Research

Validity-Reliability Test of Indonesian-translated MBD-MBS questionnaire as screening method for mouth breathers

Retno Arun Winastuti, Sinta Sari Ratunanda, Wijana
Department of Otorhinolaryngology-Head and Neck Surgery,
Faculty of Medicine, Padjajaran University, Hasan Sadikin Hospital, Bandung

ABSTRACT

Background: Mouth breathing, the process of air entry from the mouth to the lungs without passing through the nose, is an abnormal behaviour that may imply the presence of a comorbidity. Mouth breathing in children, teenagers, and adults leads to numerous pathological consequences, especially in children. There are several methods available to diagnose mouth breathing, one of them being the provision of questionnaires, however, there is not yet any mouth breathing questionnaire that has been translated into Indonesian. **Purpose:** This research aimed to translate the Mouth Breathing in Daytime (MBD), and Mouth Breathing during Sleep (MBS) questionnaire in Indonesian, and conducted a validity and reliability test for the translated questionnaire. **Method:** This cross-sectional study was conducted to 33 parents of children in day-cares or preschools in Bandung city that fulfilled the inclusion and exclusion criteria. Translation of the questionnaire was conducted by a sworn translator after permission was granted by the original author through email. The questionnaire was then distributed to the subjects after consented. Afterwards, the validity and reliability test were then conducted using Spearman and Cronbach-α formulas respectively. **Result:** All six questions in the Indonesian translated MBD-MBS questionnaire was validated (r_{count}>r_{table}, which was 0.355) and reliable (Cronbach's Alpha 0.643>0.6). **Conclusion:** Based on both validity and reliability tests, all questions in the Indonesian-translated MBD-MBS questionnaire were considered valid and reliable. Hence, this questionnaire is suitable to be utilized for further studies about mouth breathing.

Keywords: questionnaire, mouth breathing, translated, validity, reliability

ABSTRAK

Latar belakang: *Bernafas melalui mulut merupakan kebiasaan yang abnormal, ditandai dengan proses keluar masuknya udara dari lingkungan sekitar ke dalam paru melalui mulut tanpa melewati hidung, dan hal ini dapat menunjukkan adanya komorbiditas pada seseorang.* Mouth breathing (*pernafasan mulut) pada anak, remaja, maupun dewasa dapat menyebabkan efek patologis bagi tubuh, terutama pada anak. Pernafasan mulut dapat didiagnosis salah satunya dengan menggunakan kuesioner. Namun, hingga saat ini belum ada kuesioner pernafasan mulut yang dibuat dalam bahasa Indonesia.* ***Tujuan:*** *Penelitian ini bertujuan untuk mengalih-bahasakan* Mouth Breathing in Daytime (MBD) and Mouth Breathing during Sleep (MBS) questionnaire *ke dalam bahasa Indonesia, kemudian melakukan uji validitas dan reliabilitas kuesioner tersebut.* ***Metode:*** *Menggunakan studi potong lintang yang dilakukan pada 33 orang tua yang memiliki anak di* daycare *atau* preschool *di kota Bandung, dan telah memenuhi kriteria inklusi dan eksklusi. Penerjemahan kuesioner dilakukan oleh penerjemah tersertifikasi setelah mendapat izin dari pembuat kuesioner asli melalui email. Kuesioner kemudian diberikan kepada seluruh subjek setelah subjek menyetujui. Kemudian, uji validitas dan reliabilitas dilakukan menggunakan formula* Spearman *dan* Cronbach-α. ***Hasil:*** *Seluruh pertanyaan dalam kuesioner* MBD-MBS *terjemahan bahasa Indonesia adalah* valid *(*r_{hitung}>r_{tabel} *yaitu 0,355) dan reliabel (α 0,643>0,6).* ***Kesimpulan:*** *Berdasarkan hasil pengujian validitas dan reliabilitas dalam penelitian ini, kuesioner* MBD-MBS *yang telah dialih-bahasakan ke dalam bahasa Indonesia menunjukkan*

bahwa seluruh butir pertanyaan dalam kuesioner valid dan reliabel. Oleh karena itu, kuesioner ini dapat digunakan dalam studi selanjutnya untuk skrining pernafasan mulut.

