

# The Development and Validation of Diabetes Knowledge Questionnaire for the Indigenous Population in Malaysia

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## SUMMARY

The study's aim was to construct and validate a diabetes mellitus knowledge questionnaire in Bahasa Malaysia for Orang Asli (OA-DKQ). The questionnaire was administered to; case (Orang Asli) and control (administrative staff) groups at baseline and retested two weeks later. The Cronbach's Alpha was used to determine internal consistency and intraclass correlation coefficient (ICC) was used to determine test-retest reliability. The OA-DKQ has an internal consistency of 0.806. These findings suggest the OA-DKQ is an acceptable instrument to assess knowledge and preventive behaviour in Orang Asli (86 words).

## KEY WORDS:

*indigenous, diabetes knowledge questionnaire, intraclass correlation coefficient, internal consistency, test-retest, validity, reliability.*

## INTRODUCTION

Malaysia which consists of Peninsular and East Malaysia is made up of multiethnic population which coexists socially, religiously and politically has a population of approximately 28 million in 2009. The Orang Asli, also known as the original peoples of the Malay Peninsular consist of various aboriginal tribes and makes up about 1% of Malaysian population [1]. In previous study in Malaysia, the prevalence of diabetes mellitus and impaired glucose tolerance (IGT) amongst the Orang Asli in Malaysia was 0.4% and 4.4% despite living in similar environment as their Malay counterparts [2].

Though many epidemiological studies had been done in the past, studies on knowledge about general health and diabetes amongst Indigenous population is quite lacking. A recent study in Queensland, Australia looked at the associations between self-reported diabetes and self-reported smoking with health behavior. This study suggests that individuals living with diabetes in rural and remote communities are not adopting lifestyle changes that are required for optimal management of diabetes [3].

A qualitative study regarding knowledge and beliefs in Aborigines group in Northern Territory, Australia found that explanation for causes of diabetes mellitus fell into four broad themes: worry, food, family and infection. Significantly, exercise, weight loss or medication was not mentioned as part of prevention or treatment of diabetes [4].

Currently, there are more than thirty validated diabetes questionnaires such as Audit of Diabetes Dependent Quality of Life (ADDQoL), Diabetes Knowledge Questionnaire (DKQ), Diabetes Symptom Checklist - Revised (DSC-R), Diabetes Fear of Injecting and Self Questionnaire (D-FISQ) and many more. However, these validated questionnaires are not suitable for indigenous population as language remains a barrier [5-8]. In addition, some of the items in these validated questionnaires regarding type of physical activity such as cycling, golf, tennis and type of diet were deemed out of context with the indigenous lifestyle. Hence a decision was made to develop a suitable questionnaire which could assess the level of knowledge of diabetes amongst the indigenous population in Malaysia. The demographic factors such as level of education and literacy were among the important factors that were taken into consideration when developing the questionnaire.

The primary aim of this study was to construct and validate a diabetes knowledge questionnaire in Bahasa Malaysia for the Orang Asli population in Malaysia (OA-DKQ).

## MATERIALS AND METHODS

This validation study was conducted in two groups of subjects. The case group consisted of a total of 17 Orang Asli subjects from two separate villages in Selangor. 7 subjects were recruited from the first village situated approximately 35 kilometres from a small provincial town. 10 subjects were recruited from the second village situated within a well developed and affluent area in Klang Valley. The reason for including subjects from both Orang Asli villages was to ensure the sample size for case group was adequate. Secondly, both villages are included in part of a larger indigenous study regarding diabetes mellitus knowledge, hence it was useful to test the OA-DKQ in this population. The education level among these case subjects varied from no formal education to secondary education. The control group consisted of administrative staffs of a private institution in Selangor (n=12). All the control subjects received at least secondary education in the Malaysian education system (Sijil Pelajaran Malaysia).

This study has been approved by the Ethics committee of Ministry of Health, Malaysia.

