Linguistic validity and reliability of cariogenic food frequency and oral health knowledge, attitude and practice questionnaires for parents of 6-11 years old children in Kota Bharu, Kelantan

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ABSTRACT

Introduction: Cariogenic food intake and oral health knowledge, attitude and practices (KAP) of parents are contributing factors that influence the oral health status of children. As there is lack of a validated questionnaire in Bahasa Melayu (the Malay language) to measure the factors, this cross-sectional study was carried out to establish a linguistically valid and reliable cariogenic food frequency questionnaire (M-CFFQ) and oral health KAP questionnaire (M-OHKAPQ) in Bahasa Melayu, for parents of children aged 6-11 years in Kota Bharu, Kelantan. **Methods:** Relevant questionnaires in English were selected and translated to Malay language. This process included forward translation, synthesis, backward translation and consolidation to produce the preliminary drafts of M-CFFQ and M-OHKAPQ. Pre-testing was conducted on ten parents of children from a primary school in Kota Bharu by face-to-face interview. The findings were reviewed to produce the final versions of M-CFFQ and M-OHKAPQ. A test-retest reliability study was undertaken involving 49 parents. The participants were asked to answer the final M-CFFQ and M-OHKAPQ versions twice, within a 7-14 days interval. Data collected were entered into IBM SPPS version 22 software and analysed using the Intraclass Correlation Coefficient (ICC) test. **Results**: Semantic, idiomatic, experiential, conceptual as well as content and face validity issues were successfully resolved. Fifteen categories of food/drinks for M-CFFQ and 26 items/questions M-OHKAPQ were produced. The total ICC values achieved for M-CFFQ and M-OHKAPQ were 0.887 and 0.807, respectively. **Conclusion:** The M-CFFQ and M-OHKAPQ appeared to be linguistically valid and reliable with excellent test-retest reliability (ICC>0.80).

Keyword: Linguistic, cariogenic, oral health, questionnaire, test-retest reliability

INTRODUCTION

Good oral health in children is essential. In children, it affects their general health (physical, mental, psychological) and social well-being, especially in later life (Schroth, Brothwell & Moffatt, 2007). Yet, dental caries remains a major public health problem in children worldwide (Peres _et al._, 2016). Dental caries can be defined as the localised destruction

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of susceptible dental hard tissues by acidic by-products from the bacterial fermentation of dietary sugar (Fejerskov, 2004). Many children have experienced dental caries as soon as teeth erupt. Petersen *et al.* (2005) reported that about 60-90% of school-aged children are affected by dental caries in most industrialised countries in America and the Europe. In the developing countries of Africa and Asia, prevalence rates of dental caries and dental caries experience tend to escalate due to the increasing consumption of sugars and inadequate exposure to fluorides (Petersen *et al.*, 2005). In Malaysia, the latest national oral health survey showed a high prevalence of caries at 71.3% in 5 years old children and 60.0% of them had visible plaque (Oral Health Division Malaysia, 2015). In addition, 33.3% of 12-year old school children had caries on their permanent teeth (Oral Health Division Malaysia, 2017).

Mani *et al.* (2012) found that the occurrence of caries in children may be influenced by poor dietary habits. In addition, the poor knowledge of oral health, attitude and practices (KAP) of parents contributed to the problem. Children spend much of the time with their parents or primary caregivers when growing up. Most of their early childhood routines such as dietary habits and oral health behaviour are acquired from them at this stage (Naidu & Davis, 2008). It is crucial for parents to have basic knowledge of diet, nutrition and oral hygiene as a contributory factor to dental caries and to understand their significance, so as to instil good dental practices in their children (Tinanoff & Reisine, 2009). These include choosing a diet with low or non-cariogenic foods, limiting sweet foods to mealtimes, and brushing teeth after exposures to sugar (Tinanoff & Reisine, 2009). Parents also play a major role in ensuring the general wellness of their children.

Therefore, the KAP of oral health of parents should impact the oral health of their children. The assessment of these factors is essential for the successful delivery of appropriate oral health knowledge programmes or promotions to the parents. This could help them to understand, create awareness and change their attitudes and practices towards the oral health care of their children.

The Malay language or Bahasa Melayu is the official language for Malaysia. Questionnaires in Bahasa Melayu will benefit the majority of the Malaysian population, cater to respondents who are not proficient in English, particularly those with a lower socio-economic and educational background, and people from rural areas. In addition, there is a lack of an established Bahasa Melayu version of the cariogenic food frequency questionnaire (CFFQ) and oral health knowledge, attitude and practice questionnaire (OHKAPQ) which are linguistically valid and reliable. These may then be used in measuring cariogenic food intake and oral health KAP in the Malaysian population, specifically for parents of preschool and primary school children. Previous local studies had used the translated questionnaires that applied to other age groups, namely secondary school children, infants and toddlers (Cheah *et al.*, 2010; Mani *et al.*, 2010; Zahara *et al.*, 2010: Mani *et al.* 2012; Ruhaya *et al.,* 2012). The reliability and validity of these questionnaires were only partially reported. On the other hand, designing a new questionnaire may be a demanding, time-consuming and costly task (Epstein, Santo & Guillemin, 2015). This study was carried out to establish a linguistically valid and reliable Bahasa Melayu version of CFFQ and OHKAPQ questionnaires for parents of children aged 6-11 years old in Kota Bharu, in the state of Kelantan in Malaysia.