Kata kunci: *kuesioner, alih bahasa, validitas, reliabilitas, mouth breathing*

Correspondence address: Retno Arun Winastuti. Otorhinolaryngology–Head and Neck Surgery Department, Faculty of Medicine, Padjajaran University, Hasan Sadikin Hospital, Bandung.
Email: arunretno@gmail.com

INTRODUCTION

Breathing is defined as the process of the entry of air from the nose up until the lungs.[1] Physiologically, the nose is capable of filtrating and warming the air prior to its entry to the lungs. Allergic rhinitis (81.4%), enlargement of thyroid glands (79.2%), adeno-tonsillar hypertrophy (12.6%), and obstructive deviation of nose septum (1.0%) may cause disturbance of nasal breathing function, consequently leading to a new habit of mouth breathing.[2]

Mouth breathing is considered as an abnormal behaviour that may imply the presence of a comorbidity. Mouth breathing may be diagnosed by various methods, such as using a questionnaire. The questionnaire that is often used to diagnose mouth breathing is called Mouth Breathing in Daytime (MBD) and Mouth Breathing during Sleep (MBS) questionnaire.[3] Mouth breathing is generally understood as a process of air entry from the mouth to the lungs without passing through the nose.[1] There is a variety of reasons why mouth breathing happens, such as genetic factors, bad oral habits, nasal obstruction, allergic rhinitis, and improper sleep positions.[4] Moreover, mouth breathing happens mostly in children. A study in Brazil had found that 55% of the total of 370 children observed had a mouth breathing habit.[5] A similar result was also observed in Santo Amaro children aged 8-10 years old by Menezes.[6] The main clinical manifestation of oral breathing included sleeping with an open mouth (86%), snoring (79%), itchy nose (77%), salivating (62%), night sleep issues or sleep anxiety (62%), and nose blockage (49%).[4]

Mouth breathing in children, teenagers, and adults may lead to pathological consequences. This is due to the fact that inhalation of air through the mouth defers the air from the physiologic processes it should have gone through in the nose, such as filtration, humidification, and warming of the air prior to the entry to the lungs. The loss of these three main functions may stimulate the increase of leucocyte number in the blood, induce lung hypersensitivity, and decrease the volume and capacity of the lungs. With all these reasons, it is also hypothesized that mouth breathing also plays an important role in the exacerbation of asthma.[7] Moreover, mouth breathing also disturbs an array of oral function, including during eating, talking, and exploring, which may result in growth disturbances in neonates if their sucking and swallowing functions are impaired as well.[2] A number of studies had also reported that mouth breathing may disturb the growth and health of facial bones and teeth,[3,8,9] which may cause respiratory obstruction, consequently inducing sleep problems, increased blood pressure, and cardiac damage.[4,10] Studies in children had also found that sleeping problems impact negatively to children's achievement in school, increase children's drowsiness, and increase their tendency to develop behavioural problems such as attention deficit hyperactivity disorders.[11,12]

Each section of the MBD-MBS questionnaire comprises of 3 questions, written in English to identify the presence of Mouth Breathing in Daytime (MBD) and Mouth Breathing during Sleep (MBS). When determining one's MBD tendencies, respondents were asked 3 questions about their children's mouth opening habits in a daily basis and during chewing, as well as whether they look like they were breathing through their mouth. On the other hand, on the MBS portion of the questionnaire, respondents were inquired about their children's snoring habits, mouth opening habits, and mouth dryness complaints in the morning. The questionnaires came with 4 answer choices as provided in the research conducted by Yamaguchi et al.[3]

Due to the high number of mouth breathing cases alongside the amounts of negative effects it may portray, a screening questionnaire in Indonesian that is easily applicable and understood should be established. However, there is not yet any mouth breathing questionnaire that is made in Indonesian. Therefore, this research aimed to translate the MBD-MBS questionnaire in Indonesian, and subsequently conduct a validity and reliability test for the described questionnaire.

METHOD

This was an observational study with a cross-sectional method conducted to examine the validity and reliability of the MBD-MBS questionnaire that has been adapted to Indonesian language. This research was conducted to parents (mother, father, or caretaker) of children in day-cares or preschools in Bandung city that fulfilled the inclusion and exclusion criteria. The inclusion criteria for parents included: 1) had a child with an age range of 1-6 years old, and 2) were capable of reading and comprehending Indonesian language properly. On the other hand, the exclusion criteria included: 1) parents who were not within closed proximity to their children during daytime and night time, and 2) parents with mental health problems. The subject comprised of 33 samples whose data were taken through purposive sampling during August 2022.

The translation of the MBD-MBS questionnaire was made after being given permission from the original author. The questionnaire was translated to Indonesian with the help of a certified translator. Then, the translated questionnaire underwent a validity and reliability test.

We gave some informed consent to all subjects before asking them to fill in the questionnaire. The researcher had prepared the Indonesian version of the questionnaire as well as stationeries to fill them in. Afterwards, the results are statistically analyzed using SPSS v24.0 for Windows. The validity test utilized the Spearman correlation coefficient to measure the correlation of each question's value to the total score of the questionnaire. Each item is considered valid if the result shows r_{count} is bigger than r_{table} (r_{table} value was 0.355).[14] The reliability test was conducted towards all questions that had been concluded as valid. This test utilized the Cronbach-α formula, assisted with the SPSS v24.0 software. The α was set into 0.60, hence, if a variable had a value larger than 0.60, the variable was considered reliable.[15]

The author declared no conflict of interest.

