Research Article

Development and Validation of Amharic Version of the Simplified Medication Adherence Questionnaire among Literate Amharic Speaking Persons an Urban Teaching Hospital in Washington DC Region- 🔓

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ABSTRACT

Amharic- speaking persons comprise a significant part of the foreign-born immigrant population in Washington DC. Estimates on medication adherence among foreign-born persons, particularly those who are Amharic speaking is limited. Furthermore, few validated tools have been translated into the Amharic language to measure medication adherence. To develop and validate an Amharic version of the Simplified Medication Adherence Questionnaire (SMAQ).

A cross-sectional study using Audio Computer-Assisted Self-Interview (ACASI) was conducted to develop and validate the SMAQ into the Amharic language. Patients literate in Amharic were recruited from the Diabetes Treatment Center, Internal Medicine Clinic, and Center for Infectious Disease Management Research (CIDMAR) in an urban teaching hospital.

A total of 31 Amharic-speaking persons were recruited into the study. Majority were from Ethiopia and reported difficulty communicating in English. The SMAQ had a Cronbach's alpha of 0.653. Known-group validity was confirmed based-upon a significant association between adherence and good control of A1C ($p < 0.038$). This survey tool developed in this study has demonstrated acceptable validity and reliability. With the critical need to improve the quality of health care encounters for Amharic speaking persons with English language barriers in Washington DC, the developed adherence measurement tool can be used in care settings and further validated in larger studies.

Keywords: Literate in amharic; Simplified medication adherence questionnaire; Psychometric testing; medication adherence

INTRODUCTION

The non-adherence data for foreign born persons who are Amharic-speaking is limited and evidence on contributing factors is particularly scarce. Given that these factors may vary considerably for this population, more research studies are needed in this area. Adherence measurement for this group could be aided by translating and validating existing general medication adherence tools into Amharic language. Such efforts can facilitate the measurement of adherence levels for the majority of them who have difficulty writing or speaking in English. (Department of Multi-Cultural Affairs, November 12, 2014). The Simplified Medication Adherence Questionnaire (SMAQ) is a general medication adherence questionnaire with high reliability and validity [1]. The SMAQ was derived from the Morisky scale [1]. The Morisky scale has since been translated into different languages, but has not been translated into Amharic [2-7]. To fill this knowledge gap, this study translated the SMAQ into the Amharic language and validated it in a population of Amharic- speaking patients seeking care in an urban teaching hospital in Washington DC.

METHODS

Study design and population

A pilot study following a cross-sectional study design was conducted to translate, develop and validate the Simplified Medication Adherence Questionnaire (SMAQ) into the Amharic language. Patients were recruited from the Diabetes Treatment Center, the Internal Medicine Clinic, and the Center for Infectious Disease Management Research (CIDMAR) at an urban teaching hospital in Washington DC. To be eligible for the study a patient had to be 1) literate in Amharic (speaking and comprehending), 2) aged 18 to 85 years and either 3) a patient at the Diabetes Treatment Center or Internal Medicine Clinic and CIDMAR, and 4) taking one or more medications continuously to manage a condition. This study received approval from the Howard University Institutional Review Board and the Howard University Hospital.

Development of the Amharic-version SMAQ

Item selection: The SMAQ is a six-item, short self-administered questionnaire determining complete medication adherence, and accuracy of medication intake (e.g. number of missed doses) among patient with chronic diseases. The developed Amharic-version SMAQ had items selected from the original Simplified Medication Adherence Questionnaire (SMAQ). The SMAQ was adopted from the original Morisky scale questionnaire for use as a general medication adherence questionnaire and Samet J et al [8,9]. The following six questions form the items in the SMAQ: 1. Do you ever forget to take your medication? 2. Are you careless at times about taking your medication? 3. Sometimes if you feel worse, do you stop taking your medicines? 4. Thinking about the last week. How often have you not taken your medicine? 5. Did you not take any of your medicines over the past weekend? 6. Over the past 3 months, how many days have you not taken any medicine at all? For the SMAQ questions 1-3 and 5, a total score of 1 was given if the participant responds "Yes" to any of the questions. If the participant responds "No" to any of the questions a total score of 2 is received. For question 4, a total score of 2 was given if the participant responds Never. If the participants respond to ≥ 1 times, then the participants received a score of 1. For question 6, a total score of 2 was given if the participant responds ≤ 2 days. If the participant responds > 2 days, then the participant received a score of 1. If the participant receives a total score of 12 then the patient is considered an adherent to medication. If the participant receives a total score of 11 and below, then the patient is considered non-adherent to medication.