MATERIALS AND METHODS

Research tools

The CFFQ used in this study was adapted from Habibian *et al.* (2001). Initially, it was a food list established from a three-day food diary to describe the dietary habits and oral hygiene behaviour in infants and toddlers over the first 18 months of life, in Mid-Surrey, United Kingdom. It consisted of 18 categories of foods and beverages, namely, all cakes, chocolate, crisps, sweets, sugared cereal, fruits, sugared milk, cow's milk, formula milk, soya milk, formula milk with non-milk extrinsic sugar (NMES), sugared drinks, sugared beverages, fruit juices, water, drinks no sugar, milk desserts and non-milk dessert. The food list had been adapted in Malaysia by Ruhaya *et al.* (2012) and Rathmawati *et al.* (2017) in their studies related to dietary habit and oral health in young children and disabled children. For this study, a formula for food intake frequency was adapted from Chee *et al.* (1996) and added to the CFFQ. The food intake frequencies were categorised into 7-point scale rating, in which '1' represented the never or rarely response, '2' represented once a month, '3' represented 2-3 times a month, '4' represented once a week, '5' represented 2-3 times a week, '6' represented once daily and '7' represented 2-3 times daily.

Meanwhile, OHKAPQ was adapted from the Oral Health Promotion Evaluation Toolkit by Watt *et al.* (2004). This toolkit was produced from a project that aimed to critically review, test and publish a set of appropriate age-specific oral health promotion evaluation outcome measures for parents and carers of pre-school children, 12 year-old children and people over 65 years of age in the United Kingdom. For the purpose of this study, 28 questions or outcome measures that are relevant for parents of children aged 6-11 years were selected from the toolkit. These questions were then categorised into three sections, namely, oral health knowledge, attitude and practice in regard to plaque control, fluoride use, diet behaviour and dental attendance.

Process

This study was conducted from February to May 2017. Ethical approval to conduct this study was obtained from the Human Research Ethics Committee of Universiti Sains Malaysia (JEPem Code: USM/JEPem/17010067) and National Medical Research Register, Ministry of Health Malaysia (NMRR ID Number: NMRR-17-706-35129). It was divided into two phases, namely linguistic validation and test-retest reliability. Figure 1 and Figure 2 show the translation or linguistic validation process and flow charts of both phases.

Phase I: Translation/linguistic validation
The linguistic validation process in this study was adapted from the guidelines proposed by Beaton *et al.* (2000), with slight modifications. Initially, CFFQ and OHKAPQ that were selected underwent a translation process involving forward translation, synthesis, backward translation and consolidation to produce a preliminary Bahasa Melayu version of CFFQ and OHKAPQ which were called M-CFFQ-P and M-OHKAPQ-P. Following the pre-testing stage, ten parents of school children aged 6-11 years old from a primary school in Kota Bharu were selected using quota sampling and invited for a face-to-face interview. The sample size that was decided was based on the process of translation and adaptation guideline recommended by WHO (2001). The inclusion criteria were Malaysian citizens, able to read and write in Bahasa Melayu. All participants gave their consent. During this stage, each participant was informed about the purpose and procedure of the study by a single interviewer. They were asked for their opinions, suggestions and comments regarding the M-CFFQ-P and M-OHKAPQ-P. Any word or expression in these questionnaires that was difficult

for the participants to comprehend or inappropriately used was probed in detail. A meeting was then held to review and resolve the issues in the pre-test study, to eventually produce the final versions of M-CFFQ and M-OHKAPQ. Members of the expert review committee involved in this phase were a nutritionist specialist, a dental public health specialist, a dental public health (doctorate) student and the researcher.

Phase II: Test-retest reliability
In test-retest reliability study, the sample size was calculated using a Microsoft Excel spreadsheet file developed by Arifin
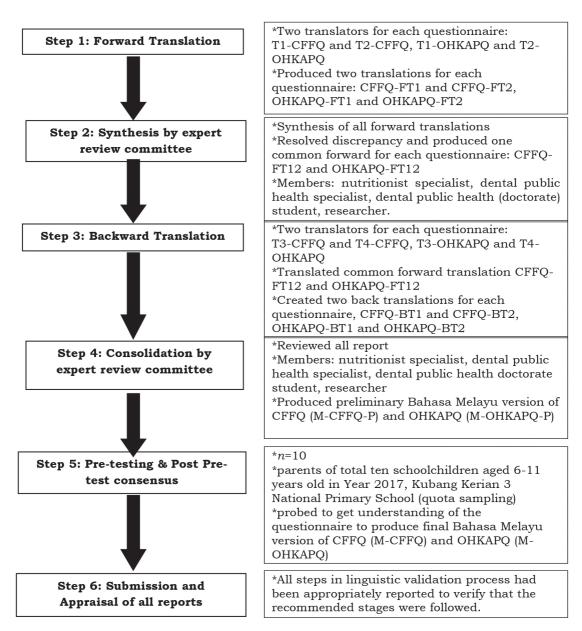
Step 1: Forward Translation	*Two translators for each questionnaire: T1-CFFQ and T2-CFFQ, T1-OHKAPQ and T2-OHKAPQ *Produced two translations for each questionnaire: CFFQ-FT1 and CFFQ-FT2, OHKAPQ-FT1 and OHKAPQ-FT2
Step 2: Synthesis by expert review committee	*Synthesis of all forward translations *Resolved discrepancy and produced one common forward for each questionnaire: CFFQ-FT12 and OHKAPQ-FT12 *Members: nutritionist specialist, dental public health specialist, dental public health (doctorate) student, researcher.
Step 3: Backward Translation	*Two translators for each questionnaire: T3-CFFQ and T4-CFFQ, T3-OHKAPQ and T4-OHKAPQ *Translated common forward translation CFFQ-FT12 and OHKAPQ-FT12 *Created two back translations for each questionnaire, CFFQ-BT1 and CFFQ-BT2, OHKAPQ-BT1 and OHKAPQ-BT2
Step 4: Consolidation by expert review committee	*Reviewed all report *Members: nutritionist specialist, dental public health specialist, dental public health doctorate student, researcher *Produced preliminary Bahasa Melayu version of CFFQ (M-CFFQ-P) and OHKAPQ (M-OHKAPQ-P)
Step 5: Pre-testing & Post Pre-test consensus	*n=10 *parents of total ten schoolchildren aged 6-11 years old in Year 2017, Kubang Kerian 3 National Primary School (quota sampling) *probed to get understanding of the questionnaire to produce final Bahasa Melayu version of CFFQ (M-CFFQ) and OHKAPQ (M-OHKAPQ)
Step 6: Submission and Appraisal of all reports	*All steps in linguistic validation process had been appropriately reported to verify that the recommended stages were followed.

