Reliability and validity of a Malay-version questionnaire assessing knowledge of breastfeeding

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Abstract

Background: There is a need to identify the knowledge that mothers have about breastfeeding to help promote it. Therefore, it is important to develop a valid and reliable questionnaire to provide useful and comparable data about breastfeeding knowledge. The objectives of this study were to determine the reliability and validity of a Malay version of a questionnaire assessing breastfeeding knowledge and describe the breastfeeding knowledge level among respondents.

Methods: A cross-sectional study was conducted from 1 January to 31 May 2008 among female staff working at the Universiti Sains Malaysia Health Campus. A self-administered questionnaire containing 53 items assessing breastfeeding knowledge was given to respondents. The questions were adapted and modified from a breastfeeding questionnaire developed by a team of Hospital Universiti Sains Malaysia paediatric nurses. Exploratory factor analysis, internal consistency reliability, and descriptive analysis of respondents' knowledge were conducted.

Results: A total of 252 female staff participated in the study. Factor analysis constructed 10 domains of knowledge and excluded 6 items, leaving 47 items in the final questionnaire. Cronbach's alpha of the final questionnaire was 0.77. Respondents' lowest knowledge was on the practical aspects of breastfeeding.

Conclusion: The questionnaire is reliable and valid to assess the breastfeeding knowledge of Malaysian women.

Keywords: breastfeeding, knowledge, reliability and validity, questionnaires, medical sciences

Introduction

Breastfeeding is the best method for feeding an infant. The World Health Organisation (WHO), the United Nations Children's Fund (UNICEF), and other agencies are promoting exclusive breastfeeding up to 6 months of age. The recommendation refers to giving breast milk only, without any other food or drink (1). Malaysia also adopted the same recommendation as stated in the National Breastfeeding Policy. Despite many studies showing the benefits of breastfeeding for infants and mothers, the practice of breastfeeding, especially exclusively, is still far below the standard recommendation. In Malaysia, the prevalence of exclusive breastfeeding up to infant age of 6 months in 2006 was only 14.5%, and only 37.4% of mothers continued breastfeeding for 2 years (2). There is a need to conduct more research that may help to identify the problems and obstacles hindering mothers from breastfeeding their babies. Using a questionnaire is a common tool to get information on the knowledge related to breastfeeding.

It is important to conduct reliability and validity studies so that we may trust the data derived from data collection instruments and procedures. Validity refers to the appropriateness, meaningfulness, and usefulness of the specific inferences made from test scores. An instrument is valid if it measures what it is supposed to measure (3). Among other types of validity, construct validity refers to the extent to which a particular measure relates to other measures consistent with theoretically derived hypotheses concerning the concepts that are being measured (4). One commonly used statistical approach for assessing construct validity is factor analysis. Factor analysis is a statistical tool used for analysing scores on large numbers of variables to determine whether there are any identifiable dimensions that can be used to describe many of the variables under study. One of the types of factor analysis is exploratory factor analysis, which summarises

data by grouping together variables that are inter-correlated.

Usually, factor analysis is followed by computation of Cronbach's alpha coefficient, which is a measure of internal consistency reliability (5). The term reliability refers to the degree to which a measurement procedure can be replicated (6). Internal consistency reliability measures the degree to which the items "hang together", that is, the degree to which items relate to one another (7). Items that form a strong factor in factor analysis yield acceptable alpha coefficients when grouped in a scale, thus providing evidence of internal consistency reliability, as well as supporting initial evidence of construct validity for a developing scale (5).

There is a need to develop a validated questionnaire that assesses knowledge about all aspects of breastfeeding. A questionnaire that is best suited to local culture, beliefs and practices may provide good information about breastfeeding knowledge. These beliefs and practices may include certain issues specific to women in Malaysia, especially among the Malay ethnic group. Examples are beliefs about giving water to infants and ways to identify whether the infant is obtaining sufficient milk, because insufficient milk production is a common reason for introducing formula. In addition, knowledge about storage of expressed breast milk is also important; many women do not know much regarding breast milk expression and storage.

Therefore, it will be valuable for other studies within the same research area to use this newly developed questionnaire by helping to develop comparable data and information from various studies concerning breastfeeding. The objectives of this study were to determine the reliability and validity of a Malay-version questionnaire assessing breastfeeding knowledge and to describe the knowledge of breastfeeding among the respondents.

