden of CLP is particularly high, ranking fourth globally in incidence, following China, Indonesia, and India[4]. The condition is more prevalent in males for cleft lip, whereas cleft palate is more frequently observed in females[5].

The etiology of CLP is multifactorial, involving both genetic and environmental components. Genetic mutations, particularly in the **IRF6** gene, along with chromosomal anomalies and a family history of clefting, have been implicated in increasing susceptibility[6]. Environmental risk factors such as maternal smoking, alcohol use, teratogenic drug exposure, advanced or very young maternal age, pre-existing conditions like diabetes and obesity, and nutritional deficiencies, particularly folic acid, significantly elevate the risk[7–9]. Moreover, maternal stress and exposure to infections or toxins during pregnancy have also been associated with these anomalies[10].

CLP can lead to a variety of complications including feeding difficulties, speech delays, hearing loss, and psychosocial challenges[11]. Among these, feeding issues are often the most immediate and concerning in early infancy, as the anatomical defect disrupts normal sucking, swallowing, and breathing coordination[12]. Infants with CLP are at a higher risk of aspiration, malnutrition, and growth retardation if appropriate feeding strategies are not implemented[13]. Research indicates that 67% of mothers of children with CLP report significant feeding difficulties, including choking, nasal regurgitation, prolonged feeding times, and dehydration[14]. Despite the availability of feeding interventions such as specialized bottles, nipples, and positioning techniques, many mothers lack sufficient awareness and guidance to manage these issues effectively[15].

Nurses are ideally positioned to help parents educate and train them on suitable feeding methods for their children with CLP. Systematic educational programs can help parents understand what they are doing, avoid problems associated with feeding, and improve nutrition and health for children with CLP[16]. Education and training programs that specifically target practical education (positional changes, feeding tools, and early identification of potential problems) are successful in improving feeding practices and child development[17].

As CLP (Cleft Lip and Palate) is prevalent, and there are many challenges related to feeding, we need maternal education and support from healthcare professionals desperately. Enhancing maternal knowledge through community-based training initiatives can lead to better feeding practices, reduced complications such as aspiration pneumonia, and improved quality of life for both the child and the family[18]. Moreover, we need to incorporate a structured educational component about feeding into routine care. This would improve the child's prognosis when they are born with a cleft lip and palate. This study was intended to determine maternal knowledge and maternal feeding practices surrounding feeding infants with a Cleft lip and/or cleft palate; and also evaluate the effectiveness of educational interventions to improve feeding, also known as "feeding outcomes", and feeding complications.

2. MATERIALS AND METHODS

This study employed a quantitative, quasi-experimental design using a one-group pre-test and post-test intervention model. The study was conducted at Ayesha Bashir Hospital for Cleft Lip and Palate, located on Juliani GT Road, Gujrat. The study was conducted over nine months, following the approval of the research synopsis by the Ethical Committee of the University of Lahore.

The sample size was calculated based on a 95% confidence interval, a 5% margin of error, and an expected improvement in practices of 70%. With the statistical formula P=0.70, e=0.05, the sample size was estimated to be 86 participants. This was a quasi-experimental study where one group had both a pre-test and a post-test.

The target population included children with a diagnosis of cleft lip and/or palate and their mothers. A purposive sampling method was utilized to sample participants from the designated inclusion criteria. Inclusion criteria were: children up to one year of age with a definitive diagnosis of cleft lip and/or palate made by a pediatrician or plastic surgeon, and mothers who were able to understand Urdu. Exclusion criteria included: children with dentoalveolar clefts or any associated congenital disease unrelated to cleft lip and palate, and mothers of those children.

The study was conducted at Ayesha Bashir Hospital after obtaining formal permission from the hospital's medical superintendent. In the preparatory phase of the study, the mothers of the participants were informed of the nature and aims of the study, and written informed consent was obtained. The study was undertaken with the principles of ethics regarding participants' rights, including the confidentiality and anonymity of the participants and their right to withdraw enragement in the study without justification at any time. The demographic data, feeding practices, maternal knowledge, and observed complications were gathered pre-intervention via a structured tool and checklists shared at the same time on the morning shift.