Figure 1. Flow chart of phase I - linguistic validation process of M-CFFQ and M-OHKAPQ (adapted from a guideline proposed by Beaton *et al.* (2000) with a slight modification)
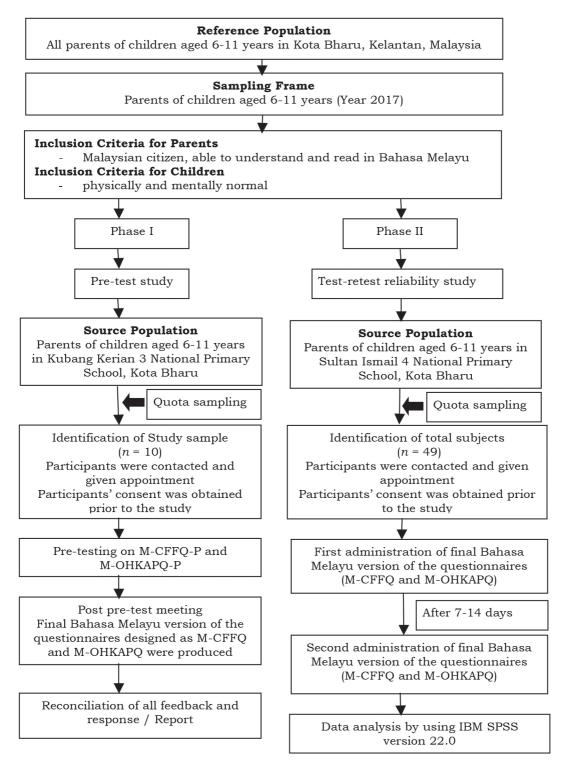
Reference Population
All parents of children aged 6-11 years in Kota Bharu, Kelantan, Malaysia

Sampling Frame
Parents of children aged 6-11 years (Year 2017)

Inclusion Criteria for Parents
- Malaysian citizen, able to understand and read in Bahasa Melayu
Inclusion Criteria for Children
- physically and mentally normal

Phase I

Phase II

Pre-test study

Test-retest reliability study

Source Population
Parents of children aged 6-11 years in Kubang Kerian 3 National Primary School, Kota Bharu

Source Population
Parents of children aged 6-11 years in Sultan Ismail 4 National Primary School, Kota Bharu

Quota sampling

Quota sampling

Identification of Study sample
(n = 10)
Participants were contacted and given appointment
Participants' consent was obtained prior to the study

Identification of total subjects
(n = 49)
Participants were contacted and given appointment
Participants' consent was obtained prior to the study

Pre-testing on M-CFFQ-P and M-OHKAPQ-P

First administration of final Bahasa Melayu version of the questionnaires (M-CFFQ and M-OHKAPQ)

After 7-14 days

Post pre-test meeting
Final Bahasa Melayu version of the questionnaires designed as M-CFFQ and M-OHKAPQ were produced

Second administration of final Bahasa Melayu version of the questionnaires (M-CFFQ and M-OHKAPQ)

Reconciliation of all feedback and response / Report

Data analysis by using IBM SPSS version 22.0

Figure 2. Sampling and flow chart of pre-test study (in phase I) and test-retest reliability study (phase II)

Table 1. Names of foods and beverages in English (CFFQ) and Bahasa Melayu (M-CFFQ) versions of cariogenic food intake questionnaire

No	*English version (CFFQ) [from Habibian et al. (2001)] domains and items*	No	*Bahasa Melayu version (M-CFFQ) domains and items*

1	Cake
	    Cakes, pastries, bun, breadstick, biscuits
		1	Kek, Pastri dan Roti
			    Semua jenis kek,
			    Semua jenis pastri (contoh : tart, pai, krim paf, roti canai),
			    Semua jenis roti dan ban
			    Lain-lain. Sila nyatakan

		2	Biskut
			    Semua jenis biskut
			    Lain-lain. Sila nyatakan

		3	Kuih tradisional
			    Semua jenis kuih tradisional
			    Lain-lain. Sila nyatakan

2	Chocolates
	    Including various types of chocolate bars and wafers
		4	Coklat
			    Coklat bar dan biskut bersalut coklat
			    Lain-lain. Sila nyatakan

3	Crisps
	    Crisps and savoury snacks
		5	Kerepek
			    Semua jenis kerepek,
			    Snek berperisa (contoh: makanan ringan atau jajan)
			    Lain-lain. Sila nyatakan

4	Sweets
	    Chewable sweets, boiled sweets, lollies
		6	Gula-gula
			    Gula-gula boleh kunyah,
			    Gula-gula keras,
			    Lolipop
			    Lain-lain. Sila nyatakan

5	Sugared cereals
	    All breakfast cereals, baby cereal, rusk
		7	Bijirin bergula
			    Semua jenis bijirin sarapan bergula
			    Lain-lain. Sila nyatakan

6	Fruits
	    All fresh fruits and dried fruits
		8	Buah
			    Semua jenis buah kering,
			    Semua jenis jeruk buah,
			    Semua jenis buah yang disira
			    Lain-lain. Sila nyatakan

