



## Research article

## Awareness of feeding, growth and development among mothers of infants with cleft lip and/or palate

Parakrama Wijekoon<sup>a,\*</sup>, Thanuja Herath<sup>b</sup>, Rahini Mahendran<sup>c</sup><sup>a</sup> Department of Oral and Maxillofacial Surgery, Faculty of Dental Sciences, University of Peradeniya, Sri Lanka<sup>b</sup> Department of Oral Medicine and Periodontology, Faculty of Dental Sciences, University of Peradeniya, Sri Lanka<sup>c</sup> Smile Train Cleft Centre, Faculty of Dental Sciences, University of Peradeniya, Sri Lanka

## ARTICLE INFO

**Keywords:**  
 Nutrition  
 Diet  
 Epidemiology  
 Dentistry  
 Pediatrics  
 Non-syndromic cleft  
 Awareness  
 Feeding  
 Weaning  
 Growth and development

## ABSTRACT

**Background:** Awareness of feeding among mothers plays an important role in the growth and development of children with cleft lip and palate. Mothers' increased awareness provides the right care and nutrition to these children in order to grow and achieve their developmental milestones.

**Objectives:** This study aimed at (1) assessing mothers' awareness on breastfeeding and formula-milk feeding, weaning, growth, and development of infants with cleft lip and palate and (2) the relationship of mothers' awareness with their level of education and monthly household income.

**Methods:** This cross-sectional pilot study included all the mothers of infants aged up to one year who had cleft lip and/or palate attended Dental Teaching Hospital, Peradeniya between the years 2015 and 2016. Mothers of infants with oral clefts associated with other syndromic features and chronic illnesses were excluded. A pre-tested interviewer-administered questionnaire was designed to collect data. To assess the clarity of the questions, prior to the study, the questionnaire was pre-tested in 10 mothers of infants with an oral cleft but not selected for the study. Frequency distributions and descriptive statistics were used to describe study variables. Spearman Rank test was used to determine the association of mothers' awareness with their level of education and monthly household income with a 95% confidence interval.

**Results:** The sample consisted of 101 mothers who had infants born with a cleft and the response rate was 100%. Except one, all mothers reported that they have received overall feeding instructions either from a doctor, nurse, cleft center staff or a midwife. Over 65.3% of mothers were aware of feeding-related factors including; breastfeeding, formula-milk feeding, and weaning of infants with a cleft. Overall more than 80% of mothers were aware of factors related to growth and development of the child including urination, sleeping pattern, weight and growth charts. The education level of mothers was not significantly associated with mothers' awareness of any factors related to breastfeeding, formula-milk feeding, weaning and growth, and development. Further, mothers' awareness of breastmilk as the best food for babies under 6 months ( $p = 0.028$ ), weaning at 4–6 months ( $p = 0.024$ ), replacing milk feeds by weaning foods ( $p = 0.02$ ) and not providing junk foods to infants in between main meals ( $p = 0.01$ ) were significantly associated with monthly household income.

**Conclusions:** The findings of this study suggest that mothers were aware of factors related to feeding infants with a cleft lip and palate and their growth and development. The awareness of mothers about certain factors related to feeding and weaning was significantly associated with monthly household income.

## 1. Introduction

Craniofacial abnormality is one of the congenital deformities that cause long-term and increased rates of morbidity [1]. Cleft lip and/or palate (CL/P) is one of the most common congenital craniofacial birth defect in the head and neck regions [2] and the second most common

congenital deformity in the human body [3]. According to the World Health Organization (WHO), globally, one in 500–700 individuals are born with this defect [4]. This rate varies significantly across geographical regions. International Perinatal Database of Typical Oral Clefts (IPDTC) working group estimated that the overall prevalence of cleft lip with or without palate was 9.92 per 10,000 population from the

\* Corresponding author.

E-mail address: [pwijekoon@yahoo.com](mailto:pwijekoon@yahoo.com) (P. Wijekoon).

information of 30 countries during 2000–2005 [5]. Although epidemiological data of cleft lip and palate in Sri Lanka is limited, a study conducted in the Central province in late 1980s estimated an incidence of 0.83 for cleft lip with or without palate and 0.19 per 1,000 births for isolated cleft palate [6].

One of the frequently reported problems in children with CL/P is difficulty in feeding [7]. For example, in Kashmir, India, 78% of parents who have children with cleft lip and palate reported difficulties in feeding [8]. These feeding problems include ineffective sucking due to inability in generating adequate negative pressure in the oral cavity, milk regurgitation through the nasal cavity and choking as a result of incomplete facial and structural defects in palate causing low food intake [1]. The risk of developing feeding difficulties is high among children with cleft palate [9]. In the Netherlands, of the total 90 children with isolated cleft palate who underwent surgical repair, 67% ( $n = 60$ ) and 32% ( $n = 28$ ) reported feeding difficulties and nasogastric feeding, respectively [10]. As a result of these feeding problems, the nutritional status of children with oral clefts becomes poor, leading to inadequate weight gain compared to children without oral clefts [1, 10]. Moreover, feeding problems can have adverse impacts on children's growth and development [11] and failure to thrive [12].