RESULT

This study included 33 subjects consisted of 31 females (93.9%) and 2 males (6.1%). Characteristics of subjects were summarized in Table 1.

Table 1. Characteristics of subjects

Characteristics	N	%
Age (years)		
20-29	18	54.5
30-39	13	39.4
>40	2	6.1
Gender		
Male	2	6.1
Female	31	93.9
Education		
High school	3	9.1
Bachelor	25	75.7
Master	5	15.2
Occupation		
Private employee	15	45.4
Civil servant	9	27.3
Entrepreneur	6	18.2
Lecturer/ professor/ teacher	1	3
Other	2	6.1
Total	33	100

Majority of subjects were within the age range of 20-39 years old. Three out of four subjects had an educational background of a bachelor degree (75.7%). Subjects' occupations were consisted of private employees (45.5%), civil servants (27.3%), and entrepreneurs (18.2%).

Before the study began, the MBD-MBS questionnaire, which comprised of 6 questions were translated into Indonesian with the help of a certified translator. The results of the translated questionnaire in comparison with the original one was illustrated in Table 2.

The translated questionnaire was then distributed to all the subjects in order to test the validity and reliability of the questionnaire. Validity assured the precision of an instrument to determine a particular health condition that had been chosen priorly. In this research, the validity test was conducted upon 33 respondents. The decision was made based on the r_{count} score (Corrected Item-Total Correlation)>r_{table} score of 0.355, for df = 33-2 = 31; a = 0.05.

Table 2. Indonesian translated questionnaire in comparison with the original questionnaire

Question	**Choices**				***Pertanyaan***	***Jawaban***			
Items for MBD					***Pertanyaan untuk pernafasan mulut saat siang hari***				
Breath with mouth ordinarily	Nose usually	Mouth usually	Mouth	Nose and mouth	*Biasanya bernafas dengan mulut*	*Biasanya melalui hidung*	*Biasanya melalui mulut*	*Mulut*	*Hidung dan mulut*
Mouth is open ordinarily	Usually closed	Some times open	Often open	Always open	*Mulut biasanya terbuka*	*Biasanya tertutup*	*Kadang-kadang terbuka*	*Sering terbuka*	*Selalu terbuka*

Mouth is open when chewing	Usually closed	Usually open	Both are applicable		*Mulut terbuka saat mengunyah*	*Biasanya tertutup*	*Biasanya terbuka*	*Keduanya*	
Items for MBS					***Pertanyaan untuk pernafasan mulut saat tidur***				
Snoring	Not at all	Not usually	Some times	Often	*Mendengkur*	*Tidak sama sekali*	*Biasanya tidak*	*Kadang-kadang*	Sering
Mouth is open during sleep	Not at all	Not usually	Some times	Often	*Mulut membuka saat tidur*	*Tidak sama sekali*	*Biasanya tidak*	*Kadang-kadang*	Sering
Mouth is dry when your child gets up	Wet	A little dry	Very dry		*Mulut kering saat anak bangun tidur*	*Basah*	*Agak kering*	*Sangat kering*	
Interpretation:					***Interpretasi:***				
Items for MDB:					*Pernafasan mulut saat siang hari:*				
0-1 criteria met: NBD (Nasal Breathers in Daytime)					*0-1 kriteria terpenuhi: NBD (Bernafas dengan hidung saat siang hari)*				
2-3 criterias met: MBD (Mouth Breathers in Daytime)					*2-3 kriteria terpenuhi: MBD (Bernafas dengan mulut saat siang hari)*				
Items for MDS:					*Pernafasan mulut saat tidur:*				
0-1 criteria met: NBS (Nasal Breathers during Sleep)					*0-1 kriteria terpenuhi: NBS (Bernafas dengan hidung saat tidur)*				
2-3 criterias met: MBS (Mouth Breathers during Sleep)					*2-3 kriteria terpenuhi: MBS (Bernafas dengan mulut saat tidur)*				
Complete Mouth Breathers (CMB): MDB + MBS					*Bernafas sepenuhnya dengan mulut (CMB): MDB + MBS*				
Partial Mouth Breathers (PMB): MBD or MBS					*Bernafas sebagian dengan mulut (PMB): MBD atau MBS*				
Complete Nasal Breathers (CNB): NBD + NBS					*Bernafas sepenuhnya dengan hidung (CNB): NBD + NBS*				

The validity test results as shown on Table 3 signified that all six of the adapted MBD-MBS questionnaires had a valid status with a r_{count} score (Corrected Item-Total Correlation)> r_{table} score of 0.355, significantly correlated with the total score value (p>0.05).

In the Indonesian translated MBD-MBS questionnaire, an internal reliability test had been carried out by analysing each question item on the instrument using Cronbach-α which was reliable if it had a minimum score of 0.6. The results showed that it was higher than the baseline value, which was 0.643 (>0.6).