The intervention phase consisted of six structured educational sessions delivered to the mothers. These sessions, lasting between 30–40 minutes each, were conducted in simple Urdu and English to match the participants' comprehension levels. The content was delivered through printed handouts, brochures, and educational videos demonstrating feeding techniques. Researchers facilitated the sessions and completed observational checklists based on maternal responses and understanding. In the evaluation phase, the same structured tools used for the pre-test were administered post-intervention to assess changes in awareness, practices, and complications. Participants also provided feedback on each session, and outcomes were used to evaluate the effectiveness of the intervention.

Data were analyzed using SPSS. Descriptive statistics were applied to summarize demographic and baseline characteristics.

Inferential statistics, including paired t-tests or non-parametric equivalents, were used to compare pre- and post-intervention scores. Data visualization was performed using bar graphs, pie charts, and tables to illustrate the study outcomes. The research followed the ethical guidelines of the University of Lahore. Written informed consent was obtained from all participants. Confidentiality and anonymity were strictly maintained, and participants had the right to withdraw at any time. Ethical approval was obtained before the initiation of the study.

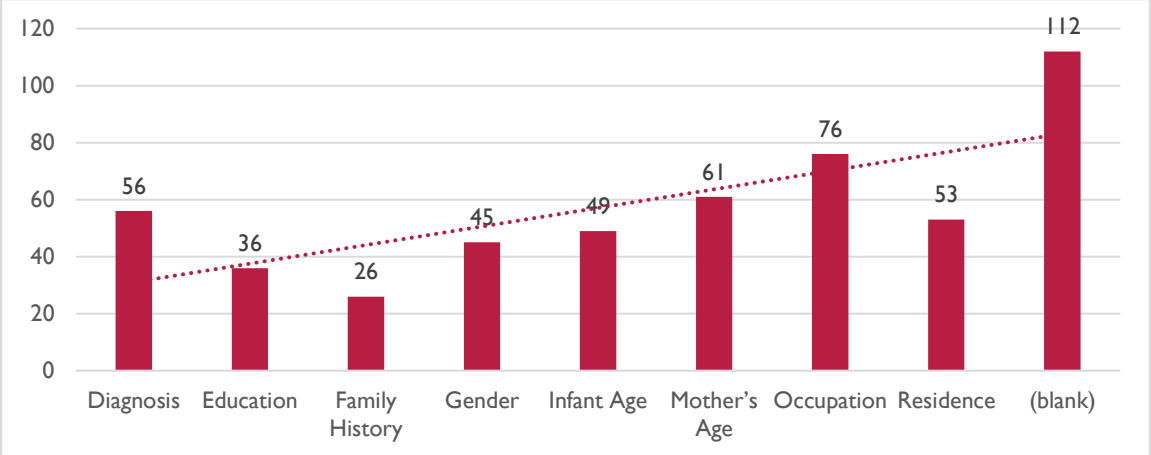
3. RESULTS

The demographic characteristics of the study participants are summarized as follows. The majority of the infants included in the study were between the ages of 0 to 6 months, accounting for 57% (n = 49), while 43% (n = 37) were aged between 6 to 12 months. In terms of gender distribution, 52.3% (n = 45) of the infants were male and 47.7% (n = 41) were female. Regarding the clinical diagnosis, 65.1% (n = 56) of the children were diagnosed with both cleft lip and cleft palate.