Different methods are available to resolve feeding problems in children with oral clefts. Along with breastfeeding, supplemental feeding has been recommended for these infants to meet their nutritional requirements [13, 14]. In Scotland, 81% of mothers reported giving formula-milk and bottle feeding to their infants with a cleft [15]. Feeding is one of the many reasons that surgical repair is completed. In the Netherlands, following the surgical repair of the palate, 79% of parents of children with cleft palate reported improvement in feeding [10]. There are different feeding resources such as feeding bottles, tubes, spoons [16, 17] and a few cleft centers use palatal obturation as it improves the seal of the palate and controls the generation of negative pressure [18]. Combinations of feeding interventions also have positive impacts on children with cleft lip and palate [14, 17]. Turner and colleagues reported a reduction in feeding time and increased volume of milk intake in a sample of infants with oral clefts following the use of palatal obturator and feeding education [17]. Growth indicators measured in these children such as height and weight for age also have shown favorable measurements that are comparable to that of normal children [17].

Although feeding instructions are provided in hospitals, understanding, and adaptation of that information by parents greatly depends on their level of education [19] and it may affect the nutritional status of the child [20]. It is commonly believed that the higher the level of mother's education, will increase the acceptance and adherence of feeding information. Findings from United Arab Emirates [21] and Indonesia [20] reported an increased awareness of mothers on breastfeeding and balanced nutrition, of children without cleft lip and palate, who have completed higher level of education (university or higher educational background). Similarly, a significant association between maternal education and accurately understanding the weaning guidelines for children without oral clefts was found in the UK [22]. In contrast, some mothers with higher level of educational background do not follow the feeding instructions due to some other factors such as work, and preference for infant formula milk. A study in Malaysia reported that more than half of the mothers with higher education levels had exclusively breastfed their children without oral clefts only for less than six months [23]. Further, according to WHO growth chart, 14.3% children of mothers with secondary level education were wasted and 13.9% of children of mothers from higher education levels were obese [23]. To ensure adequate weight gain in children with cleft lip and palate, awareness on factors such as positioning, adequate sealing between nipple and infant's lips, correct burping, assessing the adequacy of feeding and other factors are important [9].

Although there is a considerable number of studies available about awareness of mothers on feeding whose children are without cleft lip and

palate, to the best of authors' knowledge, there is no single study assessing the awareness of feeding, growth, and development, among parents who have children with a cleft. The availability of strong, timely evidence at local level will improve the quality of life for the children with cleft lip and palate. An assessment of parental awareness and its association with socio-demographic factors is therefore essential to first identify the burden of unawareness and then develop, implement and evaluate effective strategies and health programmes.

Thus, the current study is aimed at assessing mothers' awareness of breastfeeding and formula-milk feeding, weaning, growth, and development of infants with cleft lip and palate and (2) the relationship of mothers' awareness with their level of education and monthly household income.

## 2. Materials and methods

A cross-sectional pilot study was conducted to assess mothers' awareness of feeding, weaning and growth, and development. All the mothers of infants aged up to one year having CL/P, who attended the cleft treatment center at the Dental Teaching Hospital, Peradeniya, Sri Lanka were included. Mothers of infants who had cleft defects associated with other syndromic features and chronic illnesses were excluded from the study. Eligible mothers who attended cleft treatment center for the period from September 2015 to January 2016, were randomly selected from the patients' registry of the treatment center.

Verbal consent was obtained from the study participants by explaining the purpose of the study and the study procedure. An interviewer-administered questionnaire was designed considering the variables identified in the study objectives. The questionnaire consisted of two major parts of the questions. One part of questions was open-ended aimed at collecting demographic data of the infant (age, sex, type of cleft), mother's level of education and household monthly income. The second set of questions were closed-ended and collected awareness of breastfeeding, formula-milk feeding, weaning and growth, and development by identifying key variables. The original questionnaire was developed in English. Prior to the study, it was pre-tested with 10 mothers who were having similar characteristics of the study participants, but not selected for the study. This was done to assess the clarity of the questions, the average time taken to complete the questionnaire, any ambiguities in questions and other practical problems. Necessary modifications were made and the questionnaire was revised. Prior to the study, two independent data collectors who are in the field of dentistry were trained on how to administer the questionnaire. Data collection was done by the two trained interviewers in the cleft treatment center of the Dental Teaching Hospital for a period of five months from September 2015, under the close supervision of minimum one investigator.