## Questionnaire development

A panel of expert was established within the School of Medicine

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and Health Sciences. They are bilingual researchers with specific content expertise. The panel consisted of two endocrinologists, a biostatistician, a general physician and a health psychologist. Following a panel discussion, 3 categories were identified as important in constructing the Orang Asli Diabetes Knowledge Questionnaire (OA-DKQ). The categories are a) general knowledge regarding health and non-communicable disease b) knowledge specific to diabetes i) aetiology ii) prevention iii) risk factors c) preventive behaviour i) weight and diet ii) physical activity iii) types of treatment. The items in the OA-DKQ were limited to 12 items and 89 sub-items to allow concise data gathering. Seven of the items are knowledge-related questions and five are behaviour-related questions. The contents of these questions are presented in the Table I.

Table I : Number of items and sub-items in the DKQ

Items	Category	Sub-items
1	Knowledge	12
2	Knowledge	18
3	Behaviour	5
4	Knowledge	1
5	Knowledge	12
6	Knowledge	1
7	Knowledge	6
8	Knowledge	6
9	Behaviour	5
10	Behaviour	6
11	Behaviour	16
12	Behaviour	1
Total		89

**Administration of questionnaire**

The administration of the questionnaire differed for the two groups. For control group, the questionnaire was self-administered as there was no illiteracy issue. For case group, two options were offered to subjects; self-administered or interviewed. Although a few subjects (n = 5) were literate or partially literate, all subjects preferred to be interviewed. The interview was carried out by the same two interviewers during the two consecutive weeks and each interviewer was designated to interview the same subject both times. The two interviewers conducted a structured interview and used jargon-free and easy to understand words to communicate with subjects. Each interview took approximately 25 to 30 minutes to complete.

The questionnaire was distributed to the two groups; control group and case group for validation. The test retest reliability were conducted one week apart.

**Data analysis**

Frequencies and descriptive statistics were used to describe the demography of the subjects. Cronbach's Alpha (CA) was used to measure the internal consistency of the questionnaire [9]. It is a measure of degree that determines the homogeneity of the items in the questionnaire assessing one similar construct. The CA were sought to be >0.70 to be highly consistent, while CA between 0.40 – 0.69 ought to be moderately consistent and <0.39 to be inconsistent. Test-retest reliability is one of the strategies to assess the stability of the instrument [10]. It

was assessed using the intraclass correlation coefficient (ICC), with values varying from 1 (perfectly reliable) to 0 (totally unreliable). All statistical analyses were performed using SPSS for Windows version 16.0. Significance value was set at p < 0.05.

**RESULTS**

**Socio-demography characteristics**

All subjects were adults (age > 18 years) consisted of general population and not diabetes patients. All subjects are fluent in Bahasa Malaysia. The control group consisted of 10 subjects; 8 females and 2 males and age within 24 to 51 years old (34.00 + 7.80 years). The case group consisted of 17 subjects; 11 females and 5 males and age within 21 to 60 years old (34.88 + 13.76 years). Mann-Whitney test revealed no significant difference between median ages of respondents in both group (Table II). Ethnicity and marital status were significantly different between the study groups.

Table II : Content of questionnaire items grouped under two categories and question format

Knowledge	Knowledge of Personal Health
<p><b>• General/Personal</b></p> <p>Content: Weight, Identification of risk factors for chronic diseases (ie obesity) and types of food</p> <p><b>Response options</b> : Yes, No or Don't Know statements</p>	
Knowledge	Knowledge of Diabetes Mellitus
<p><b>• Specific regarding diabetes mellitus</b></p> <p><b>Content:</b> Aetiology, presentation and risk factors for diabetes mellitus</p> <p><b>Response options</b> : Yes, No or Don't Know statements'</p>	
Preventive Behavior	Behaviour to prevent Diabetes Mellitus
	<p>Content: Frequency of food and beverage consumption, frequency of physical activity, types of treatment seeked (ie modern vs traditional), weight reduction</p> <p><b>Response options</b> : Yes, No or Don't Know statements and statements rated on Likert scale ( 1= never, 2 = seldom; &lt; 1x/week, 3= sometimes; B1-2x/week; 4= often; 3-5x/week; 5= frequent; &gt; 6x/ week)</p>

**Test-retest reliability and internal consistency**

The questionnaire consisted of 12 main items. 10 out of 12 items had sub-items. The total sub-items for the entire questionnaire are 89; 56 are knowledge-related and 33 are behaviour-related. The questionnaire had an internal consistency of 0.806 when tested with case and 0.759 when tested with control. The intraclass correlation coefficient (ICC) and Cronbach's Alpha (CA) are reported for each sub-items for both groups in Table III.

