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The reliability and validity of the translated Oregon diabetes knowledge scale among Bengali women residing in Kolkata.

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Abstract: *Bengali language diabetes knowledge scale is few but need of the hour. Better knowledge can contribute to adequate prevention of the condition. Aim of the study was to assess the reliability and validity of the translated Oregon diabetes knowledge scale among Bengali women residing in Kolkata. An observational study of cross- sectional design was conducted among 231 adult Bengali women living in Kolkata .They were selected from the current updated voter list 2016 by simple random sampling. Reliability was tested using Kappa statistic (n=68) and Cronbach's coefficient alpha (n= 72). Face validity was assessed by a number of experts as well as group of study participants (n=20). Content validity was computed by comparing scores with respect to different parameters (n=163). P value < 0.05 considered to be statistically significant. Cronbach's alpha for overall score was 0.62868.Regarding inter- rater agreement, average kappa coefficient r=0.6399.Test-retest agreement, average r =0.5992. The score was influenced by greater number of education years (p=0.006); also by the presence of diabetes and other co-morbidities like hypertension (p=0.048). Translated Bengali language Oregon knowledge scale was found to have adequate face and content validity. In terms of reliability, the Cronbach's alpha score and the kappa statistic for the inter- rater agreement was moderate. Thus use of the scale can improve the efforts regarding diabetes education among women as well as benefit overall health of the society.*

Keywords: *questionnaire , urban, West Bengal,awareness*

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I. Introduction

In 2017, India topped the world with the largest number of people with diabetes. [1] Yet the knowledge regarding the disease which is the basis for its effective prevention is poor among Indians. [2] Kolkata is the largest city in Eastern India. About11.7% of the city population suffers from diabetes [3, 4]. City women are more obese compared to men (30% vs. 18%). Prevalence of diabetes- related complications is more among women [5] .Female members of the family play an important role in deciding food habits and other health related issues [6].

Very few validated, reliable diabetes questionnaire have been tested among Bengali women [7, 8]. To address this issue, the present study has been undertaken to assess the reliability and validity of the translated Oregon diabetes knowledge scale among Bengali women residing in Kolkata.

II. Material And Methods

An observational study of cross- sectional design was carried out among 231 adult willing Bengali women who were residents of municipal ward 126, Kolkata and were selected from the current updated voter list 2016 by simple random sampling (SRS). The translated Oregon diabetes knowledge scale was given to the respondents and the reliability and validity of the scale was assessed.

Study Design: An observational study of cross- sectional design
Study Location: Ward 126 of the Kolkata Municipal Corporation, Kolkata, West Bengal, India.
Study Duration: From December 2016 to February 2018.
Sample size: 231 women participants.
Sample size calculation: The sample size was estimated by taking the total prevalence of diabetes and prediabetes in India to 17.6 %(Indiabs). The allowable error was considered to be 5%. We assumed that the confidence interval of 10% and confidence level of 95%. The sample size was found to be 232 in number.
Equation is $N= 4pq/L^2$ where p=17.6%; q=82.4% while absolute error of p, L=5%; N=sample size
Subjects & selection method: A total of 231 ladies who were residents of ward 126, were selected from the current updated voter list 2016 by SRS between December 2016 to February 2018.
Subjects were divided into four groups.

Group 1(N=34) –Test-Re test reliability;
Group 2 (N=34) –Inter –rater reliability and
Group 3 (N=72) –Content validity;
Group 4(N=20)-Face validity.

Inclusion criteria:
1. Women aged 18 years to 75years
2. Willing to participate
3. Fit to understand the questions asked and answer them

Exclusion criteria:
1. Unwilling to participate
2. Too ill to be interviewed

Procedure methodology

All the subjects gave informed written consent after being fully explained about the study. Respondents were interviewed at their home on weekends at their convenient time. Participants' age, history of any other co morbidities such hypertension (HTN) and Chronic heart disease (CHD) etc were noted.

Selecting the questionnaire: From many available published questionnaires, we selected the diabetes knowledge scale developed and validated by the Oregon Diabetes Coalition [9] .In our assessment, this item scale was more suited for the participants because it was easy to understand so that women with poor literacy could also participate.

Translation of the questions: Questionnaire originally in English was translated into Bengali using standard procedure [10, 11].

Modifying the translated questions: All the items were modified based on respondents' feedback. The introductory question which was not part of original questionnaire was added (numbered question 1) but no score was allotted to it. The questions were renumbered as 2 to 6. The item 4iv was dropped due to lack of responses. All the questions had three responses with "yes" having score of 1 and "no" or "donot know" having score of zero.

The modified knowledge scale consisting of eight items numbered 2, 3, 4i, 4ii, 4iii, 5 and 6 respectively was then applied. The total maximum score being seven. Score of seven was considered a good score. All the questions were originally negative- keyed items. But as a part of the translated scale they were converted into affirmative sentences. Thus in the final analysis, they were reverse –scored before computing individuals' total scores and before conducting reliability tests [12].

To test scale reliability, three tests were done namely test –retest and inter rater correlation, test for the internal consistency. Validity- was tested with respect to face and content validity.