Necessary questions were coded while entering into the datasheet. Data were stored and analyzed in SPSS (version 20) statistical software. Frequency distributions and descriptive statistics were used to describe the awareness of mothers on breastfeeding, formula-milk feeding, weaning and child's growth and development. Spearman Rank test was used to determine the association of mothers' awareness of factors related to feeding and growth and development with their level of education and household monthly income.

The ethical approval for the study was obtained from the Ethics Review Committee of the Faculty of Dental Sciences, University of Peradeniya, Sri Lanka (ERC/FDS/UOP/1-2014/39).

## 3. Results

A total number of mothers, who have infants with CL/P and attended Dental Teaching Hospital Peradeniya from September 2015 to January 2016, included in the study was 101. Table 1 shows a summary of the participants' and their infant's characteristics. The overall response rate of the study was 100%. Over 75% of mothers have completed tertiary

**Table 1.** Summary of the participants' and their infants' characteristics.

Characteristics	Total N (%)	
Mother Level of education	Completed primary education (Grade 1–5)	2 (2%)
	Completed secondary education (Grade 6–10)	13 (12.9%)
	Completed G.C.E. O/L (Tertiary education)	52 (51.5%)
	Completed G.C.E. A/L (Tertiary education)	29 (28.7%)
	Completed higher education such as diploma or 5 (5%) degree	5 (5%)
	Monthly household income	Rs. 5000 – Rs 14000
Rs. 15000 – Rs. 24000		23 (22.8%)
Rs. 25000 – Rs. 34000		31 (30.7%)
Rs. 35000 – Rs. 44000		27 (26.7%)
Rs. 45000 – Rs. 54000		12 (11.9%)
Infant Age categories		Less than one month
	1–6 months	51 (50.5%)
	7–11 months	23 (22.7%)
	One year	5 (5%)
	Sex	Male
Female		50 (49.5%)
Type of cleft	Cleft lip	53 (52.5%)
	Cleft palate	28 (27.7%)
	Cleft lip and palate	20 (19.8%)

level education. Of them, nearly half of the mothers (51.5%) have completed General Certificate of Education (G.C.E.) Ordinary Level (O/L) and 28.7% of mothers completed G.C.E. Advanced Level (A/L). Less than 10% of mothers have completed primary education (2%) and higher education such as a degree or diploma (5%). The average monthly household income reported was Rs. 29,019.00 (SD = ± Rs. 12,170.44) and ranged from Rs. 5,000.00 to Rs. 50,000.00.

Of the total 101 infants, 50.5% were males. The mean age of 79 infants was five months (one month – one year, SD = ± 3 months) while 22 infants were aged less than one month, hence they were excluded in the calculation of mean age. There were five infants who have completed one year of age. Birthweight of these infants ranged from 2 kg to 4.8 kg and mean birthweight was 3.011 kg (SD = ± 0.538 kg). A cleft lip is more prevalent among infants of the mothers who participated in the study (52.5%). While 27.7% and 19.8% of infants were with isolated cleft palate and cleft lip and palate.

Over half of the mothers (73.3%) expressed that receiving advice and demonstration regarding feeding infants with a cleft is essential. Except one, all the mothers reported that they have received overall feeding instructions either from a doctor, nurse, cleft center staff or a midwife. The percentage of mothers who received advises from one healthcare personnel gradually decreased from 56.4% (doctors), 41.6% (nursing officer), 34.7% (staff of the cleft clinic) to 20.8% (midwife). Conversely, none of the mothers received advice from their family or friends regarding how to feed their infants with a cleft.

Most of the mothers were aware of factors related to breastfeeding, formula-milk feeding, and weaning as shown in Figure 1. Overall,

mothers were aware of breastfeeding of an infant with a cleft and related information. Of them (89.1%) knew that breastmilk is the best food for infants less than six months and only 65.3% knew how to correctly position the newborn when breastfeeding. Similarly, 74.3% of mothers were aware that requirement of top-up feeds with formula-milk following breastfeeding by an infant with a cleft and 94.1% were aware that manufacturer instructions should be followed when preparing formula-milk. Over 75% of mothers were aware that infants with a cleft should be weaned at 4–6 months and rice-based food is the best weaning food for infants with cleft lip and palate. While 99% participants agreed that weaning food should be balanced gradually by adding nutrients, only 65.3% mothers knew that junk foods should not be given to infants in between main meals.

In addition, mothers were also aware of the general feeding practices of infants with a cleft. All the participants stated that the infant should get a balanced diet after weaning. Mothers of 78.2% reported that prolonged feeding time is an indication of difficulty in suckling and 75.2% identified that the volume of milk given to a child with an oral cleft should be equal to the volume of milk given to a child without a cleft. Mothers of 70.3% knew that feeding should be done on demand of the infant. However, only 36.6% of mothers knew that burping should be done during the feed in addition to burping after the feeding in infants with clefts.