The cut off point for ICC for the questionnaire was  $> 0.60$ . ICC less than 0.6 are considered to have moderate to weak correlation. In control group, 41 sub-items had ICC  $> 0.60$  compared to case group which had 23 sub-items with ICC  $> 0.60$ . There were 14 sub-items in control group and 11 sub-items in case group that was constant as no ICC could be generated. This was because the group's baseline and re-test responses were the same. Both ICC  $> 0.60$  and constant are considered to have high correlation.

Based on ICC  $> 0.60$  or constant value generated, 62% (55 out of 89) of sub-items from control group are highly correlated (ICC  $> 0.60$ ). Similarly, in case group, 38% (34 out of 89) of sub-items are highly correlated (ICC  $> 0.60$ ). When comparing the ICC of the different categorical questions; knowledge-related and behaviour-related; for the control group, regarding knowledge sub-items, 63% (35 out of 56) had ICC  $> 0.60$  and regarding behaviour sub-items, 60% (20 out of 33) had ICC  $> 0.60$ . In contrast, in Orang Asli group; regarding knowledge sub-items, 32% (18 out of 56) had ICC  $> 0.60$  and regarding behaviour sub-items, 48% (20 out of 33) had ICC  $> 0.60$ .

Table III: Socio-demographic characteristics of the subjects

Characteristics	Case, n (%) (n = 18)	Control, n (%) (n = 12)	p
<b>Age (years)</b>			
Mean + SD	34.88 + 1.38*	33.17 + 8.52	0.842
Range	21 – 60	24 – 51	
<b>Sex</b>			
Female	7 (38.9)	2 (16.7)	0.193
Male	11 (61.1)	10 (83.3)	
<b>Ethnic group</b>			
Orang Asli	18 (100.0)	0 (0.0)	$< 0.001$
Malays	0 (0.0)	5 (41.7)	
Chinese	0 (0.0)	4 (33.3)	
Indians	0 (0.0)	3 (25.0)	
<b>Marital Status</b>			
Single	2 (11.1)	4 (33.3)	$< 0.05$
Married	16 (88.9)	6 (50.0)	
Unknown	0 (0.0)	2 (19.7)	

\* 15 years old subjects was not included in the calculation of mean age.

## DISCUSSION AND CONCLUSION

### Discussion

The OA-DKQ was constructed in Bahasa Malaysia using simple generic and non-medical terms to minimize any language barrier among subjects. The decision was made early on, not to translate the DKQ to English language as target subjects for future clinical survey will be Orang Asli population in Malaysia who do not converse in English. Hence, no English translation process for the OA-DKQ took place. Based on ICC  $> 0.60$  and constant value generated, 62% (55 out of 89) of sub-items from control group are highly correlated (ICC  $> 0.60$ ). Similarly, in case group, 38% (34 out of 89) of sub-items are highly correlated (ICC  $> 0.60$ ). The difference between correlation values for the two cohorts is not surprising as there are some basic differences in the environment they lived in and the education received.

### Administration of questionnaire

With regards to the administration of questionnaire, the methodology was different in control and case group. In control group, the questionnaire was self-administered as there were no language or illiteracy issues. All subjects completed the questionnaire. However, in the case group, the indigenous subjects were given the option of either being interviewed or self administered questionnaire. Due to the various level of education received i.e. no formal education to secondary education, their reading ability varied within the Orang Asli group and between the two cohorts. Though a few of the Orang Asli subjects (n = 5) were literate or partially literate (can read simple four to five letter word eg kaki, mata, makan), all subjects preferred to be interviewed. A decision was made to standardise the administration of questionnaire, hence all indigenous case group subjects were interviewed.