Materials and Methods

A cross-sectional study was conducted from 1 January to 31 May 2008, with the target population of all female staff working at Universiti Sains Malaysia (USM) Health Campus. They consisted of lecturers, administrators, nurses, technicians, and other employees at 3 different schools: the School of Medical Sciences, the School of Health Sciences, and the School of Dental Sciences. One hundred and eleven (44.0%) of them had received formal education on breastfeeding during

their training and service. The Research Ethics Committee (Human) at Universiti Sains Malaysia approved the study protocol on 9 April 2008 (USMKK/PPP./JEPeM [200.4.(1.1)]). The study applied universal sampling, in which the research team recruited all female staff with at least one child. Those who did not understand the Malay language were excluded from the study; thus, all 290 staff eligible for this study were contacted and informed about the study. For the sample size, the study needed a minimum of 159 respondents to validate the questionnaire because there were 53 items for the whole questionnaire with an average of 3 options of answer for each item.

The questionnaire assessing knowledge of breastfeeding was adapted and modified from a breastfeeding questionnaire developed by a team of paediatric nurses at the Hospital Universiti Sains Malaysia (HUSM). Written consent for using the questionnaire was obtained from them before the study. The study began as a pilot study conducted among 60 nurses working at 7 specialist clinics in HUSM. The nurses all completed the same questionnaire. There was then a small discussion between the researchers and 5 of the nurses to hear their opinion about the questionnaire used. Their suggestions for the improvement of the questions on respondent's background were noted. Reliability analysis was conducted and the Cronbach's alpha was 0.70.

All 53 items in the modified questionnaire covered the following scopes of knowledge on breastfeeding: general knowledge, colostrum, advantages to mothers and babies, effective feeding method, duration of feeding, expressed breast milk (EBM), storage of EBM, complementary feeding, and problems with breastfeeding. The respondents were given self-administered questionnaires, and the complete forms were collected back on the same day to reduce information bias. Each item had categorical responses of true, false, or not sure. A correct response scored as '1', whereas a wrong and a not sure response scored as '0'. Total knowledge score ranged from 0 to 53, with higher scores indicating more knowledge. Exclusive breastfeeding is defined in this study as the practice of giving the infant breast milk without any additional food or drink, including water (1).

Statistical Analysis

A breastfeeding consultant, a family health specialist, a nutritionist, and 3 nurses involved with breastfeeding promotion evaluated and discussed the questionnaire to verify its content validity. For construct validity, exploratory factor

analysis using principal components and Varimax rotation method were performed. Items with factor loading of 0.2 and above were grouped into 1 factor and domains were constructed. Internal consistency reliability was carried out using Cronbach's alpha statistic. The item analysis was considered satisfactory if the Cronbach's alpha value was 0.7 or above (8).

Later, we calculated the scores for each domain of breastfeeding knowledge and the total knowledge score for each respondent. They were then converted to percentage scores by dividing by the possible maximum score and multiplying by 100. The percentage scores were presented in median because they were not normally distributed. Interquartile range (IQR), which was a measure of statistical dispersion, was calculated as the difference between the third and the first quartiles of each score. A higher percentage of knowledge indicated higher knowledge of the item tested. All statistical analyses were done using SPSS Version 12.0.

Results

From 290 eligible staff who were invited to take part in the study, 252 respondents completed the questionnaire, resulting in a response rate of 87%. The mean age of respondents was 38.2 (SD 7.6) years old. Most of them (243 respondents, 96.4%) were Malay, while others were Chinese (6 respondents, 2.4%), Indian (1 respondent, 0.4%) and Siamese (2 respondents, 0.8%). The respondents were mainly from the School of Medical Sciences (177 respondents, 70.2%), and

the rest were from the School of Health Sciences (38 respondents, 15.1%), and the School of Dental Sciences (37 respondents, 14.7%). As for educational level, 64 (25.4%) of them completed education up to secondary school, 109 (43.3%) have a diploma certificate and 79 (31.3%) of them graduated with a bachelor degree or higher qualification. A majority of them (241 respondents, 95.6%) were not involved with shift work. Among the respondents, the median number of children they had was 3 (IQR 2).

From factor analysis, the study constructed 10 domains of knowledge on breastfeeding. Table 1 shows factor loading for each domain of knowledge. From the initial 53 items, 6 items with factor loading below 0.2 were excluded because there were other additional items testing on similar topics and this exclusion would not affect the content validity of the questionnaire; therefore, the final questionnaire consisted of 47 items with an overall factor loading between 0.20 and 0.88. Table 2 shows the items in each domain of breastfeeding knowledge. As for the internal consistency reliability, Cronbach's alpha for knowledge was 0.77, suggesting a good internal consistency.

Using the finalised questionnaire, the median percentage score for total breastfeeding knowledge among the respondents was 76.6% (IQR 14.9). Table 3 shows the median percentage score for each domain of breastfeeding knowledge. The lowest percentage score was for the practical aspects of breastfeeding. Respondents also had low knowledge about breast engorgement and complementary feeding. However, they had high knowledge of the advantages of breastfeeding, colostrum, and effective feeding.