7	Sugared milk
	    Milk with added sugar/ honey (milkshake)
		9	Susu segar bergula atau susu UHT bergula
			    Susu segar yang ditambah gula atau madu
			    Susu UHT yang ditambah gula atau madu
			    Lain-lain. Sila nyatakan

8	Soya milk
	    All soya bean-based milk
		10	Susu soya
			    Semua susu berasaskan soya
			    Lain-lain. Sila nyatakan

9   Formula milk
   All formula milk containing
   only lactose

10   Formula milk with NMES
   All formula milk containing
   non-milk extrinsic sugars

11   Sugared drink
   Squash,baby drinks, herbal
   drinks, fizzy drinks

12   Sugared beverages
   Tea with added sugar, coffee
   with added sugar

11   Susu formula dengan gula tambahan
   Semua susu formula dengan gula tambahan
   Lain-lain. Sila nyatakan.

12   Minuman bergula/ susu pekat manis
   Minuman bercoklat
   Minuman berperisa buah/kordial (contoh:
   jagung, laici, anggur, oren dan lain-lain)
   Minuman dalam kotak (contoh: teh bunga,
   coklat , oren, laici dan lain-lain)
   Minuman bergas,
   Teh ditambah gula/susu pekat manis (contoh:
   teh tarik)
   Kopi ditambah gula/susu pekat manis
   Minuman herba
   Lain-lain. Sila nyatakan.

13   Fruit juices
   All fruit juices and drinks

13   Jus buah-buahan
   Semua jus buah-buahan yang;
   Tanpa gula
   Ditambah gula
   Ditambah susu pekat manis
   Lain-lain. Sila nyatakan.

14   Milk dessert
   Yogurt, fromage frais,
   custard

15   Non-milk dessert
   Baby dessert, pureed fruits
   with added sugar, preserves,
   honey, table sugar, ice lollies,
   baby dessert

14   Pencuci mulut
   Semua jenis pencuci mulut
   Yogurt dengan gula tambahan
   Dadih dengan gula tambahan
   Semua jenis aiskrim, cendol, air batu campur.
   Lain-lain. Sila nyatakan.

16   Cow's milk
   Cow's milk, goat's milk

17   Water
   Water as drink

18   Drinks no sugar
   Sugar-free drinks

*Excluded as not relevant to the content of the
CFFQ*
*Fresh Cow's and goat's milk are categorised as
cariostatic. Meanwhile, water and sugar-free
drinks are not cariogenic.*

15   Lain-lain
   Madu
   Semua jenis jem
   Kaya
   Semua jenis colek/ sos/ kicap (untuk buah,
   rojak, lok chen, keropok dan lain-lain)
   Lain-lain. Sila nyatakan

(2015), based on a formula designed by Walter, Eliasziw and Donner (1998). The lower limit of accepted reliability (P_0) was set at 0.6, whereas expected reliability coefficient (P_1) was decided at 0.8 (Zulkifli, Tin-Oo & Saddki, 2015), with 80% power and alpha 0.05. The sample size obtained was 39 subjects. After assuming a 20% drop-out rate, the sample size was increased to 49 subjects. Thus, 49 eligible parents of children aged 6-11 years of age were recruited via quota sampling from another primary school in Kota Bharu. The selected parents were contacted and asked to complete the M-CFFQ and M-OHKAPQ forms twice with 7-14 days intervals between the first and second administration of the questionnaires. Appointments were made with the parents and the interviews conducted accordingly. All participants gave their informed consent. Data collected in this study was entered into the IBM SPPS version 22 software. The intraclass Correlation Coefficient (ICC) test was used to check for test-retest reliability by assessing the agreement of the responses in the time interval. The level of significance was set at $p<0.05$.

RESULTS

Phase I: Linguistic validation
The Bahasa Melayu versions of CFFQ (M-CFFQ) and OHKAPQ (M-OHKAPQ) showed satisfactory equivalence with the respective English versions of CFFQ (Table 1) and OHKAPQ (Table 2). Some modifications were made by the expert committee to achieve better semantic, idiomatic, experiental as well as conceptual equivalences. Meanwhile, content validity and face validity of M-CFFQ and M-OHKAPQ were obtained through expert committee review in the synthesis, consolidation and post pre-test stages. Some domains and items in M-CFFQ and M-OHKAPQ required modifications to suit common Malaysian cariogenic foods/drinks and to be

properly translated into local language and culture. Common Malaysian foods/drinks include traditional delicacies, spicy and sweetened soy bean sauce (*colek)*, coconut-spread (*sekaya* or *kaya*), tea drinks with sweetened creamer (*teh tarik*), and *cendol* which is an icy dessert with glutinous pellets, coconut milk, palm sugar, and sometimes with added coloured syrup, sweet corn and black beans. None of the intended objectives and concept of the questionnaires was compromised in the process. At the end of this phase, 15 categories of foods/drinks for M-CFFQ and 26 items/questions for M-OHKAPQ were produced. Sociodemographic profile of participants in the pre-test stage is shown in Table 3.

Phase II: Test-retest reliability
The socio-demographic profile of respondents in test-retest reliability is shown in Table 3.

Table 4 shows the ICC analysis of M-CFFQ and M-OHKAPQ for each domain. Total ICC value of M-CFFQ and M-OHKAPQ are 0.887 and 0.807, respectively. Using the guideline of interpretation of the ICC by Cicchetti (1994), these findings indicate that M-CFFQ and M-OHKAPQ showed excellent agreement between test and retest study and both are stable between the two different occasions or time.

