



Original Article

Reliability and validity of the Persian version of the Kessler psychological distress scale among patients with type 2 diabetes

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Abstract

Introduction: Prevalence of depression in patients with diabetes is 2-3 times more than patients without diabetes. Hence, the aim of the current study was to evaluate the reliability and validity of Persian version of the 10-item Kessler Scale (K10) in assessment of mental health status among patients with type 2 diabetes in Ardabil, Northwest of Iran.

Methods: This cross-sectional methodological study was conducted in Ardabil on a total of 70 patients with type 2 diabetes. K10 was translated into Persian by backward-forward method, and content validity was evaluated by a panel of experts in the field of psychiatry, psychology and epidemiology. Concurrent validity examined by the correlation between K10 and general health questionnaire-12 (GHQ-12). The reliability and stability evaluated by Cronbach's alpha and intraclass correlation coefficient (ICC) (test-retest method). The total score was computed from 10-items, which were classified into four categories (well, mild, moderate and severe). The analysis was performed using SPSS the level of significance was set at 0.05.

Results: The total average content validity ratio (CVR) and content validity index (CVI) were 0.88 and 0.95; correlation between K10 and GHQ-12 was significant ($r = 0.63$, $P < 0.001$), hence, the content and concurrent validity of K10 Persian version was confirmed. Reliability was tested by Cronbach's alpha = 0.84 and ICC = 0.77, respectively.

Conclusion: The Persian version of K10 is valid and reliable for evaluation of mental health status among patients with type 2 diabetes.

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Introduction

According to the International Diabetes Federation (IDF) in 2013, more than 382 million patients worldwide have diabetes, about 80% of them live in low or middle-income countries; 175 million of these patients are undiagnosed. If these trends continue, the number of patients with diabetes will increase to 592 million by 2030.¹

Based on a systematic review, prevalence of major depression in patients with diabetes

was around 12% (8-18%), while depressive symptoms were reported in 15-35% of them.² Descriptive studies have shown that the prevalence of depression in patients with diabetes is 2-3 times more than people without diabetes.³ Chronic depression can seriously impede the ability of patients to self-care.⁴ In addition, chronic psychological stress has a continuous negative impact on the nerves and glands, inflammation, neurological and mental changes that leading

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glucose intolerance syndrome, atherosclerosis, and cardiovascular disease among patients with type 2 diabetes. Furthermore, patients who suffer from both diabetes and depression or anxiety, have poor glycemic control and more complications because most patients are less likely to adhere physician orders and use health care services.³

American Association of Diabetes suggested a comprehensive therapeutic approach for the treatment of diabetes that should be included psychological needs in order to achieve a good mental health, which is essential for a good quality of life.⁵ Comparing to the importance of treatment of depression in patients with diabetes, the detection rate is low.⁴

Screening of depression is an important task among patients with type 2 diabetes and having a simple and reliable scale to do this is necessary. Until date, various tools and questionnaires have been used for screening and diagnosis of mental disorders among patients with diabetes.⁶

World Health Organization-5 (WHO-5) questionnaire has been used as a first stage of the screening process; this questionnaire should be used during structured clinical interview based on the diagnostic and statistical manual of mental disorders-IV (DSM-4th Edition). Other questionnaires have been used for screening and diagnosis of mental disorders such as Center for Epidemiologic Studies Depression (CES-D),^{7,8} oxford happiness questionnaire (OHQ-9),⁹ composite international diagnostic interview-short form (CIDI-SF),^{10,11} geriatric mental state (GMS)¹² and diabetes distress scale (DDS).⁸ These tools are capable of distinguishing a psychological disorder. However, they are very time-consuming and performance of them requires special skills.¹³ Though, for clinical and epidemiological research, the tools that require less time and skills are preferable. Furthermore, it has been reported that the diagnosis of mental disorders is poor in the primary health care system due to numerous barriers such as lack of time.⁵

Kessler designed a non-specific

psychological questionnaire which contains 10 questions, in order to collect information related to mental health.¹³ So far, it has been used in the United States, Canada, Australia, WHO psychology research fields and 30 other countries around the world.⁶ 10-item Kessler Scale (K10) is a self-report instrument and consists of questions to measure the level of mental distress in clinical studies and the general population.¹³ This tool has been used extensively in WHO's mental health studies, at the global level.¹⁴ Previous studies have shown that K10 is an excellent tool for the evaluation of mental disorders.¹⁵

Due to the high level of psychological problems in patients with diabetes² and need to easier screening instrument in the fields of clinical and epidemiological surveys, K10 can be a good choice. This scale has been translated into many languages¹⁶ and several studies have been conducted by using this questionnaire.¹⁷ Furthermore, K10 has been implemented in different studies of mental disorders in patients with diabetes;¹⁸⁻²¹ however, it has not been evaluated in Iran. Therefore, the aim of this study was to translate K10 to Persian and evaluate the validity and reliability of the Persian version of K10 questionnaire, as a brief tool for screening common mental disorders (depression and anxiety) in patients with type 2 diabetes.