For testing test – retest reliability, the questions were repeated after 1 week by the same interviewer. Only 34 individuals were able to complete the whole procedure.

For testing inter- rater reliability, 34 new participants were assessed. The item scale was applied on same day to each participant by the two interviewers thirty minutes apart. The participants were randomly allotted to raters.

Face Validity: was assessed by a number of experts as well as group of study participants (n=20).

Content Validity: The total knowledge score was compared by age, education years, diabetes status, history of other chronic diseases, social class.

Statistical analysis

Data were analyzed using Software MedCalc version 11.6 [Mariakerke, Belgium: MedCalc Software 11.6]. Quantitative variables were analyzed by Student's t test. Qualitative data were examined by Fisher Exact test. P value less than 0.05 was considered to be statistically significant.Cronbach's coefficient alpha was used to calculate item inter-relatedness. Value of 0.7 indicate high internal consistency, value of 0.4 to 0.6 suggest moderate consistency and value of 0.3 was considered inconsistent. The alpha for the overall test score as well as individual item was calculated. Reliability was tested for inter- rater and intra- rater correlation using Kappa statistic. It was computed using Fleiss, Cohen method. Kappa values range from 0 to 1. Values <0.4 suggests poor agreement, 0.4 – 0.6 show moderate agreement, 0.6 -0.8 indicate substantial agreement and >0.8 signifies perfect agreement [13].

III. Result

Overall mean age of the participants was 42.0946 ±10.6406 years. Mean Education year's was12.31± 2.84 years.

Table 1 shows the modified Diabetes Knowledge scale- the translated version. Table 2 depicts the distribution of different variables among the respondents.

Table 3 shows the Cronbach alpha values of individual items of the knowledge and also the overall score. Table 4 gives the kappa statistic 'r' values for responses given to two different interviewers. While Table 5 depicts the correlation for the responses given by a study participant to the same interviewer twice within a time interval.

Table 1 shows Modified Oregan diabetes knowledge scale

1.Have you heard about "sugar" disease? Yes/No/Donot know [no score allotted]
2. A person can have diabetes but be unaware of it. Yes/No/Donot know
3. Diabetes can harm a person's body before diagnosis. Yes/No/Donot know
4. Long term complications of diabetes may involve: (i) eye- Yes/No/Donot Know (ii)kidney- Yes/No/Donot Know (iii)heart – Yes/No/Donot Know
5. The age group in which diabetes is most common is >45 years. Yes/No/Donot Know
6. Diabetes is curable. Yes/No/Donot Know

Table 2 shows distribution of different study variables among the participants according to Knowledge Score (n=163)

Knowledge Score	Poor Score[>4];n=41[25 .15%]	Average [4-6]; n=105[64.41%]	Good[7] n=17[10.42%]	P value
Age, mean(SD)	44.53(14.29)	41.67(13.67)	51.66(9.18)	NS
Education years	10.29(4.37)	13.11(2.84)	13.55(1.33)	0.006*
Social class-poor	16	52	2	NS
Occupation-Homemaker	48	14	11	NS
Marital status-married	48	14	11	NS
Family history of diabetes	14	60	13	NS
Diabetes present	5	17	8	NS
DM+HTN&/CHD present	5	36	9	0.048*
History of Physical activity present	24	33	6	NS

*Statistically Significant; NS-Not Significant

Table 3 shows Cronbach alpha values of Individual items and overall score

Item	Cronbach alpha
2	0.50591
3	0.71064
4i	0.66899
4ii	0.64082
4iii	0.461
5	0.49095
6	0.85743
Overall Score	0.62868

Table 4 shows Inter rater agreement in responses for each item of the knowledge scale

Item in the knowledge scale	Kappa statistic	SD	95%CI	Agreement in responses(%)	P value
Item 2	0.4138	0.1906	0.0402-0.7874	28 out of 34(82.35)	0.015
Item 3	0.651	0.321	0.0212-1.000	29 out 30(96.7)	0.0001
Item 4i	0.9399	0.0591	0.8241 to 1	33 out 34(97.05)	0.0001
Item 4i	0.9399	0.0591	0.8241 to 1	33 out 34(97.05)	0.0001
Item 4ii	0.4569	0.1212	0.2194-0.6944	24 out 34(70.58)	0.0001
Item 4iii	0.629	0.196	0.2447-1	31 out 34(70.58)	0.0001

Item 5	0.76	0.131	0.5029-1.000	31 out 34(91.17)	0.0001
Item 6	0.629	0.196	0.2447-1.000	31 out 34(91.17)	0.0001

Table 5 shows Test - retest agreement in responses for each item of the knowledge scale (Intra- rater)

Item in the knowledge scale	Kappa statistic	SD	95%CI	Agreement in responses(%)	P value
Item 2	0.4138	0.1906	0.0402-0.7874	28 out of 34(82.35)	0.015
Item 3	0.464	0.321	0.165-1.000	28 out 30(93.33)	0.0098
Item 4i	0.8786	0.0833	0.7154-1	32 out 34(94.11)	0.0001
Item 4ii	0.4101	0.1181	0.1786-0.6416	23 out 34(67.64)	0.0005
Item 4iii	0.634	0.233	0.1786-0.6416	28 out 30(93.33)	0.0002
Item 5	0.76	0.1312	0.5029-1.000	31 out34(91.17)	0.0001
Item 6	0.634	0.233	0.178-1.000	28 out 30(93.33)	0.0002