The maternal demographic data revealed that most mothers (70.9%, n = 61) were between the ages of 20 and 30 years. Concerning educational status, 41.9% (n = 36) had completed primary education, while 39.5% (n = 34) had attained secondary-level education. A significant proportion of the mothers were housewives, representing 88.3% (n = 76) of the total sample. Additionally, 61.6% (n = 53) of the participants resided in rural areas, and 30.2% (n = 26) reported a positive family history of cleft lip and/or palate. (Table 1)

Table 1: Demographic Characteristics of Participants

Variable	Category	Frequency (n)	Percentage (%)
Infant Age	0–6 months	49	57.00
	6–12 months	37	43.00
Gender	Male	45	52.30
	Female	41	47.70
Diagnosis	Cleft lip and palate	56	65.10
Mother's Age	20–30 years	61	70.90
Education	Primary	36	41.90
	Secondary	34	39.50
Occupation	Housewife	76	88.30
Residence	Rural	53	61.60
Family History	Yes	26	30.20

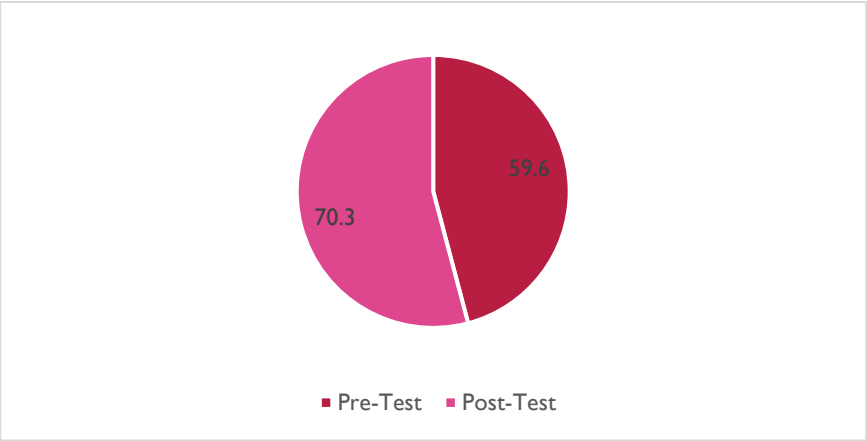


The assessment of maternal knowledge and practices regarding feeding techniques for children with cleft lip and palate showed notable improvement following the educational intervention. The average pre-test score was 59.6%, which is classified as poor. The post-test mean score showed an increase with a mean percentage of 70.3%, revealing an average level

of knowledge/ practice. This improvement in mean scores demonstrates that the educational sessions were able to positively impact maternal awareness and feeding practices. (Table 2)

Table 2: Awareness of Mothers Regarding CLP Feeding Protocols

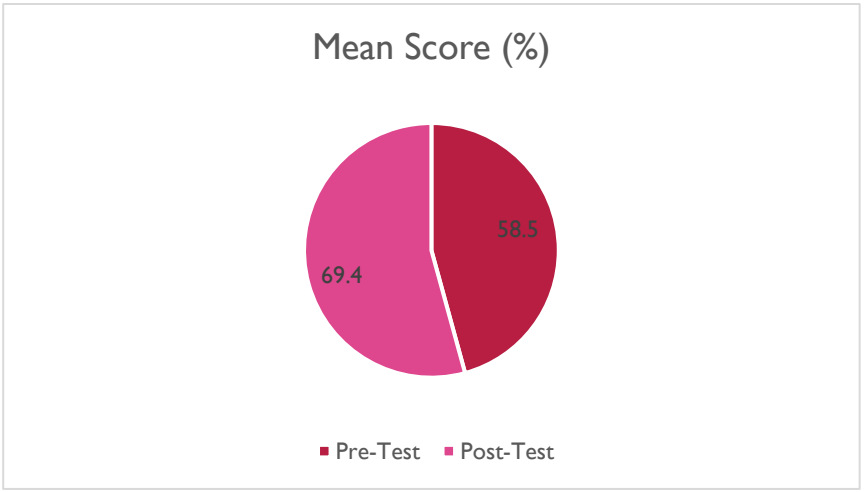
Assessment	Mean Score (%)	Classification
Pre-Test	59.6	Poor
Post-Test	70.3	Average