### Knowledge related sub-items

Analysis of knowledge related sub-item (K1) on aetiology of diabetes showed 7 sub-items with ICC  $> 0.60$  in control group compared to 5 sub-items with ICC  $> 0.60$  in case group. A more obvious difference was seen in knowledge related sub-item (K2) regarding consequences or complications of diabetes. There were 10 sub-items with ICC  $> 0.60$  in control group and 3 sub-items with ICC  $> 0.60$  in case group. Both findings indicated level of knowledge and general exposure to diabetes is higher in the control group possibly through their working and living environment as well as ease to information. Pertaining sub-item (K6) on body weight, the ICC were  $> 0.60$  for both groups and the item was easily understood. It is encouraging that both groups were aware that excess weight is a risk factor for diabetes, suggesting some important health messages did reach various groups of the general public. For sub-item (K8) on healthy food; in control group, 5 out of 6 sub-items has ICC  $> 0.60$  and in the *Orang Asli* group, 3 out of 6 items has ICC  $> 0.60$ . This could be due to the lack of exposure to certain types of food in the *Orang Asli* group. Alternatively, more effort could be made to include dietary fibres and vegetables common to indigenous people in the questionnaire. In general, the knowledge related sub-items are considered to have good correlation with 63% of sub-items has ICC  $> 0.60$  in the control group and 32% of sub-items have ICC  $> 0.60$  in the case group.

### Behaviour related sub-items

Among the behaviour related sub-items, there were more similarities than differences in the two cohorts. With regards to seeking treatment (B3), both groups has constant value (ICC=1.00) for seeking medical treatment. This is not surprising for control group but an interesting finding for case group. All case group subjects indicated they would seek medical help and reject traditional measures such as traditional healers (eg bomoh). This indicates that the health sector (eg. health care workers) has the potential to educate indigenous population in preventive measures in diabetes if the right approach is adopted. For prevention of diabetes (B9), both groups have 4 sub-items that have ICC  $> 0.60$ . In contrast, for frequency and types of meals and beverages (B11) consumed there were differences in the ICC; there were 8 sub-items with ICC  $> 0.60$  in the control group compared to 7 sub-items with ICC  $> 0.60$  in the case group. Again, this could be due to the lack of exposure of case group to certain types of food or a different meal pattern. For example, having three meals a day is usual for control group but perhaps is not the case in *Orang Asli* group who has less meal per day. In addition, more effort should be

made to include the types of foods and beverages common to indigenous population. In general, the behavior related sub-items are considered to have good correlation with 60% of sub-items has ICC > 0.60 in the control group and 48% of sub-items has ICC > 0.60 in the *Orang Asli* group.

#### Limitation

Several limitations of the study should be acknowledged. Firstly, the numbers in control group is small; n=10 and does not match the number of the case group which is larger; n=17. However, the control group is representative of the major ethnicity in Malaysia which is Malays, Chinese and Indians. In the control group, there were four Malays, three Chinese and three Indians. Both groups also had similar mean age ( $34.88 \pm 13.76$  years vs.  $34.00 \pm 7.80$  years). Secondly, during the two days of study, more than 17 indigenous subjects showed up for the interview. However, not all of them could be interviewed as some could not understand the interviewers. This small group tended to be subjects who are older than 65 years old. These subjects could have been included if an interpreter was available to assist with the interview. Thirdly, the method of administration of questionnaire was not standardised between case and control group. As per mentioned earlier, this was due to the difference in education level between case and control subjects.

#### Conclusion

We tested the reliability and validity of OA-DKQ for the indigenous population in Malaysia. The intraclass correlation coefficients of the items were in the acceptable range, indicating reasonable intraclass reliability. The questionnaire has a good internal consistency in the indigenous population. These findings suggest that the OA-DKQ is an acceptable instrument to assess the preventive behavior, general and specific knowledge regarding diabetes in indigenous population in Malaysia.

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