DISCUSSION

Phase I: Translation/Linguistic validation and equivalences
Both M-CFFQ and M-OHKAPQ achieved semantic, idiomatic, experiental and conceptual equivalences as in original sources through the translation/linguistic validation process (Karthikeyan, Manoor & Supe, 2015; Beaton *et al.*, 2000). The content validity and face validity of the questionnaires were assessed, as suggested by Karthikeyan *et al.* (2015). Amendments in both questionnaires were made in accordance with the comments received

Table 2. Questions in English (OHKAPQ) and Bahasa Melayu (M-OHKAPQ) versions of KAP questionnaire

No	English Version (OHKAPQ)	Bahasa Melayu version OHKAPQ (M-OHKAPQ)
	Section: Knowledge	Bahagian: Pengetahuan
1	Sugary snacks/drinks are best limited to meal times. Yes No Do not know	Makanan/minuman bergula paling sesuai dihadkan pada waktu makan utama (sarapan, makanan tengahari dan malam) sahaja Ya Tidak Tidak tahu
2	If your child had a bag of sweets, would it be better for his/her teeth to eat them All in one go A few now and rest later Do not know	Jika anak anda mempunyai sejumlah gula-gula (satu peket atau sebungkus), adalah lebih baik untuk mereka sekiranya dimakan: Semua sekaligus Sedikit demi sedikit Tidak tahu
3	Fruit drinks designed specially for children are safe to teeth Yes No Do not know	Minuman berperisa buah-buahan (contoh: laici, anggur , oren dan lain-lain) adalah selamat untuk gigi anak anda Ya Tidak Tidak tahu
4	Most medicines are sugar-free Yes No Do not know	Kebanyakan ubat-ubatan dalam bentuk cecair mengandungi gula. Ya Tidak Tidak tahu
5	At what age do you think that you should start to brush your child's teeth? At birth When first teeth come through 1 - 2 years Over 2 years Do not know	Pada pendapat anda bilakah umur yang paling sesuai untuk mula menjaga kebersihan mulut anak anda? Selepas lahir Apabila gigi pertama telah tumbuh 1-2 tahun Lebih dua tahun Tidak tahu
6	You should brush your child's teeth after each meal to prevent decay Yes No Do not know	Anak-anak perlu memberus gigi atau berkumur setiap kali selepas makan untuk mengelakkan kerosakan gigi. Ya Tidak Tidak tahu
7	How often each day should children's teeth to be brushed? Once Twice Three times Never Do not know	Berapa kali sehari gigi anak anda perlu diberus? Sekali Dua kali Tiga kali Tidak pernah Tidak tahu

8	How much toothpaste should be used for each brushing of a child's teeth?	Berapa banyak ubat gigi yang diperlukan setiap kali memberus gigi anak anda?
	Blob, the size of a pea	Sekecil saiz kacang pis
	½ brush head length	Setengah saiz kepala berus gigi
	Whole brush head length	Keseluruhan saiz kepala berus gigi
	Does not matter	Tidak penting.
	Do not know	Tidak tahu
9	Fluoride strengthens tooth enamel	Florida menguatkan enamel (permukaan luar) gigi.
	True	Betul
	False	Salah
	Do not know	Tidak tahu
10	At what age should you start taking your child to the dentist?	Pada umur berapakah anda perlu mula membawa anak berjumpa doktor gigi?
	0 - 12 months	0-12 bulan
	13-24 months	13-24 bulan
	25-36 months	25-36 bulan
	When at school	Apabila mula bersekolah
	When they have a toothache	Apabila sakit gigi
	Do not know	Tidak tahu
11	For what reason should you take your child to the dentist?	Mengapakah anda perlu membawa anak berjumpa dengan doktor gigi?
	Because they have a toothache	Sebab sakit gigi
	For a checkup	Untuk pemeriksaan
	To get them used to go	Untuk membiasakan anak
	Do not know	Tidak tahu
	Others	Lain-lain
	Section: Attitude	Bahagian: Sikap
12	There is no need to be concerned about baby teeth.	Adalah perlu untuk mengambil berat berkenaan gigi susu.
	Strongly agree	Sangat setuju
	Agree	Setuju
	Undecided	Tidak pasti
	Disagree	Tidak setuju
	Strongly Disagree	Sangat tidak setuju
13	It is not worthwhile to get cavities in baby teeth filled because those teeth fall out anyway	Adalah berbaloi menampal gigi susu yang berlubang walaupun gigi tersebut akan diganti dengan gigi kekal.
	Strongly agree	Sangat setuju
	Agree	Setuju
	Undecided	Tidak pasti
	Disagree	Tidak setuju
	Strongly Disagree	Sangat tidak setuju
14	Regular visits to the dentist are very important.	Pemeriksaan berkala oleh doktor gigi adalah sangat penting
	Strongly agree	Sangat setuju
	Agree	Setuju
	Undecided	Tidak pasti
	Disagree	Tidak setuju
	Strongly Disagree	Sangat tidak setuju