Table 1: Factor loading for domains of breastfeeding knowledge

Domains	No. of items (Total = 47)	Median scale score	IQR	Factor loading
Advantages to baby	6	6.0	1	0.42−0.71
Advantages to mother	6	6.0	1	0.33−0.75
Colostrum	4	4.0	1	0.56−0.88
Effective feeding	3	3.0	0	0.42−0.77
Breast milk expression	8	6.0	2	0.20−0.75
Duration of feeding	4	3.0	2	0.30−0.64
Complementary feeding	2	1.0	1	0.20−0.30
Problem with breastfeeding	5	4.0	2	0.3−0.69
Breast engorgement	2	1.0	1	0.59−0.61
Practical aspects of breastfeeding	7	3.0	2	0.26−0.60

IQR: interquartile range

Table 2: Items in each domain of breastfeeding knowledge

Domains	Items
Advantages to baby	Breastfeeding reduces the risk of lung infection among babies
	Breastfeeding increases the baby's intelligence
	Breastfeeding helps to reduce the incidence of child abuse and neglect
	Baby who received breastfeeding is less prone to get diarrhoea
	Breast milk provides baby with more protection from allergy compared to formula milk
	Breastfeeding causes good development of baby's teeth and gum
Advantages to mother	Exclusive breastfeeding is beneficial in spacing birth
	Breastfeeding helps to stimulate uterine contraction
	Mothers who practised breastfeeding may achieve pre-pregnancy weight faster
	Frequent breastfeeding may prevent breast engorgement
	Mother who practised breastfeeding has a low risk of getting breast cancer
	Breastfeeding may protect against osteoporosis
Colostrum	Colostrum is the mother's early milk, which is thick, sticky, and yellowish in colour
	Colostrum is difficult to digest and needs to be discarded
	Colostrum causes constipation among babies
	Colostrum is not able to protect babies from jaundice
Effective feeding	Babies will gain weight if they receive effective feeding
	Correct positioning helps to achieve effective breastfeeding
	Babies sleep well after they receive adequate breastfeeding
Breast milk expression	Breast milk expression may be done every 3 hours
	Expressed breast milk may be stored for 3 months in a freezer of a 2-door refrigerator
	Expressed breast milk may be stored for 24–48 hours in a lower part of a refrigerator
	It is necessary to express breast milk from one side of the breast only
	Expressed breast milk may be mixed with the previous expressed milk
	Expressed breast milk may be warmed on a fire
	Expressed breast milk may be warmed in a microwave
	The leftover expressed breast milk that has been used may be stored again
Duration of feeding	Breastfeeding should be initiated within 30 minutes after delivery
	Breastfeeding should be given on demand
	Baby should be allowed to breastfeed for at least 10–20 minutes for each feeding
	Breastfeeding should be continued up to 2 years even though the baby has received complementary food

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Complementary feeding	Complementary feeding should be introduced at 6 months of age
	Mothers may mix breastfeeding and formula feeding once baby starts taking complementary food
Problem with breastfeeding	Breast milk production is influenced by breast size
	Mothers with inverted nipples cannot breastfeed their babies
	Breastfeeding must be discontinued if mother has cracked nipple
	Breastfeeding must be discontinued if baby has jaundice
	Breastfeeding must be discontinued if mother has breast engorgement
Breast engorgement	Breast engorgement may be reduced with cold packs
	The use of cabbage may help to reduce breast engorgement
Practical aspect of breastfeeding	Exclusive breastfeeding must be practiced until the infant is 6 months old
	Massage may reduce breast engorgement
	Giving water to baby is encouraged after every breastfeeding
	Belching after feeding shows that the baby is full
	Babies who get enough feeding will pass urine more frequently
	Babies may also be given formula milk in the first 6 months of life
	Oral thrush frequently happens to babies who breastfeed

Table 3: Respondents' score on each domain of knowledge on breastfeeding (*n* = 252)

Domains of knowledge on breastfeeding	Median percentage score (IQR)
Advantages to baby	100.0 (16.7)
Advantages to mother	100.0 (16.7)
Colostrum	100.0 (25.0)
Effective feeding	100.0 (0.0)
Breast milk expression	75.0 (25.0)
Duration of feeding	75.0 (50.0)
Complementary feeding	50.0 (50.0)
Problem with breastfeeding	80.0 (40.0)
Breast engorgement	50.0 (50.0)
Practical aspects of breastfeeding	42.9 (28.6)