Overall more than 80% of mothers aware of factors related to the growth and development of the child. Over 95% were aware that infants should pass urine 6–7 times during a day if feeding is adequate and medical advice should be sought when no weight gain is observed or reduction of weight for two consecutive months. Of total mothers, 89.1% knew infant's weight should gradually increase parallel to the growth curves in the greenzone of the Child Health Development Record (CHDR), 82.2% of mothers knew that infants should sleep about 3–4 h following an adequate feeding and 80.2% were aware that inter-current infections likely to cause growth failures in infants.

As shown in Table 2, the awareness of mothers on factors related to breastfeeding, formula-milk feeding, weaning and growth, and development was not significantly associated with their level of education.

Table 3 shows the association of household monthly income with mothers' awareness of factors related to feeding, growth, and development. In addition, household monthly income was significantly associated with the awareness of mothers that breastmilk is the best food for babies under 6 months ( $p = 0.028$ ), infant with a cleft should be weaned at 4–6 months ( $p = 0.024$ ), replacing milk feeds by weaning foods ( $p = 0.02$ ) and junk foods should not be given to infants in between main meals ( $p = 0.01$ ). However, awareness of other factors related to breastfeeding, formula-milk feeding and growth and development were not associated with monthly income of the household.

#### 4. Discussion

Children born with a cleft fail to gain weight due to inadequate feeding caused by their defect [1, 17]. Therefore, multiple interventions are required to provide adequate nutrition. Awareness of mothers is an important factor that plays a role in feeding infants and improving their nutritional status [20]. Hence, the primary aim of this study was to assess the awareness of mothers on feeding and growth and development of infants born with a cleft lip and palate in Sri Lanka.

Our study found that all of the mothers, except one, have received instructions on feeding infants with a cleft from varied healthcare staff, including a doctor, nurse, the staff at the cleft center and midwife which is similar to that of reported by previous studies [1, 9, 16, 21]. Most of this feeding-related information has been given by a doctor followed by a nurse and other healthcare professionals [16]. In Brazil, a considerable number of mothers received instructions from specific rehabilitation centers which are similar to cleft center in the present study [1]. Midwife is the grass-root level healthcare personnel in Sri Lanka who do home visits of newborns and pregnant women with excellent coverage in