15	If your child had a bad back tooth and it was not a baby tooth, but a second tooth, would you rather it was filled or taken out?	Adakah anda mahu jika gigi geraham kekal anak anda yang rosak untuk.......?
	Filled	Ditampal
	Taken out	Dicabut
	Do not know	Tidak tahu
16	If your child had a bad front tooth and it was not a baby tooth, but a second tooth, would you rather it was filled or taken out?	Adakah anda mahu jika gigi depan kekal anak anda yang rosak untuk.......?
	Filled	Ditampal
	Taken out	Dicabut
	Do not know	Tidak tahu
17	Brushing my teeth twice a day for 2 -3 minutes will keep the gums health	Memberus gigi dua kali sehari selama 2-3 minit dapat mengekalkan kesihatan mulut, gigi dan gusi.
	Extremely likely	Sangat setuju
	Likely	Setuju
	Neither likely nor unlikely	Tidak pasti
	Unlikely	Tidak setuju
	Extremely likely	Sangat tidak setuju
18	Some children insist on brushing their own teeth from a very early age. Does your child:	Sesetengah anak-anak hendak memberus gigi sendiri di usia awal kanak-kanak. Adakah anak anda
	Brush his/ her own teeth?	Memberus giginya sendiri?
	Has it done for him/her (adult always assists and repeats)?	Memberus gigi dengan dibantu orang dewasa?
	Sometimes do it alone and sometimes have it done for him/her?	Ada masanya memberus sendiri dan ada masa dibantu orang dewasa
	Section: Practice	Bahagian: Amalan
19	How often does your child brush his/her teeth or have them brushed?	Berapa kerap anak anda memberus gigi?
	Less often than once a week	Kurang dari sekali seminggu
	At least once a week but not every day	Sekurang-kurangnya sekali seminggu tetapi tidak setiap hari
	Once a day	Sekali sehari
	Twice a day	Dua kali sehari
	More than twice a day	Lebih dari dua kali sehari
20	Has your child started using toothpaste?	Adakah anak anda telah mula menggunakan ubat gigi?
	Yes	Ya
	No	Tidak
	(If 'Yes', answer Q21 onwards) (If 'No', the questionnaire ends here)	Jika Ya, sila jawab Soalan 21dan seterusnya. Jika Tidak, sila jawab Soalan 23 dan seterusnya.

21	Does the toothpaste your child uses contain fluoride? Yes No Do not know	Adakah ubat gigi anak anda mengandungi fluorida? Ya Tidak Tidak tahu
22	The amount that my child usually use during tooth brushing : Blob, the size of a pea 1/2 brush head length Whole bush head length Does not matter Do not know	Semasa memberus gigi anak saya menggunakan ubat gigi......? Sekecil saiz kacang pis Setengah saiz kepala berus gigi Keseluruhan saiz kepala berus gigi Tidak penting Tidak tahu
23	What drink do you usually give to your child before bed or during the night? Tap/still mineral water Fizzy mineral water (not flavoured) Fizzy mineral water(flavoured) Herbal drink Milk drinks (not flavoured) Flavoured milk (eg: Horlicks, Ovaltine, milkshake) Non-diluted fruit juice Fruit drink/squash Diluted fruit juice Fizzy drink Tea or coffee Something else Do not know If yes, answer Q24 onwards If never, Stop here	Apakah minuman yang sering anak anda ambil sebelum tidur atau pada waktu malam? Jika ya untuk pilihan jawapan ini, sila jawab Soalan 24 dan seterusnya Susu dengan gula tambahan Minuman bercoklat Jus buah-buahan Minuman berperisa buah-buahan (contoh laici, oren, anggur dan lain-lain) Minuman dalam kotak (contoh : teh bunga, coklat, anggur dan lain-lain) Minuman bergas Teh/kopi dengan susu pekat manis atau gula Minuman herba Lain-lain. Sila nyatakan: Jika ya untuk pilihan jawapan ini, sila terus ke soalan 25 dan seterusnya Air kosong/mineral Tidak tahu Tidak minum
24	Nowadays, how often does your child take something to drink before bed or during the night? Every night 4-6 nights a week 1-3 nights a week Less often than once a week Never	Berapa kerap anak anda minum minuman tersebut dalam tempoh seminggu? Setiap malam 4-6 malam 1-3 malam Kurang dari sekali
25	How often does your child have something to eat between meals during the day? Most of the time Some of the time Once in the while Rarely Never Do not know	Berapa kerap anak anda makan makanan bergula di antara waktu makan utama dalam sehari? (makan utama: sarapan, makan tengahari dan malam) Pada kebanyakan masa Beberapa kali dalam sehari Sekali dalam sehari Jarang-jarang Tidak pernah Tidak tahu

26	How often does your child have something to eat between meals in the evening or in weekend?	Berapa kerap anak anda makan makanan bergula di antara waktu makan utama pada hujung minggu? (makan utama: sarapan, makan tengahari dan malam)
	Most of the time	Pada kebanyakan masa
	Some of the time	Beberapa kali dalam sehari
	Once in the while	Sekali dalam sehari
	Rarely	Jarang-jarang
	Never	Tidak pernah
	Do not know	Tidak tahu

Table 3. Socio-demographic profile of the respondents

Variables	*Pre-test stage (n=10)*	*Test Retest Reliability (n=49)*
Respondents, n (%)		
Fathers	2 (20.0)	9 (18.4)
Mothers	8 (80.0)	40 (81.6)
Sex of child, n (%)		
Boy	4 (40.0)	24 (49.0)
Girl	6 (60.0)	25 (51.0)
Age (years), Mean±SD)		
Child	8.5±1.6	8.6±1.8
Respondent	40.4±5.9	40.2±6.4
Respondent's race, n (%)		
Malay	10 (100.0)	49 (100.0)
Chinese	0 (0.0)	0 (0.0)
Indian	0 (0.0)	0 (0.0)
Others	0 (0.0)	0 (0.0)
Respondent's education level, n (%)		
No formal education	0 (0.0)	0 (0.0)
Primary school	0 (0.0)	0 (0.0)
Lower secondary school	1 (10.0)	3 (6.1)
Upper secondary school	5 (50.0)	11 (22.5)
Diploma or equivalent	1(10.0)	11 (22.5)
Degree/Master/PhD	2 (20.0)	24 (48.1)
House income per month (Ringgit Malaysia), Median (IQR)	1100 (2600)	5000 (6100)
Oral health information sources, n (%)		
None	0 (0.0)	0 (0.0)
Doctor/Nurses/ Healthcare workers	8 (80.0)	37 (75.5)
Television/Radio	8 (80.0)	29 (59.2)
Newspaper/Article	9 (90.0)	29 (59.2)
Internet	8 (80.0)	31 (63.3)
Family/Friend	7 (70.0)	24 (49.0)
Others	0 (0.0)	0 (0.0)