Translation of SMAQ

All parts of the study instrument including the socio-demographic variables, the clinical variables and the 6-item within the SMAQ scale were translated all translated into Amharic. First, a forward translation of the original questionnaire into Amharic was done by two independent expert translators in Amharic and English language. One of the two independent translators reviewed both the translations. A final step was reversing the translated Amharic questionnaire into English by a third expert. Then a discussion was held between the two independent translators and the third expert. Inconsistencies were resolved in a consensus meeting and a final version of the questionnaire was developed. Lastly, a final check on the face and content validity of the questionnaire was done by two subject and language experts prior to entering the questionnaire on the Audio Computer Assisted Self-Interview (ACASI) for the reliability and validity study.

Data Collection

Study variables: Study variables collected included adherence (via the SMAQ items), socio-demographic and clinical variables (age, gender, marital status, number of diseases, alcohol use, medication knowledge, unhealthy diet, smoking, number of pills, language spoken, stigma, complementary and alternative medicine use, duration of complementary and alternative medicine use, patient-provider relationship, education level, social support, length of years in the US, duration of medication, income, transportation, HBA_{1C}, medication adherence, holy water and spiritual healing, duration of medication, country of birth, state you live in, illegal drug use, physical activity level, consultation of medication, difficulty in communicating in English, smoke, and drug coverage.

Data collection procedures: After receiving informed consent, the patients were directed to a dedicated space for data collection in both the Diabetes Treatment Center and the Internal Medicine Clinic. The patients were then given laptops along with headphones and instructions on how to use the ACASI system. This method was selected specifically because ACASI considers participant's privacy, incorporates a different level of literacy participants, and can be used with different languages [10-17]. Furthermore, the system allows for participants' responses to the questionnaire to directly populate an analytic database thus minimizing data entry errors [10-17]. As incentive patients who completed the survey were given the opportunity to draw a raffle ticket to get $50 dollars gift certificate to have a meal at an Ethiopian restaurant.

Statistical analysis: Descriptive statistics including means and percentages was estimated for continuous and categorical variables respectively were conducted for all study variables. To assess construct validity factor analysis was conducted [18]. Two methods were used to conduct factor analysis, the first was categorical principal components analysis (Method 1) and the second one was factor analysis with tetrachoric correlation (Method 2). Two different approaches were used because of the different school of thoughts on how to perform factor analysis. Confirmatory analysis was used to confirm the number of constructs. To assess known group validity, the Chi-square test was conducted to assess the association between the HBA_{1C} (i.e < 7% and > 7%) and the adherence level from the SMAQ. To assess internal consistency, Cronbach alpha coefficient was used. All analysis was performed using the SPSS version 23.

RESULTS

Characteristics of participants

The characteristics of all 31 patients who were recruited are presented in Table 1. Out of 31 patients, 61.3% (N = 19) of them have difficulty in communicating in English, 96.8% (N = 30) of them were born in Ethiopia, and 54.8% (N =17) were female. The average age and years lived in the United States of America were 57.9 ± 11.8 and 13.8 ± 8.3 respectively.