The assessment of maternal feeding practices before and after the educational intervention showed a remarkable change. At the pre-test assessment, their mean score was 58.5%, which was classified as incompetent. With the post-test mean score being 69.4%, we were able to classify this as borderline competent. The upward shift in performance lets us know the educational sessions had an impact on the mothers' ability to implement appropriate feeding methods for infants with cleft lip and palate; however, more reinforcement may be needed for full competence. (Table 3)

Table 3: Feeding Practices of Mothers

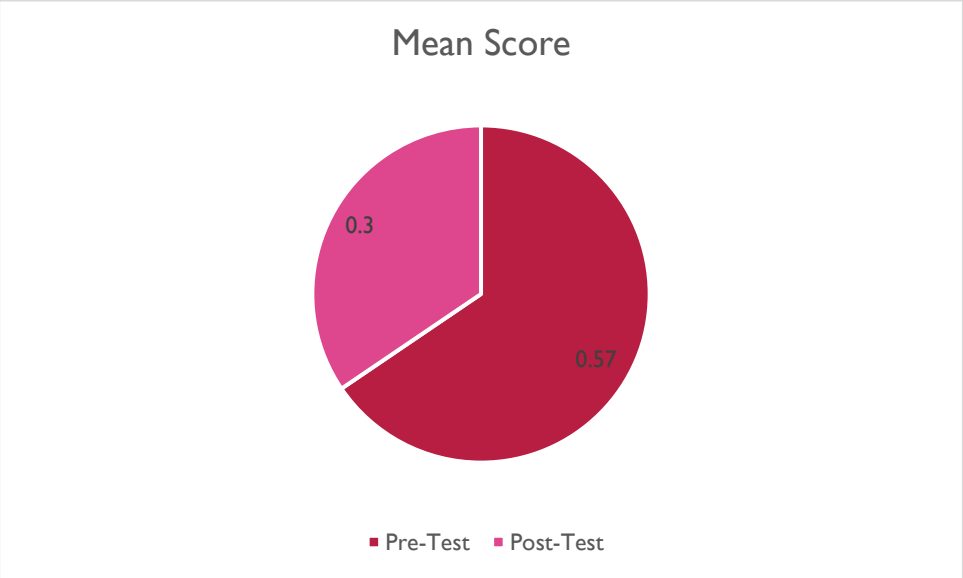
Assessment	Mean Score (%)	Classification
Pre-Test	58.5	Incompetent
Post-Test	69.4	Borderline Competent



The analysis of feeding complications before and after the intervention, presented in Table 4, shows a marked decrease in complications for infants with cleft lip and palate. In the pre-test, the mean score for complications was 0.57, which represents a moderate level of complications. After the educational intervention, the mean score for complications dropped to 0.30, indicating a decrease in feeding complications. This decline is indicative that the educational intervention helped mothers to understand and use feeding techniques properly and, therefore, reduce associated complications such as choking, nasal regurgitation, and aspiration.