Table 4. Intraclass Correlation Coefficient (ICC) of M-CFFQ and M-OHKAPQ

No	Domains	Test-Retest Reliability[†] (ICC)	95% CI
M-CFFQ			
1	Cake	0.719	0.542, 0.834
2	Biscuits	0.803	0.676, 0.884
3	Traditional delicacies	0.608	0.400, 0.758
4	Chocolate	0.729	0.550, 0.841
5	Crisps	0.768	0.624, 0.862
6	Sweets	0.801	0.669, 0.883
7	Sugared cereals	0.872	0.785, 0.926
8	Fruits	0.663	0.472, 0.794
9	Sugared fresh /UHT milk	0.687	0.504, 0.811
11	Formula milk with added sugar	0.815	0.694, 0.892
10	Soya milk	0.703	0.530, 0.821
12	Sugared/Sweetened drink	0.699	0.488, 0.826
13	Fruits Juice	0.767	0.622, 0.862
14	Dessert	0.718	0.550, 0.830
15	Others	0.866	0.775, 0.922
Total ICC Value of M-CFFQ		0.887	0.788, 0.938
M-OHKAPQ			
1	Knowledge (K)	0.714	0.542, 0.829
2	Attitude (A)	0.858	0.759, 0.918
3	Practice (P)	0.876	0.790, 0.928
Total ICC Value of M-OHKAPQ		0.807	0.680, 0.887

[†]ICC was calculated using two way mixed model with absolute agreement type option (IBM SPPS version 22)

from the participants, taking into consideration the characteristics and socio-demographic profile of the target population (Table 3) can influence the feasibility, readability, consistency, formatting, and clarity of language (Vyas *et al.*, 2016).

Content validity
Content validity is defined as the extent to which a measurement reflects the specific intended domain of content. The evidence for content validity was obtained from previous literature, the views of experts and from local target groups, as there are no objective measurements to test content validity (Laaksonen, 2012). With regard to M-CFFQ, there were

some issues encountered during forward translation, concerning particular words and items that are uncommon in Malaysian population or which could not be translated into Bahasa Melayu. Otherwise, the words and items were translated into terms that had similar meaning without compromising the content. These included words such as 'breadstick' which was replaced with 'bread' (*roti*) and 'squash' which was redefined as 'fruit flavoured drinks' (*minuman berperisa buah-buahan*). However, 'fromage fraise' and 'baby dessert' items were excluded from M-CFFQ as these foods were not familiar or relevant to these preschool and primary school children. These changes

were consistent with those of Shinga-Ishihara *et al.* (2014) who had excluded the items 'applesauce' and 'breakfast drinks' from their FFQ which was adapted from a western study, as these were not familiar to the Japanese.

In our study, the expert committee also agreed to omit the items that were not relevant to the intended content for the M-CFFQ. These were the 'water' and 'drinks no sugar' domains, which were identified as not cariogenic. In addition, the domains on 'cow's milk' and 'formula milk that contains only lactose' were excluded based on the report by Rugg-Gunn and Woodward (2011) which stated that these types of milk are virtually non-cariogenic. The sugar present is lactose, which is the least cariogenic of all mono- and disaccharides. Milk also contains calcium phosphate, fat and casein that protect against demineralisation of enamel and overcome the cariogenicity of the milk (Rugg-Gunn & Woodward, 2011). Furthermore, Rugg-Gunn and Woodward (2011) concluded that milk and milk products such as cheese and yoghurt without added sugars were safe and possibly beneficial for teeth. Therefore, the item 'yoghurt' in the CFFQ was substituted with 'yoghurt with added sugar' in the M-CFFQ as the latter is better in representing the intended content of the questionnaire.

In addition, the item 'fresh fruit' in the original CFFQ was omitted since its cariogenicity is considered very low, unless it was consumed at least 17 times per day (Moynihan & Petersen, 2004). Besides, data from epidemiological studies largely showed that fresh fruit is non-cariogenic and its consumption had been reported to have a negative correlation with dental caries (Arora & Evans, 2012). However, the consumption of fresh fruits is encouraged by Malaysian Dietary Guidelines and health reports from Australia recommend at least two servings of fresh fruits per day (NCCFN, 2010; Arora & Evans, 2012). Fruit consumption is also supported by The Eatwell Plate, the United Kingdom national food guide that recommends that one-third of dietary volume should be provided by fruits and vegetables (Arora & Evans, 2012). The general opinion appears to favour the consumption of whole fruits, as they benefit overall health and stimulate salivary flow (Arora & Evans, 2012).

In order to include more potential cariogenic foods in Malaysian population, our expert committee decided to add the domains, 'traditional delicacies' and 'others' as they captured miscellaneous local foods such as 'honey', 'coconut spread' (*sekaya* or *kaya*), and 'sweet sauce' (*colek*). The items 'sugared/sweetened drinks' and 'packet drinks' (*minuman dalam kotak*) were introduced as these were commonly available in retail outlets. This, again, is in agreement with Shinga-Ishihara *et al.* (2014), who added five new items of traditional fresh and semi-dry confectioneries that are common in Japan to their adapted food questionnaire. These were bread filled with bean jam or fruit jam (*An-pan* or *Jampan*), rice cracker (*Senbei*), bun with a bean-jam filling (*Manju*), rice cake (*Mochi*), and bar of sweet jellied adzuki-bean paste (*Youkan*).