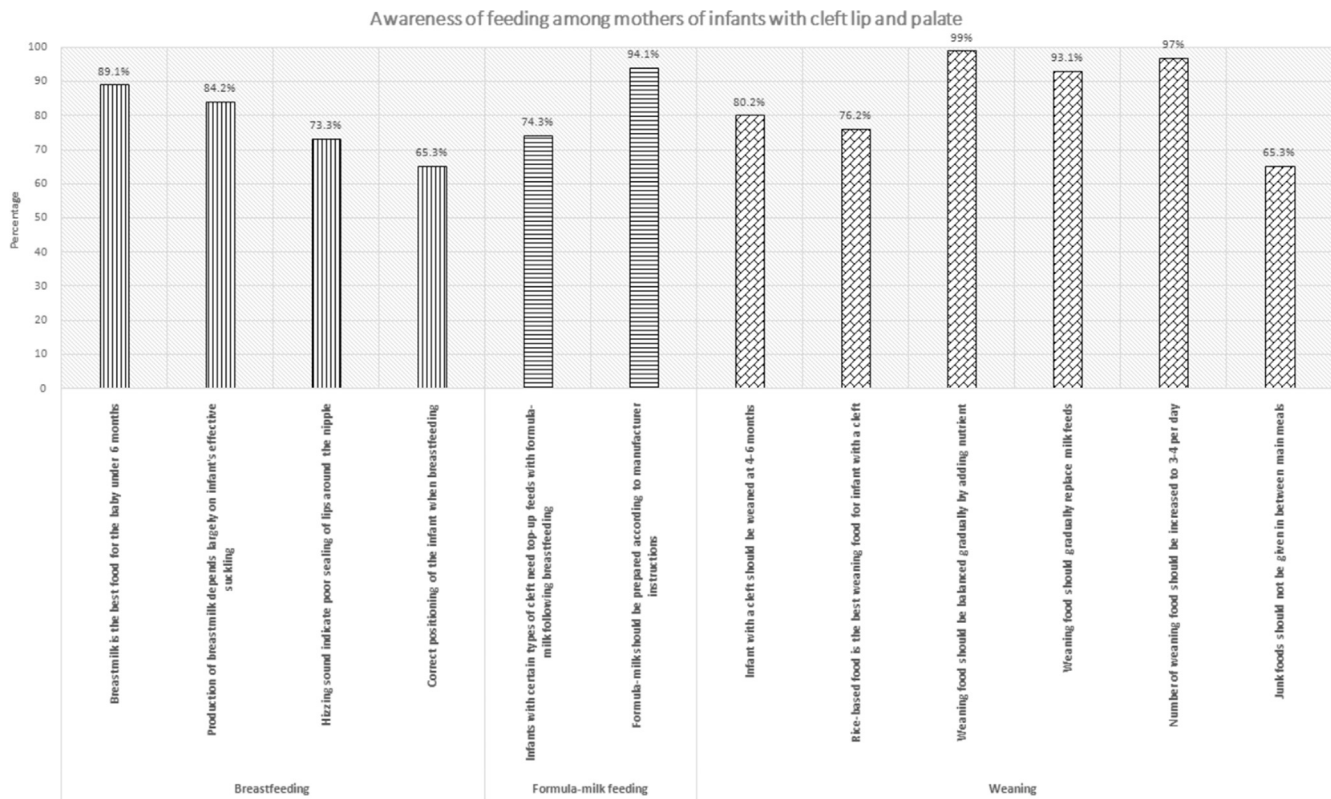


Figure 1. Awareness of feeding among mothers of infants with cleft lip and palate.

providing basic instructions on nutrition. However, only 20.8% of mothers reported receiving feeding orientation during home visits, this could be due to newborns diagnosed with a cleft lip and palate are first referred to doctors and specialist units in the hospital, before they are discharged and parents of these newborns may receive feeding instructions either from a doctor or nurse, prior to the visit of midwife.

Mothers from various countries demonstrated a fair knowledge about breastfeeding as similar to our study [21, 24]. The World Health Organization recommends exclusive breastfeeding for the first 6 months of life [25]. In our study, almost 89.1% of mothers were aware that breastfeeding is the best food for infants less than 6 months. The results from our study parallel the results of Al Ketbi et al who reported 81.2% of mothers in Abu Dhabi stated that breastmilk is sufficient for the first 6 months of child's life [21]. Our study also found that 84.2% of mothers knew that production of breastmilk largely depends on infant's effective suckling and 65.3% of mothers aware that newborns should correctly be positioned and closely attached to the breast when breastfeeding. In Nigeria, mothers of 71.3% were aware of correct breastfeeding postures and techniques [24] and this figure was higher than that reported in our study (65.3%). This difference in breastfeeding postures reflects the necessity of providing awareness to mothers about breastfeeding techniques of a newborn with or without a cleft. There are various recommended feeding positions for newborns and infants with a cleft [14], which can be incorporated into awareness programmes for mothers of children with cleft lip and palate.

While breastfeeding, supplemental feeding is also recommended for infants with an oral cleft [13, 14]. In our study, mothers of 74.3% believed that providing supplementary feeding with formula-milk is necessary following breastfeeding to their infants. Almost 94.1% of mothers follow the manufacturer's instructions when preparing formula-milk. This finding confirms the previous finding that 81% of Scotland mothers reported giving formula-milk and bottle-feeding to their infants with a cleft [15].

According to WHO, weaning is the process of introducing solid foods and gradually replacing milk feeds by solid food as the main meal when a baby is about 4–6 months old [26]. From our study, 80.2% of mothers reported weaning at 4–6 months which was similar to that of reported by UK mothers of infants without a cleft (80%) [22]. Our study also found that the awareness of mothers is fairly good at choosing a rice-based diet as the most appropriate weaning food and increasing the number of weaning foods to 3–4 per day. The nutritional requirement of a child with a cleft is similar to that of children without a cleft [27]. This is evident in our study where all the mothers were aware of giving a balance diet after weaning and 75.2% reported giving the equal volume of milk to infants with a CL/P as to infants without a cleft. However, only 36.6% of mothers reported knowing that burping should be done during feeds which reflects that awareness programmes should focus factors useful for mothers having children with cleft lip and palate.

Another factor that was found to be important in our study was the awareness of the growth and development of infants. Over 80% of mothers knew that babies pass urine 6–7 times during a day if feeding is adequate, the infant should sleep about 3–4 h following an adequate feeding, infant's weight should gradually increase parallel to the growth curves in the green zone of the CHDR and inter-current infections result in growth failure. This demonstration of good knowledge towards the growth and development of infants could be inherited from the awareness of the nutritional status of the previous child.

In our study, increased awareness among mothers about providing breastmilk to babies under 6 months ( $p = 0.028$ ) and replacing their milk feeds by weaning food ( $p = 0.02$ ) were significantly associated with increased monthly household income. This may be because their better economic conditions allowed them to access various information related to weaning most of which may be accurate. On the contrary, poor awareness of mothers about providing junk foods in between main meals was significantly associated with those having higher monthly income ( $p = 0.01$ ) which may in future increase the intake of junk foods by infants

**Table 2.** Findings of the correlation between level of education of mothers and their awareness of factors related to feeding and growth and development.