Methods

This descriptive and the methodological study were conducted between January and May 2014, in a Diabetes Clinic in Ardabil, Northwest of Iran. A total of 70 patients were chosen using a convenience sampling method from about 7500 patients with diabetes registered in the clinic, to end of 2013. Eligible patients were selected with inclusion criteria: aged 20-70 years, have type 2 diabetes and care records, and, exclusion criteria: gestational diabetes, type 1 diabetes and unwillingness to participate in the study. This study received an ethical approval from the Ethics Committee of Tabriz University of Medical Sciences, Iran. Moreover, written informed consent was received from all

patients. During this study, three questionnaires were completed by patients.

Research made questionnaire

Consisted of 26 items, demographic (10 items), caring variables (10 items) and disease status (6 items).

K10 questionnaire

A short questionnaire designed as a screening tool for mental disorders. Those questions have been chosen from 612 items that, extracted from 18 existing famous instruments such as self-rating depression scale (SDS), Beck depression inventory (BDI) and the CES-D. After conducting a comprehensive study, the number of these questions significantly reduced, and the final version of the questionnaire consisted of 10 questions. Each question has five category answers: (1) "None of the time," (2) "a little of the time," (3) "some of the time," (4) "most of the time" and (5) "All of the time."^{22,23}

General health questionnaire (GHQ-12)

The GHQ for the first time designed in 1972 by Goldberg and has widely used to detect minor psychiatric disorders. Usage of this questionnaire is not for diagnostic purposes, but it can be used to screening objectives for mental disorders.²⁴ The original questionnaire contains 60 items, but shortened forms including 30, 28, 20 and 12 item questionnaire has been used in various studies. According to studies, GHQ-12 has an efficiency almost equal to GHQ-60.²⁵ Translation and validation of GHQ-12 in Persian language has been done by Montazeri et al.²⁴ Total score of GHQ-12 is 36 or 12 based on scoring methods, included a conventional method (0-0-1-1) and Likert simple scoring style (0-1-2-3). Higher scores indicate lower psychological health.²⁴ We use the Likert scale for questionnaire scoring.

In this study, backward-forward method was used for translation of the K10 to Persian. In the first step, two individuals fluent in English translated the original version to Persian separately. In order to review translations, a meeting was held by translators and study performer, and then,

after making the necessary changes, the initial version was prepared. In the backward step, the initial Persian versions were translated into English by two other individuals, both of whom fluent in English and Persian. Backup translations, matched with the original version of K10 at a meeting with translators, project manager and by an expert in psychology, then, after making necessary changes, a third version of the Persian translation was adjusted.

The validity of Persian version of K10 checked using content and concurrent validation methods. For content validity it was sent to a panel of expert including 16 psychiatrists, psychologist and epidemiologist, to evaluate content validity of questionnaire [content validity ratio (CVR) and content validity index (CVI)]. Then CVR (based on the three scales: necessary; useful but not necessary; not necessary)²⁶ and CVI [based on three criteria: simplicity, specificity (relevance) and clarity on a four-point Likert scale] were evaluated for each item of the questionnaire. The item was accepted only if both of them were satisfactory (CVR > 0.62 and CVI > 0.79) and otherwise refused. Furthermore, CVI was computed by calculating the means of item's CVR that Lawshe has recommended.²⁶ To investigate the concurrent validity, GHQ-12 questionnaire was completed for all of the 70 patients and Spearman's correlation coefficient between scores of K10 and GHQ-12 was computed.

After confirmation of CVI and CVR, 10 patients with type 2 diabetics were asked to complete the Persian version of K10 and give out their viewpoint about simplicity and clarity of its questions. Finally, the questionnaire was reformed again, and the best Persian translation with the highest CVR and CVI scores was accepted. In order for the questionnaire to be more functional, the demographic characteristics including file number; date of completing, age, gender and phone number were added to the top of the questionnaire.

Reliability was assessed by internal consistency and stability methods. For

checking the stability of the Persian version of K10, the questionnaire was given to 70 patients with type 2 diabetes, in two stages with a 2-3 weeks interval (test-retest method).