Construct validity

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy as assessed by Method 2 was determined as 0.825. The Barlett's test results (χ^2 = 83.4, P < 0.000 (p = 0.000) suggested that data was inter-related and suitable for factor analysis. Based on the first approach. The first component of principal component analysis had factor loadings of 4 items > 0.4 (items 1, 2, 3, and 6). Additionally, the highest correlation was item 2 (r = 0.839). This component was assumed to be the one

that reflected the underlying construct of medication adherence. In the second component, the highest correlation was item 5 (r = 0.865) and 3 items had factor loadings > 0.3 (items 1, 4, and 5) (Table 3). Based on the second approach. The second component of principal component analysis had factor loadings of 6 items > 0.3 (items 1, 2, 3, 4, 5, and 6). Additionally, the highest correlations were items 1 (r = 0.821) and 2 (r = 0.817). This component was assumed to be the one that reflected the underlying construct of medication adherence. In the first component, the highest correlations were items 4 (r = 0.859) and 5 (r = 0.878). In addition, 3 items had factor loadings > 0.3 (items 2, 3, and 6) (Table 2).

Reliability testing

Internal consistency reliability, as measured by the Cronbach's alpha for the SMAQ 6 items scale was 0.653 which is sufficient. The corrected item-total correlation ranged from 0.084 - 0.581 as shown in table 3. If item 5 was deleted a slight change in the Cronbach alpha from 0.653 to 0.678 will be detected (Table 3).

Known group validity

For the known group validity, literate in Amharic patients with

Table 1: Socio-demographic of study participants. (N = 31).

Participant characteristics	
Age (Mean ± SD)	57.9 ± 11.8
Years in America	13.8 ± 8.3
Female (N (%)	17(54.8)
Difficulty communicating in English (N(% yes))	19(61.3)
Speak Amharic (N(% yes))	29(93.5)
Write Amharic (N(% yes))	23(95.8)
Read Amharic (N(% yes))	31(100)
Country of birth as Ethiopia (N(% yes))	30(96.8)
State or jurisdiction live in	
District of Columbia	26(83.9)
Other (Maryland and Virginia)	5(20.8)
Marital Status (N(%))	
Married	15(48.4)
No more married	13(42.0)
Never married	
Highest grade or year of school have you completed (N (%))	3(9.7)
Never attended school	5(16.1)
Grade 12 or lower	15(67.8)
Higher than high school	11(35.5)
Had Prescription drug coverage (N(% yes))	31(100)
Annual household income from all sources: (N(%))	
Less than $ 10,000	18(58.1)
$ 10,001- $ 50,000	9(29.1)
$ 50,001- more	4(12.9)
Illegal drugs (cocaine, marijuana, etc.) (N(% No))	30(96.8)
Access to transportation	24(77.4)
Alcohol (N(% No))	24(77.4)
Smoke (N(% yes))	3(9.7)

diabetes were only considered. The Chi-square test showed that significant ($p = 0.038$) relationship between glycemic control and medication adherence. Eighty-three percent of patients with poor glycemic control HbA$_{1C}$ > 7% are non-adherent to medication compared to patients with HBA$_{1C}$ < 7% and good glycemic control (Table 4).

DISCUSSION

This pilot study translated, validated and developed an Amharic version of the Simplified Medication Adherences Questionnaire. To our knowledge, this is the first translated version of the SMAQ in this language. The results of this study have shown an acceptable reliability and validity of the Amharic version SMAQ among literate in Amharic patients with chronic diseases. The Morisky scale reported a Cronbach's α of 0.83 but the estimated reliability for the translated version in this study was (α = 0.653) [19]. This value is lower than

Table 2: Results of Simplified Medication Adherence Questionnaire (SMAQ) Items.