Table 3. Validity Test Result of Adapted MBD-MBS questionnaire

Questions	r_{count} score	Sig.	r_{table} score	Criteria
Biasanya bernafas dengan mulut	0.743	<0.001	0.355	Valid
Mulut biasanya terbuka	0.770	<0.001	0.355	Valid
Mulut terbuka saat mengunyah	0.424	0.014	0.355	Valid
Mendengkur	0.665	<0.001	0.355	Valid
Mulut terbuka saat tidur	0.485	0.004	0.355	Valid
Mulut kering saat anak bangun tidur	0.611	<0.001	0.355	Valid

DISCUSSION

Through this research, we had found that the amount of female was more than male subjects. This aligns with a study that showed how mothers were more involved in their children's life in comparison to fathers.[16] The bigger involvement of mothers in this research should imply a more accurate results in the questionnaire as they knew best of their children's daily activities. Based on Table 1, majority of the subjects had finished their higher education, particularly bachelor degree. Hence, having a higher educational background of the subjects in this questionnaire ensured the understanding of the questions provided, and further contributed to the accuracy of this research.

The MBD-MBS questionnaire is a questionnaire formed by Yamaguchi et al.[3] on 2015, and since then has been used as an early detection screening tool for mouth breathing in children and teenagers. This questionnaire comprises of 3 questions each to identify the presence of mouth breathing habits during the daytime or sleep. The original questionnaire and the Indonesian-translated questionnaire could be observed on Table 2 and Table 3 respectively. In every question provided, the option signifying a positive result towards mouth breathing was underlined (this indicator was not shown to the subjects when they were filling the questionnaire). A child was determined to have mouth breathing habits if they answered 2 to 3 positive options from each section (MBD/MBS).

The MBD-MBS questionnaire had been utilized by various studies to cater to the diagnosis of mouth breathing. A study conducted by Lee[17] (2020) used the questionnaire on 1831 children aged 8-11 years old to study the impact of mouth breathing towards atopic dermatitis. Another study conducted by Kaur[17] (2019) also used the MBD-MBS questionnaire on 42 children aged 8-12 years old to identify the prevalence of mouth breathing and its effects towards head and neck posture. Other mouth breathing questionnaires are also available, such as Habitual Mouth Breathing (HMB) scores developed by Sano[18] (2018) consisted of 10 questions, including questions about nasal obstruction, mouth posture when opened, swollen gums, presence of halitosis, and nasal obstruction history during childhood. However, the MBD-MBS questionnaire was still considered as the main choice for screening as it had a less complicated format and content, hence, it was ideal as a quick and easy screening method.

The validity test conducted for this research was analyzed through Rank Spearman in order to compare the results between each question with a total score on a significance value of 0.05.[14] The total score or r_{table} in this research was 0.355. The score for each question or r_{count} score could be seen in

Table 4. It had been found that each $r_{count} > r_{table}$ was 0.355. This signified that each question in the Indonesian-translated MBD-MBS questionnaire was valid. From 3 questions provided for evaluating mouth breathing during daytime, the lowest r was identified, which was 0.424 for the third question: "mouth open when chewing". However, we did not retrieve any data regarding prevailing complaints or questions when the subjects were filling in the questionnaire. This might indicate that the subjects were not fully understand the difference between chewing and eating. On the other hand, for the questions designed to analyze the presence of mouth breathing during sleep, the lowest r (0.485) was seen in the fifth question, which said "mouth open when sleeping". This might be caused by the presence of two similar options of "usually not" and "sometimes", which may be used to indicate a similar time frame within the general public.

The reliability test for this questionnaire utilized the Cronbach's α. Ursachi[15] (2015), had established that a research was deemed reliable if it had an α score of 0.6 and above. An α score higher than the base value shows a better reliability. In this research, we retrieved an α value of 0.643, which was higher than 0.6. Therefore, the Indonesian translated MBD-MBS questionnaire was safely noted to be reliable.

This research was the first to translate the MBD-MBS questionnaire into Indonesian, and also acquired the validity and reliability test. Previous studies had used the MBD-MBS questionnaire, but there were no studies that had translated the MBD-MBS questionnaire into other languages. This study, which was a preliminary study, had its own limitations, such as the lack of conformity of the questionnaire results with clinical examination of mouth breathing. Therefore, further studies with this Indonesian-translated MBD-MBS questionnaire are needed.

Overall, we might conclude that through the validity and reliability test, the Indonesian-translated MBD-MBS questionnaire showed that all questions were considered as valid and reliable. As justified in our discussion, the MBD-MBS questionnaire, as a screening tool, managed to identify a large percentage of children with mouth breathing. Hence, further identification and management should be conducted pertaining to mouth breathing and its causes, to prevent further negative effects in children.

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