As for M-OHKAPQ, there was a challenge in defining, in Bahasa Melayu, 'often', which means '*kerap*' (frequent) or '*selalu*' (always or consistent) and other terms related to the frequency measurement such as 'some of the time', 'once in a while' and 'rarely'. However, the expert committee managed to address these issues by using suitable local terms. The same idea was applied by Hammond *et al.*, (2014) who undertook the linguistic validation of the Evaluation of Daily Activity Questionnaire (EDAQ) for use in rheumatoid arthritis from the Swedish language to British-English. They made several changes in the forward translation, for example, for 'high' and 'low spirited.' As these terms are not in everyday use in British-English and they decided to replace them with 'happy' and

'unhappy', respectively (Hammond *et al.*, 2014).

Otherwise, there were minor changes regarding the use of appropriate nouns, words and expression as well as rearrangement of the questions in M-CFFQ and M-OHKAPQ. These were done for better understanding and, eventually, to increase content validity (Shinga-Ishihara *et al.*, 2014).

Face validity

Face validity of the M-CFFQ and M-OHKAPQ was achieved through pre-test and test-retest reliability. The main purpose of pre-testing was to determine whether all the items were comprehensive and acceptable. In this study, cognitive interview/debriefing approach was used to assess whether the concepts, questions and response alternatives were clearly conveyed to the participants by the questionnaires, as intended (Laaksonen, 2012). Generally, there were no serious difficulties encountered by the participants in understanding the words and sentences used in the M-CFFQ and M-OHKAPQ.

Minor amendments and modifications were done following the pre-test study. Some of the participants suggested that certain domains and items in M-CFFQ and M-OHKAPQ should provide a few examples or explanation for better understanding. This involved the items 'pastries', 'snack' and 'sugared milk' (*susu bergula*) in the M-CFFQ and the terms 'snack', 'main meal', 'enamel' and 'fruit drinks' in the M-OHKAPQ. This matter was successfully resolved by the expert committee by adding the examples as suggested by the participants. On other hand, some phrases that could potentially cause confusion were substituted with other terms with a similar meaning. These included 'a bag of sweets', replaced with '*sepeket atau sebungkus gula-gula*', 'a few now and the rest later' (*makan sedikit demi sedikit*), 'after meals' (*selepas makan*), and 'blob, the size of a pea' (*sekecil saiz kacang pis*).

Our undertaking of the face validity of M-CFFQ and M-OHKAPQ was in line with that of study of Hammond *et al.* (2014). They received recommendations from their cognitive debriefing participants that requested simplification of some part of the adapted questionnaire, combining items where possible and deleting uncommon items. There were also suggestions to add relevant items and to omit some inappropriate items which were not relevant to their target group. All changes were made through a consensus approach (Hammond *et al.*, 2014). The words and phrases used in M-CFFQ and M-OHKAPQ were carefully chosen to avoid any misunderstanding. Content validity was again obtained through post pre-test meeting of the experts to resolve the issues that were identified during the face validation process.

Test-retest reliability

Test-retest reliability of M-CFFQ and M-OHKAPQ were examined through ICC. The ICC value showed the degree of reproducibility of the questionnaires in repeated measurements. The high test-retest reliability could be attributed to the acceptable face and content validity of the translated questionnaire (Vyas *et al.*, 2016). It also indicated the questionnaires were stable, in terms of the ability to reproduce measures, assuming that variables that were to be tested did not change over time (Streiner, Norman & Cairney, 2014).

In our study, total ICC values of M-CFFQ and M-OHKAPQ showed excellent agreement between test and retest. The overall ICC value of M-CFFQ was 0.887 (95% CI; 0.788, 0.938). As for specific domains, values of ICC ranged from 0.608 (traditional delicacies) to 0.872 (sugared cereal). The total ICC value of M-OHKAPQ was 0.807 (95% CI; 0.680, 0.887). The ICC value for the Knowledge domain was 0.714 (95% CI; 0.542, 0.829), the Attitude domain was 0.858 (95% CI; 0.759, 0.918) and the

Practice domain was 0.876 (95% CI; 0.790, 0.928). The smaller ICC value was noted for the Knowledge domain was due to the lower agreement for the two occasions the questionnaire was administrated. It is possible that the first administration may have induced the participants to seek the right answers which then led to the changes of responses in the second administration.

CONCLUSION

The content validity and content face validity of the Bahasa Melayu version of CFFQ (M-CFFQ) and OHKAPQ (M-OHKAPQ) for parents of children aged 6-11 years old in Kota Bharu, Kelantan were satisfactorily established in the translation process. M-CFFQ and M-OHKAPQ also successfully achieved semantic, idiomatic, experiental and conceptual equivalences. They showed excellent results in test-retest reliability (ICC >0.800). Both M-CFFQ and M-OHKAPQ have been proven to be linguistically valid and reliable in this study.

This study was a first attempt to adapt the questionnaires from the original sources. Therefore, the findings could not be compared with any previous studies. Further studies on psychometric testing of M-CFFQ and M-OHKAPQ are suggested to assess other aspects of validity and reliability. The studies should be conducted in a larger Malaysian population with different ethnic variations and sociodemographic backgrounds. They could be improved with the establishment of a user's guide, which could include features such as the mode of administration, references, scoring and interpretation of the scores, to help future researchers using the questionnaires. The cariogenicity index and quantity measurement of the foods or drinks could be incorporated in M-CFFQ, to produce a more meaningful and valuable assessment for dental studies.

Authors' contributions

RN, the principal investigator, conducted the study, data collection and data analysis and drafted the manuscript; RH, undertook data analysis, interpretation of data, assisted in drafting and review of the manuscript; NAR performed the data analysis and interpretation of data, and assisted in the drafting and review of the manuscript.

Conflict of interest

The study was internally funded. The authors declare no conflict of interest.

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