Table 4: Feeding Complications

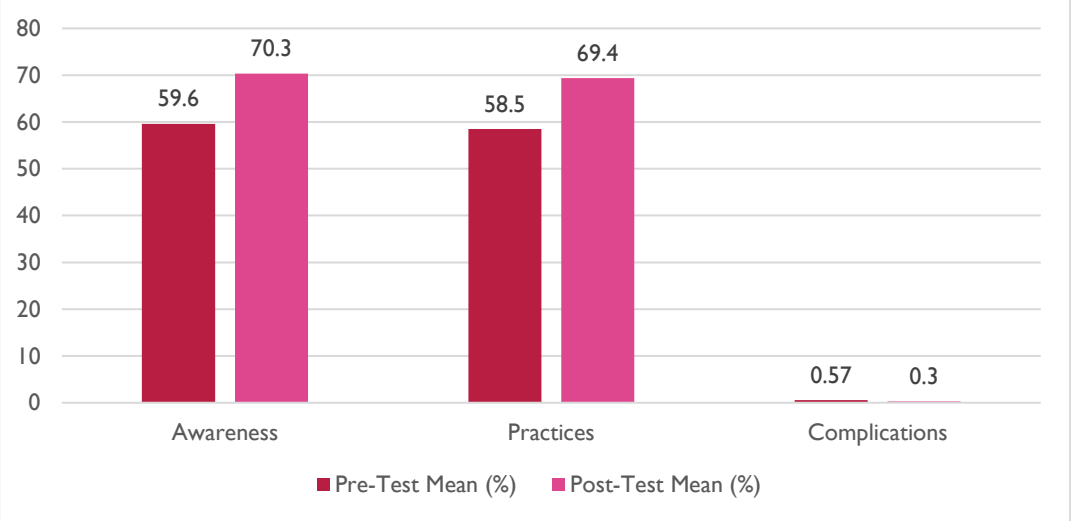
Assessment	Mean Score	Interpretation
Pre-Test	0.57	Moderate complications
Post-Test	0.30	Reduced complications



The comparison of pre- and post-test data indicates a beneficial educational intervention on the maternal awareness, feeding practices, and complications while feeding their infants with cleft lip/palate. The maternal awareness mean score improved from 59.6% in the pre-test to 70.3% in the post-test, thereby demonstrating meaningful improvement in maternal knowledge. The mean scores of feeding practices moved participants from incompetent to borderline competent. Finally, the mean score for complications related to feeding decreased from 0.57 to 0.30, which indicates a significant drop in complications (e.g., aspiration, choking, and nasal regurgitation). As a whole, this educational intervention improved the feeding practices of mothers and resulted in a reduction of feeding risks in children with cleft lip/palate.(Table 5)

Table 5: Overall Comparative Summary

Variable	Pre-Test Mean (%)	Post-Test Mean (%)	Change
Awareness	59.6	70.3	Improved
Practices	58.5	69.4	Improved
Complications	0.57	0.30	Decreased



4. DISCUSSION

Cleft lip and palate (CLP) represent some of the most prevalent congenital anomalies globally, with an estimated incidence of 1 in every 700 live births. However, the prevalence varies geographically, with regions such as Africa and Europe reporting lower rates, while South Asian countries, particularly Pakistan, exhibit a significantly higher burden. Within Pakistan, Punjab accounts for the highest proportion of CLP cases at 67.4%, and males are disproportionately affected[19]. This study aimed to evaluate the effectiveness of an educational intervention on improving maternal awareness and feeding practices for children with CLP. The findings indicated a measurable improvement in both knowledge and practices, though full competency was not achieved. Notably, a significant reduction in feeding-related complications, such as dysphagia and nasal regurgitation, was observed post-intervention, with techniques like ESSR (Enlarge, Stimulate, Swallow, Rest) and Kumagai proving effective[20].

Comparable findings were reported in a recent study where the application of similar educational interventions resulted in improved maternal confidence and feeding skills, along with a reduction in feeding-related complications. These outcomes were strongly linked to the implementation of structured techniques like ESSR and Kumagai, which helped mothers better manage feeding challenges. However, a disparity between early initiation of breastfeeding (44%) and continued exclusive breastfeeding (35%) suggested difficulty in sustaining proper practices beyond the neonatal period[21].

Another study corroborated these findings, showing that mothers, once properly trained, demonstrated improved proficiency in breastfeeding and bottle-feeding techniques. In that study, the mean age of infants was 3.8 ± 3.3 months, and over half the mothers had a family history of CLP. Following the structured feeding protocol, there was a statistically significant improvement in maternal knowledge and practices ($p < 0.05$), which aligns with the outcomes of the present study[22].

A cross-sectional study further highlighted maternal anxiety associated with feeding infants with CLP, particularly when the infants struggled to suck or experienced nasal regurgitation. Many mothers resorted to bottle-feeding as a coping strategy, yet gaps remained in their understanding and application of correct feeding methods. The findings supported the role of comprehensive educational programs in reducing these anxieties and improving feeding efficacy[23].