IQR: interquartile range

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Discussion

There is a need for an objective, reliable, valid, and sensitive questionnaire to assess knowledge of breastfeeding as part of breastfeeding interventions. There are some existing validated tools assessing knowledge, attitude, confidence, self-efficacy, or satisfaction towards breastfeeding. These tools include the Modified Breastfeeding Evaluation Scale, the Breastfeeding Attrition Prediction Tool, and the Breastfeeding Self-Efficacy Scale (9). However, we developed a new questionnaire in this study to ensure its appropriateness with the local culture. Malaysian women have cultural and traditional beliefs and practices related to breastfeeding that are passed down from generation to generation. For example, many believe that they need to give an infant water to avoid thirst or constipation. As a result, they were not exclusively breastfeeding, even though they were not introducing formula to the infants. They also believe that mothers who have just given birth need to perform breast massage to stimulate milk production. Therefore, the questionnaire tested details of breastfeeding knowledge in all these areas, including the assessment of the respondents' mistaken perceptions of the need for discontinuation of breastfeeding when a baby developed jaundice or a mother has breast engorgement, and the need for discarding colostrum.

Reliability refers to the stability or consistency of information; a reliable measurement tool is one that produces similar information when a measurement is performed more than once. It is an important concept for health education evaluators because an evaluator must ensure the data collection instruments are free from measurement error. Just as there can be measurement error when assessing the physical characteristics of an individual, for example, measurement of height or weight, there is also possible measurement error present when assessing a person's knowledge, attitude, and behaviours (3). In addition to reliability, validity is also important to ensure quality of data derived from the use of the instrument. Therefore, we conducted this study to ensure that the questionnaire yields reliable and valid data accurately and reflects respondents' breastfeeding knowledge.

This study used factor analysis to test the validity of ideas about questionnaire items to determine how items should be grouped into subscales as well as to choose the relevant items and remove some of them from the instrument. Exploratory factor analysis in this study had constructed 10 domains of breastfeeding knowledge. It may provide justification for assessing summated scales for each domain, thus providing information on which aspects of knowledge the respondents are lacking. For example, by using the questionnaire and calculating scores for each domain, researchers may be able to assess in which aspects of knowledge the respondents were lacking, and further intervention can be specifically targeted towards that aspect. Based on factor analysis, we excluded 6 items with factor loading below 0.2. It is common to drop some items from a scale based on factor analysis results (5). Furthermore, most of the areas covered in those items were already included in other domains of the questionnaire.

Because this study used items to form a scale, it required internal consistency. This study found that Cronbach's alpha for the knowledge component of the questionnaire was above 0.7; therefore, the items in that component were measuring the same parameters and correlated with one another. Even though this study used 0.7 as a cut-off level for Cronbach's alpha, there is no specific cut-off value for what level of reliability is acceptable. However, a minimum value of 0.60 is desirable for basic research or evaluation studies (3); therefore, this questionnaire is reliable to assess the knowledge on breastfeeding.

Using the questionnaire, we assessed breastfeeding knowledge among USM female staff. Respondents had low knowledge of the practical aspects of breastfeeding. These practical aspects include the instructions to exclusively breastfeed for 6 months, not to give water after every feeding, and how to detect whether the baby has received sufficient breast milk. It is important to educate mothers that they do not need to provide babies with water, especially in the first 6 months of life. The practice of giving water is widespread throughout the world despite the recommendation and definition of exclusive breastfeeding. Studies conducted in several communities in the Gambia, the Philippines, Egypt, and Guatemala reported that more than 60.0% of newborns were given sugared water and tea (10).

They also lacked adequate knowledge of dealing with the problems of breastfeeding such as breast engorgement or the storage and use of expressed breast milk. Other studies also showed a low level of breastfeeding knowledge, even among health workers. A study conducted among doctors and community health workers in rural South Africa found significant discrepancies in breastfeeding knowledge compared with

the WHO recommendations (11). In North Carolina, many staff nurses who were involved in breastfeeding support had incorrect information and negative attitudes towards breastfeeding (12). It is important to overcome this problem because nurses' support of breastfeeding was best predicted by their breastfeeding knowledge and attitude (13). As for the mothers, receiving accurate information from health workers on every aspect of breastfeeding is important because their decision on infant feeding method is strongly dependent on their knowledge of and attitude towards breastfeeding. Because a majority of the respondents in this study were nurses, their knowledge must be accurate and complete to promote breastfeeding success.

Conclusion

The questionnaire used in this study is reliable and valid for assessing knowledge of breastfeeding; therefore, it can be used for subsequent studies on breastfeeding among women in Malaysia. Low knowledge levels in certain aspects found in this study, such as the false need to provide water to the baby, dealing with problems encountered during breastfeeding, as well as storage and use of expressed breast milk, need to be addressed in a more strategic intervention.

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Authors' Contributions

Conception and design, obtaining of funding, provision of study materials or patients, collection and assembly of data, drafting of the article: TATI
Analysis and interpretation of the data, statistical expertise, final approval of the article: TATI,ZS
Critical revision of the article, administrative, technical, or logistic support: ZS

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