Awareness of factors		Correlation coefficient	Level of significance
Breastfeeding	Breastmilk is the best food for the baby under 6 months	0.192	0.054
	Production of breastmilk depends largely on infant's effective suckling	-0.144	0.151
	Hissing sound indicate poor sealing of lips around the nipple	0.017	0.865
	Correct positioning of the infant with a cleft during breastfeeding	-0.09	0.370
Formula-milk feeding	Infants with certain types of cleft need top-up feeds with formula-milk following breastfeeding	-0.018	0.856
	Formula-milk should be prepared according to manufacturer instructions	-0.032	0.747
Weaning	Infants with a cleft should be weaned at 4–6 months	0.109	0.276
	Rice-based food is the best weaning food for infants with a cleft	-0.027	0.788
	Weaning food should be balanced gradually by adding nutrients	0.157	0.116
	Weaning food should gradually replace milk feeds	0.121	0.227
	Number of weaning food should be increased to 3–4 per day	-0.115	0.253
	Junk food should not be given in between main meals	-0.147	0.144
	Infants should pass urine 6–7 times during a day if feeding is adequate	-0.051	0.615
Growth and development	Infants should sleep about 3–4 h following an adequate feeding	0.077	0.446
	Infant's weight should gradually increase parallel to the growth curves in the green zone of the CHDR	0.009	0.928
	Inter-current infections result in growth failure in infants	0.04	0.694
	Medical advice should be sought if no weight gain is observed or reduction of weight for two consecutive months	-0.057	0.570

\*p < 0.05.

of those who are affluent which is a poor feeding practice leading to inadequate weight gain.

The national policy of Sri Lanka is exclusive breastfeeding for the first six months and to wean with semi-solids and gradually turning to an adult diet at the age of one year [28]. However, most infants with a cleft lip and palate fail to be fed according to the recommended policy. Therefore, it is essential to have recommendations and guidelines to feed infants with a cleft lip and palate that could be adopted by primary healthcare workers in Sri Lanka. The findings of this study also emphasize the need for the development of feeding guidelines for children with oral clefts and also to open areas for researchers working on feeding and nutrition of infants with oral clefts and health education.

The most effective solution to the cleft lip and palate is corrective lip and/or palatal surgery which is done between three and nine months. The success of this surgery is greatly influenced by adequate weight gain before the surgery to minimize intra and post-operative complications and infection. Therefore, achieving adequate weight gain through milk during first few months followed by complementary feeding replaced by the adult diet by the age of one year similar to a regular child is more important. In this juncture, increased awareness of mothers of infants about breastfeeding, formula-milk feeding, weaning and growth, and

**Table 3.** Findings of the correlation between household monthly income of the participants and their awareness of factors related to feeding and growth and development.

Awareness of factors		Correlation coefficient	Level of significance
Breastfeeding	Breastmilk is the best food for the baby under 6 months	0.219	0.028*
	Production of breastmilk depends largely on infant's effective suckling	-0.068	0.501
	Hissing sound indicate poor sealing of lips around the nipple	0.123	0.221
	Correct positioning of the infant with a cleft during breastfeeding	0.094	0.350
Formula milk feeding	Infants with certain types of cleft need top-up feeds with formula-milk following breastfeeding	0.123	0.222
	Formula-milk should be prepared according to manufacturer instructions	-0.097	0.334
Weaning	Infants with a cleft should be weaned at 4–6 months	-0.225	0.024*
	Rice-based food is the best weaning food for infants with a cleft	0.058	0.567
	Weaning food should be balanced gradually by adding nutrients	0.014	0.888
	Weaning food should gradually replace milk feeds	0.231	0.020*
	Number of weaning food should be increased to 3–4 per day	-0.095	0.345
	Junk food should not be given in between main meals	-0.257	0.010*
	Infants should pass urine 6–7 times during a day if feeding is adequate	-0.005	0.960
Growth and development	Infants should sleep about 3–4 h following an adequate feeding	0.163	0.103
	Infant's weight should gradually increase parallel to the growth curves in the green zone of the CHDR	-0.158	0.114
	Inter-current infections result in growth failure in infants	0.133	0.185
	Medical advice should be sought if no weight gain is observed or reduction of weight for two consecutive months	-0.102	0.310

\* p < 0.05.

development will help infants to gain adequate weight for their lip and/or palate corrective surgery and to become healthy in the long run.

The factors assessed in the present study such as positioning of the infant when breastfeeding, problems caused by cleft during feeding and understanding infants' cues for feeding were more similar to one of the previous studies on feeding education intervention [17]. However, the generalizability of the findings is limited, since the questionnaire is not validated. All the data presented in this study are observational and in the absence of most demographic and socioeconomic data, and there are still unanswered questions such as the relation of mothers' awareness with mothers' age, occupation, ethnicity and the parity that can be examined in the future. Further studies could be designed to reduce the effect of potential confounding factors.