The efficacy of the ESSR method was also emphasized in another investigation, where the technique led to reduced feeding difficulties and enhanced growth outcomes in infants with CLP. However, the study also pointed to the need for improved maternal education on appropriate usage, especially concerning the use of specialized feeding tools like squeezable bottles and spoon-feeding devices[24]. Structured interventions that increased maternal understanding of feeding positions, techniques, and complications were recommended to ensure sustained improvement in both infant outcomes and maternal practices.

Post-intervention assessments in the present study revealed that feeding practices shifted from *incompetent* to *borderline competent*. Although these results reflect positive progress, they also indicate the need for further training. The success of the intervention, which incorporated videos, interactive discussions, and live demonstrations, was evident in the reduction of complications such as nasal regurgitation and aspiration. It was also noted that factors such as maternal income levels influenced awareness about the benefits of breast milk and appropriate weaning strategies[25].

Furthermore, improvements in maternal knowledge were positively correlated with better feeding practices and, subsequently, improvements in infant feeding patterns and weight gain. These clinical improvements underscore the importance of sustained maternal education. Pediatric nurses played a vital role throughout this process, offering support, education, and regular follow-ups to mothers. Ongoing education and skill reinforcement were identified as essential

components in maintaining improved outcomes over time[26].

A related quasi-experimental study evaluated two specific feeding positions, elevated supine (ESU) and elevated side-lying (ESL), and their impact on infants with CLP. While no statistically significant differences were observed in physiological parameters such as oxygen saturation and pulse rate, the ESL position showed a slight advantage in feeding performance and physiological stability. These findings suggest that while both positions are viable, ESL may offer marginal benefits and should be considered based on individual infant needs[27].

This study demonstrates that structured educational interventions can enhance maternal knowledge and feeding practices for infants with CLP, while also reducing feeding-related complications. Although the practices improved to a borderline competent level, ongoing efforts in training, follow-up, and support are necessary to achieve and maintain optimal maternal performance and infant health outcomes.

Limitations: This study has several limitations that should be considered when interpreting the findings. It was conducted in a single healthcare facility, which may limit its generalizability to other settings with different resources and populations. The assessment's short-term nature, lack of control data, and reliance on self-reported data could be subject to bias and affect the reliability of the reported results. Furthermore, additional shortfalls included not sufficiently exploring relevant socioeconomic factors, failing to investigate some feeding complications, not accounting for the influence of other caregivers (if applicable), and not considering the impact on mothers' psychological well-being. Variations in delivery of the intervention, alongside no long-term follow-up, meant that this limited the strength of conclusions.

5. CONCLUSION

As the current study concludes that structured educational interventions can enhance maternal awareness, improve feeding practices, and potentially lead to reduced feeding-related complications in infants with cleft lip and palate, the use of modified techniques, specifically the specialized ESSR and Kumagai, produced the most beneficial feeding practices. While mothers of the infants may not have achieved full competency in feeding practices, it was clear that the educational intervention offered mothers significant improvements in supporting their infants. Overall, the study emphasized that mothers of infants with CLP should be entitled to ongoing education and training, as well as progressive improvement in care from healthcare providers, so that families can be assured their infants with CLP are receiving sustainable and effective care.

Recommendations

It may be most effective for educational interventions for mothers of CLP children to be implemented as part of routine healthcare services, emphasizing practical training and continued follow-up sessions. The training of healthcare professionals about advanced feeding practices should also be viewed as a regular part of their training so that they can adequately address the mothers' issues. Later programs should accommodate the varying literacy levels and socioeconomic status, and could benefit from using various multimedia resources. Community outreach could also expand long-term care plans and lessen stigma by creating engagement with stakeholders other than mothers, such as teachers and the general public. Future studies should take a multi-center, longer-term, and controlled design approach. These activities would create greater validity and credibility in this field.

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