Content validity evaluated by CVR and CVI scales and Spearman correlation test was applied to evaluate the concurrent validity. Internal consistency and stability, in turn, evaluated by Cronbach's alpha and intraclass correlation coefficient (ICC) for test-retest method, respectively. The content was assessed valid if the results of Cronbach's alpha and ICC was 0.70 or greater.^{27,28} Total score of K10 variables were computed from 10-items in test and retest data separately in the range of 10 (no distress) to 50 (severe distress) [well (< 20), mild (20-24), moderate (25-29), sever (> 30)].^{22,29} Data analysis was performed using SPSS (version 20, SPSS Inc., Chicago, IL, USA). The level of significance was set at P < 0.050.

Results

The average age of patients was 55.01 ± 10.14, ranging from 26 to 70. Other demographic features include 77% female, 50% illiterate, 89% married, 93% with health insurance and 74% housekeeper. Based on the results of the K10 questionnaires, 27% of the questioned patients suffered from severe mental disorders (Table 1). CVR and CVI of all items were shown to be < 0.62 and 0.79, respectively whereas the total average CVR and CVI were 0.88 and 0.95 (Table 2). Concurrent validity showed a correlation between K10 and GHQ-12 which was significant (r = 0/63, P < 0.001) (Figure 1). Overall Cronbach's alpha coefficient was 0.84. There were no statistical differences between Cronbach's alpha after deleting each items (max = 0.81, min = 0.84). ICC was at 0.77 [ICC (95% CI) (confidence interval) = 0.77 (0.62-0.86)], which shows acceptable stability.

Table 1. Demographic characteristics and K10 diagnosis of the patients (n = 70)

Characteristics	n (%)
Age (years) (mean ± SD)	Range: 26-70, 55.01 ± 10.14
Sex (n = 70)	
Male	16 (23)
Female	54 (77)
Marital status (n = 70)	
Married	62 (89)
Widow	8 (11)
Occupation status (n = 70)	
Governmental or private sector staff	5 (7)
Worker	4 (6)
Housekeeper	52 (74)
Retired and other*	9 (13)
Education (n = 67)	
Illiterate	35 (50)
Primary school	19 (28)
Under High school diploma	6 (9)
High school diploma	4 (6)
College education	5 (5)
Health insurance coverage (n = 68)	
Yes	63 (93)
No	5 (7)
K10 diagnosis (n = 70)	
Well (< 20)	28 (40)
Mild (20-24)	8 (12)
Moderate (25-29)	15 (21)
Sever (> 30)	19 (27)

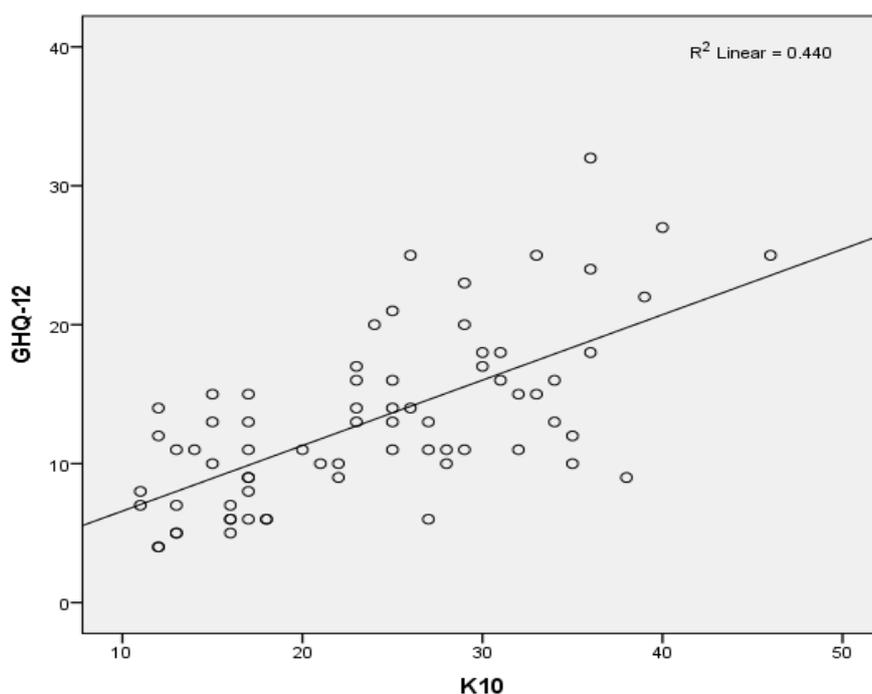
*Driver, self-employment, unemployed

K10: 10-item Kessler Scale; SD: Standard deviation

Table 2. Distribution of CVI and CVR of K10 Persian version

In the past 4 weeks, about how often did you feel	CVI*	CVR**
Tired out for no good reason?	0.88	0.99***
Nervous?	0.99	0.73
So nervous that nothing could calm you down?	0.78	0.87
Hopeless?	0.99	0.99***
Restless or fidgety?	0.99	0.73
So restless you could not sit still?	0.99	0.99***
Depressed?	0.99	0.99***
That everything was an effort?	0.99	0.87
So sad that nothing could cheer you up?	0.94	0.73
Worthless?	0.99	0.87
Average	0.95	0.88 [#]