In this study, we did not investigate feeding practices and nutritional status of infants because most children included were less than 6 months old and had not started weaning. In 2009, Matthew et al studied the effect of feeding practices on nutritional status of children between 6 – 24 months in Nigeria where 31.7% of those children were severely stunted as a result of poor feeding practices [29]. Evidence suggests that feeding problems in children with cleft lip and palate can have adverse impacts on their growth and development causing failure to thrive [11, 12].

Hence, the effect of feeding practices of infants with a cleft on their nutritional status is a potentially interesting path for future research.

## 5. Conclusion

In summary, this cross-sectional pilot study assessed the awareness of mothers, on factors related to feeding and growth and development of infants with a CL/P. A total of 101 mothers of infants with a cleft attended cleft treatment center in the Dental Teaching Hospital were randomly selected while excluding mothers of infants who had associated other syndromic features and chronic illnesses. Data were collected using an interviewer-administered questionnaire which was pre-tested prior to the study. Over half of the mothers demonstrated a fairly higher knowledge of factors related to breastfeeding, formula-milk feeding, weaning and growth and development of infants with a cleft. Despite a lower percentage of mothers were (36.6%) aware of burping during the feed, overall more than 70% of mothers were aware of general feeding practices such as feeding on demand, providing a balanced diet after weaning, prolonged feeding time is an indication of difficulty in suckling and volume of milk given to an infant with a cleft is equal to the volume of milk given to an infant without a cleft.

There was no significant association between the awareness of mothers and their level of education. However, monthly household income was significantly associated with mothers' awareness of exclusive breastfeeding for babies under 6 months, weaning at 4–6 months, replacing milk feeds by weaning foods and not providing junk foods in between main meals. Our findings recommend working towards feeding guidelines for infants with cleft lip and palate. It also suggests conducting future research to assess the awareness of mothers and most importantly to investigate the effect of feeding practices of infants with a cleft on their growth and development.

## Declarations

### Author contribution statement

Parakrama Wijekoon, Thanuja Herath: Conceived and designed the experiments; Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Rahini Mahendran: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

### Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### Competing interest statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

## Acknowledgements

This study was self-funded and authors would like to acknowledge Dr. K. Rathnayaka and Dr. T. Dissanayake for their contribution in data collection.

## References

- [1] L.G. Amstalden-Mendes, L.A. Magna, V.L. Gil-da-Silva-Lopes, Neonatal care of infants with cleft lip and/or palate: feeding orientation and evolution of weight gain