SMAQ items	
Do you ever forget to take your medicine? (N (% Yes))	16(51.6)
Are you careless at times about taking your medicine? (N (% No))	22(71.0)
Sometimes if you feel worse, do you stop taking your medicines? (N (% No))	26(83.9)
Thinking about the last week. How often have you not taken your medicine? (N (%))	
Never	26(83.9)
1 ± 2 times	5(16.1)
Did you not take any of your medicine over the past weekend? (N(% No))	30(96.8)
Over the past 3 months, how many days have you not taken any medicine at all? (N (% reporting < = 2 days))	24(77.4)
Who consults you better about your medication? (N (% reporting physician))	29(93.5)
Physician	
Adherence status from SMAQ (N (%))	
Yes	11(35.5)
No	20(64.5)

Table 3: Factor loading of principal component analysis of SMAQ.

Items	Factor loadings Method 1[a]	Factor loadings Method 2[b]
1. Do you ever forget to take your medicine?	0.667	0.821
2. Are you careless at times about taking your medicine?	0.839	0.817
3. Sometimes if you feel worse, do you stop taking your medicines?	0.552	0.647
4. Thinking about the last week. How often have you not taken your medicine?	0.254	0.355
5. Did you not take any of your medicines over the past weekend?	-0.202	0.356
6. Over the past 3 months, how many days have you not taken any medicine at all?	0.746	0.700
[a]Categorical principal components analysis [b]Tetrachoric correlation		

Table 4: Reliability analysis of SMAQ.

Items	Corrected item-total correlation	Cronbach's alpha if item deleted
1. Do you ever forget to take your medicine?	0.532	0.544
2. Are you careless at times about taking your medicine?	0.581	0.523
3. Sometimes if you feel worse, do you stop taking your medicines?	0.264	0.649
4. Thinking about the last week. How often have you not taken your medicine?	0.338	0.625
5. Did you not take any of your medicines over the past weekend?	0.084[a]	0.678[b]
6. Over the past 3 months, how many days have you not taken any medicine at all?	0.444	0.586
[a] Corrected item correlation < 0.2		
[b] Increase in Cronbach alpha if deleted		

Table 5: Association between adherence and glycemic control.

Clinical data (N = 24)	Non-Adherent N (%)	Adherent N (%)
Poor glycemic control (HBA$_{1C}$ >7%)	15(88.23%)	2(11.77%)
Good glycemic control (HBA$_{1C}$<7%)	3(42.86%)	4(57.14%)
*p-value < 0.05 (0.038)		

the original scale; however, it is still not lower than the acceptable threshold. Factors such as sample size (N = 31) may have contributed to the lower alpha value [20]. Additionally, the cultural and the geographical difference may also have contributed to the difference in alpha values [19]. Larger studies are recommended to confirm these study findings.

Known group validity was established based upon a significant association between the adherence (as measured by the SMAQ) and HbA1c. These findings demonstrated that the SMAQ distinguished between patients with HBA$_{1C}$ lower or greater than 7 and adherence level. Findings related to construct validity showed the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was determined as 0.611, which was observed to be an acceptable value. The Barlett's test results (χ^2 = 31.28, $P < 0.001$ ($p = 0.008$) also indicated that data was inter-related and suitable for factor analysis. Based on these findings the Amharic version SMAQ has demonstrated reasonable validity and can provide the basis for future studies.

There are few limitations in this study. Firstly, as aforementioned sample size may have contributed to lower than expected Cronbach alpha values. Secondly, the patients HbA$_{1C}$ level was measured during the 6 months and not at the point of taking the survey due to missing data for the usual 3-month window for collection of HbA1c data. Thirdly, there may be a potential for re bias based on the items inquired, patients may not remember if they have forgotten to take their medication in the past.

In conclusion, this study developed and validated the Simplified Medication Adherence Questionnaire (SMAQ) scale into Amharic for the first time. This tool can help healthcare providers and researchers to evaluate the level of adherence to medication among Amharic-speaking persons who have difficulty in communicating in English.

Further studies are suggested to confirm the findings reported in other populations of Amharic speaking persons in the United States.

COMPLIANCE WITH ETHICAL STANDARDS

Ethical approval

The research was approved by the Howard University Institutional Review Board and all procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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