*Calculated for each items based on experts panel, ** Calculated for each items based on experts panel, *** Adjusted from 0.99-1.00, [#]CVI (simply mean of item's CVR)²⁶
 K10: 10-item Kessler Scale; CVI: Content validity index; CVR: Content validity ratio

**Figure 1. Correlation between K10 and GHQ**

K10: 10-item Kessler Scale; GHQ: General health questionnaire-12

Discussion

Diabetes distress is descriptive by emotional tension, worry of the patient about disease control, social support and availability of care.³⁰ The study presented in this paper was aimed to translate and validate the K10 questionnaire in Persian, to facilitate screening mental disorders in patients with diabetes at epidemiological and clinical research fields. Due to time-consuming nature of most common diagnostic questionnaires and dissatisfaction of patients and physicians, application of quicker methods has been welcomed by researchers.

The K10 questionnaire is a short and simple tool, which has been translated into several languages and to date has been used in several studies.¹⁷

In this study, we found that the Persian version of K10 questionnaire is an appropriate tool for screening of mental disorders in patients with diabetes due its validity and reliability (CVR > 0.62, CVI > 0.79), its correlation with GHQ-12 ($r = 0.63$, $P < 0.001$), its Cronbach's alpha coefficient (0.84) and finally its (ICC = 0.77).

Translation of the K10 questionnaire was based on WHO guidelines.³¹ In the

translation process, there were some challenges in choosing symmetrical phrases in Persian. For example, our expert panel pointed out that physical reaction in facing with stress or nervous disorders is different in various cultures, thus, some of the questionnaire items were modified to reflect such differences (items 6 and 9).

The results showed the content validity of K10 questionnaire is verifiable (average CVR and CVI were 0.88 and 0.95).²⁶ All the 10 items in K10 questionnaire retained (CVR > 0.62); however based on Lawshe recommendation for CVR score calculation, "When all say "essential" the CVR is computed to be 1.00, It is adjusted to 0.99 for ease of manipulation,"²⁶ CVR values on of four items (1, 4, 6, 7), were adjusted from 1.0 to 0.99 (Table 2). Concurrent validity was conducted to assess the correlation between K10 and GHQ-12 (scores of scale for both questionnaires (K10 and GHQ-12) were ordinal). To our knowledge, these indexes were not reported in other K10 validation studies to compare.

To ensure similar results is the yield in multiple measurements with the same tool, it is necessary to evaluate its reliability.³² The reliability was evaluated through internal consistency and stability, which showed acceptable results (overall Cronbach's alpha = 0.84, ICC = 0.77).

In this study, the reliability of the scale was acceptable (the Cronbach's alpha was 0.84). K10 has been translated into different languages with reliability scores higher than our study. For example among Dutch, Moroccan and Turkish participants (Cronbach's alpha = 0.93),²³ Dutch (Cronbach's alpha = 0.94),³³ America (Cronbach's alpha = 0.93),³⁴ Japan (Cronbach's alpha = 0.91),³⁵ Burkina Faso (Cronbach's alpha = 0.87).³⁶ Although the value (0.84) is somewhat lower than other studies, it is much higher than the significance threshold (0.70).²⁷ Therefore, the result of our study replicates the others' findings.

According to our knowledge this is the first translation and validation of the Persian

version of the K10 questionnaire applicable to patients with diabetes, but it can be evaluated and developed on other subjects or fields as a screening tool in further research.

Limitation

This study was subject to selection bias because of the following reasons; due to some constraints e.g., migration, death, address and phone number changes of patients, non-response and refusals to cooperate, probabilistic method sampling was not possible. Thus convenience sampling was used. Besides, the validity of responses to questions might be affected and reduced due to the low level of education in the majority of patients (Table 1). Since the sample may not be a representative of all patients with type 2 diabetes, the generalizability of our results to other patients in this clinic and other parts of the country might be reduced. We recommend that, this study be repeated again with a larger sample and a probabilistic method sampling in a larger target population.

Conclusion

The Persian version of K10 is valid and reliable for evaluation of mental health status among patients with type 2 diabetes.

Conflict of Interests

Authors have no conflict of interest.

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