- in a non-specialized Brazilian hospital, *Cleft Palate-Craniofacial J.* 44 (3) (2007) 329–334.
- [2] P. Agbenorku, Orofacial clefts: a Worldwide review of the problem, *ISRN Plastic Surg.* (2013) 1–7.
- [3] S. Anchlia, K.S. Rao, K. Bonanthaya, B. Anupama, L.V. Nayak, Ophthalmic considerations in cleft lip and palate patients, *J. Maxillofac. Oral. Surg.* 10 (1) (2011) 14–19.
- [4] WHO, Oral Health, 2017. Available at: <http://www.who.int/mediacentre/factsheets/fs318/en/>. (Accessed 7 April 2017).
- [5] IPDTC working group, Prevalence at the birth of cleft lip with or without cleft palate: data from the International Perinatal Database of Typical Oral Clefts (IPDTC), *Cleft Palate-Craniofacial J.* 48 (1) (2011) 66–81.
- [6] A.N. Amaratunga, A. Chandrasekara, Incidence of cleft lip and palate in Sri Lanka, *J. Oral Maxillofac. Surg.* 47 (6) (1989) 559–561.
- [7] M.A. Balluff, Nutritional needs of an infant or child with a cleft lip or palate, *Ear Nose Throat J.* 65 (7) (1986) 311–315.
- [8] F. Naz, S. Mir, S.K. Bali, S. Nazir, Awareness of feeding plates among the parents of cleft lip and palate children in Kashmiri population – an original research, *Int. J. Appl. Decis. Sci.* 4 (4) (2018) 67–69.
- [9] R.Q. Oliver, G. Jones, Neonatal feeding of infants born with cleft lip and/or palate: parental perceptions of their experience in South Wales, *Cleft Palate-Craniofacial J.* 34 (6) (1997) 526–530.
- [10] IACDe Vries, C.C. Breugem, A.M.B. van der Heul, M.J.C. Eijemans, M. Kon, A.B. Mink van der Molen, Prevalence of feeding disorders in children with cleft palate only: a retrospective study, *Clin. Oral Investig.* 18 (2014) 1507–1515.
- [11] B. Felix-Schollaart, J.B. Hoeksma, B. Prah Andersen, Growth comparison between children with cleft lip and/or palate and controls, *Cleft Palate-Craniofacial J.* 29 (1992) 475–480.
- [12] A.N. Pandya, J.G. Boorman, Failure to thrive in babies with cleft lip and palate, *Br. J. Plast. Surg.* 54 (2001) 471–475.
- [13] J. Reid, A review of feeding interventions for infants with cleft palate, *Cleft Palate-Craniofacial J.* 31 (3) (2004) 268–278.
- [14] M. Goyal, R. Chopra, K. Bansal, M. Marwaha, Role of obturators and other feeding interventions in patients with cleft lip and palate: a review, *Eur. Arch. Paediatr. Dent.* 15 (2014) 1–9.
- [15] K.F.M. Britton, S.H. McDonald, R.R. Welbury, An investigation into infant feeding in children born with a cleft lip and/or palate in West Scotland, *Eur. Arch. Paediatr. Dent.* 12 (5) (2011) 250–255.
- [16] V.L. Gil-da-Silva-Lopes, A.C. Xavier, D. Klein-Antunes, A.C.R.G. Ferreira, R. Tonochochi, A.C. Fett-Conte, R.N. Silva, V.H.V. Leiriao, L.P.C. Caramori, L.A. Magna, L.G. Amstalden-Mendes, Feeding infants with cleft lip and/or palate in Brazil: suggestions to improve health policy and research, *Cleft Palate-Craniofacial J.* 50 (5) (2013) 577–590.
- [17] L. Turner, C. Jacobsen, M. Humenczuk, V.K. Singhal, D. Moore, H. Bell, The effects of lactation education and a prosthetic obturator appliance on feeding efficiency in infants with cleft lip and palate, *Cleft Palate-Craniofacial J.* 38 (5) (2001) 519–524.
- [18] L. Hemingway, Breastfeeding a cleft palate baby, *Med. J. Aust.* 2 (1972) 626.
- [19] P. Nassanga, I. Okello-Uma, D. Ongeng, The status of nutritional knowledge, attitude and practices associated with complementary feeding in a post-conflict development phase setting: the case of Acholi sub-region of Uganda, *Food Sci. Nutr.* 6 (1) (2018) 2374–2385.
- [20] C.M. Siagian, M. Halisitjayani, Mothers knowledge on balanced nutrition to nutrition to nutritional status of children Pukesmas (public health center) in the district of Pancoran, Southern Jakarta 2014, *Int. J. Curr. Microbiol. App. Sci.* 4 (7) (2015) 815–826.
- [21] M.I. Al Ketbi, S. Al Noman, A. Al Ali, E. Darwish, M. Al Fahim, J. Rajah, Knowledge, attitudes and practices of breastfeeding among women visiting primary healthcare clinics on the island of Abu Dhabi, United Arab Emirates, *Int. Breastfeed. J.* 13 (26) (2018) 1–14.
- [22] A.P. Moore, P. Milligan, L.M. Goff, An online survey of knowledge of the weaning guidelines, advice from health visitors and other factors that influence weaning timing in UK mothers, *Matern. Child Nutr.* (2012).
- [23] N. Adnan, N.D. Muniandy, The relationship between mothers' educational level and feeding practices among children in selected kindergartens in Selangor, Malaysia: a cross-sectional study, *Asian J. Clin. Nutr.* 4 (2) (2012) 39–52.
- [24] C.E. Mbada, A.E. Olowookere, J.O. Faronbi, F.C. Oyinlola-Aromolaran, F.A. Faremi, A.O. Ogundele, T.O. Awotidebe, A.A. Ojo, O.A. Augustine, Knowledge, attitude and techniques of breastfeeding among Nigerian mothers from a semi-urban community, *BMC Res. Notes* 6 (2013) 552.
- [25] M.S. Kramer, R. Kakuma, Optimal duration of exclusive breastfeeding (Review), *The Cochrane Library* 8 (2012).
- [26] World Health Organization, Weaning from breast milk to family food – a guide for health and community workers, England, 1988.
- [27] R. Jaju, A.R. Tate, The role of pediatric dentistry in multidisciplinary cleft palate teams at advanced pediatric dental resident programs, *Pediatr. Dent.* 31 (3) (2009) 188–192.
- [28] Ministry of Healthcare and Nutrition Sri Lanka, Guidelines on Infant and Young Child Feeding, 2007. Available at: [http://medicine.kln.ac.lk/depts/publichealth/Fixed\\_Learning/Nutrition/Guidelines%20on%20Infant%20and%20Young%20Child%20Feeding.pdf](http://medicine.kln.ac.lk/depts/publichealth/Fixed_Learning/Nutrition/Guidelines%20on%20Infant%20and%20Young%20Child%20Feeding.pdf). (Accessed 7 April 2017). Accessed.
- [29] A.K. Mathew, A.D. Amodu, I. Sani, S.D. Solomon, Infant feeding practices and nutritional status of children in North-Western Nigeria, *Asian J. Clin. Nutr.* 1 (1) (2009) 12–22.