IV. Discussion

Summary of the key results:

The knowledge scale scores showed no significant difference with age, social class, occupation or family history of diabetes. But the score were more for respondents with greater number of education years(p=0.006).Though diabetic status did not affect the knowledge score but presence of diabetes and other co-morbidities like hypertension, chronic heart disease did influence the knowledge score significantly(p=0.048).[Table 2]

Overall Cronbach alpha was more 0.6(0.62868) thus had moderate consistency. [Table 3]

The alpha for individual item ranged from 4.61 to 8.57. [Table 3]

Inter- rater agreement was moderate Average kappa coefficient, r=0.6399. (Kappa statistic "r" ranged from 0.41 to 0.93). [Table 4]

Intra rater agreement was less than 0.6 Average "r" =0.5992("r" ranged from 0.41 to 0.87). [Table 5]

Comparison with other studies:

Ahmad et al constructed and validated a diabetes mellitus knowledge questionnaire in Bahasa Malaysia for Orang Asli (OA-DKQ). The Cronbach's Alpha used to determine internal consistency was 0.806. [14].A questionnaire based study was done by Simmons et al to assess the importance of community awareness programme. A total of 350 participants were included.Cronbach alpha range was 0.59 to 0.90 [15].

In the present study, Cronbach alpha of the overall item score was found to be less than 8 though it was above 0. 4(0.62).However for individual items the score ranged from 0.41 to 0.85.

The overall alpha score was less probably because the number of questions were less than 10 even though the average inter item correlation 0.26029 was greater than 0.25 [16]. If the scale has more than 20 items then the alpha is more than 0.7 [17, 18].

Reproducibility of the present study was as follows: Inter- rater agreement was moderate while test-re test agreement was less than 0.6.

In study by Simmons et al, reproducibility by Pearson's r ranged was 0.39 to 0.74 was acceptable [15]. Malaysia based study considered the intra class correlation of more than 0.6 i.e. more than 60% to be adequate [14]. In the current study, the percent agreement for all items in inters rater and test-re test study was greater than 87%.

Validity of a questionnaire can be established by a group of expert which explores how well the construct has been represented. This is called translational or representational validity. It is of 2 types –face validity and content validity [19, 20].

Face validity has been tested by group of experts and found to be adequate.

With respect to content validity, the knowledge scale scores showed no significant difference with age, social class; occupation, marital status or family history of diabetes. The present study indicates that one's level of education and presence of more than one co morbidities has a direct influence on one's level of knowledge regarding diabetes. More number of chronic ailments in an individual more is the probability of patient –doctor interaction which is the cornerstone of health education.

The findings of the current study were similar to that of Long et al who found formal education and clinic setting were independent predictors of diabetes while and sex were not. Literacy showed a significant association with good knowledge, attitude and perception ($P < 0.001$ each) in general population and those with diabetes [21, 22].

On the contrary, other workers showed that there is a statistically significant difference in knowledge among different age groups, with family history of diabetes but not with respect to different education levels [23, 24, 25, and 26].

Strengths of the study:
The given scale is a quick method for assessing the knowledge among women regarding diabetes. It is applicable for poor literacy group. Scale is user- friendly as all the respondents completed the interview.
Limitations of the study:
The scale could not be validated against a gold standard so criterion -based validation was not performed.
Using the scale for a larger population can help prove its generalizability.
Interpretation of results:
Bengali is the seventh most spoken language in the world [27]. Study by Long et al(2015) found that Kolkata based participants with poor access to health care has less knowledge regarding diabetes compared to people with better access to community clinics though p value was not statistically significant [7].
However a feasibility study by the present authors found that only when the disease was addressed by its more popular name i.e. "sugar" disease that 10 out of 30 participants(33.3%) could answer in affirmative and the overall knowledge score was poor[28]. Primary prevention of diabetes is possible through life style changes. But adequate knowledge is required for the same.

V. Conclusion

Bengali language diabetes knowledge scale addressing is few but need of the hour. Literacy regarding the condition is the first step to combat it. Women can play an important role in creating awareness about the disease within family. Translated Oregon scale tested among women residing in Kolkata was found to have adequate face and content validity. In terms of reliability, the Cronbach alpha score and the kappa statistic for the inter rater agreement was moderate .Using the scale for a larger population can help prove its generalizability.

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References

[1]. www. idf.org/our-network/regions-members/south-east Asia.
[2]. Deepa M, Bhansali A, Anjana RM, Pradeepa R, Joshi SR, Joshi PP, et al. Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes 4. Indian J Endocrinol Metab . 2014; 18:379–85.
[3]. Health and Living conditions in Eight Indian cities – National Family Health Survey NFHS- 3; 2007.
[4]. Kumar A, Goel MK, Jain RB, Khanna P, Chaudhary V. India towards diabetes control: Key issues. Australas Med J. 2013; 6(10):524–31.
[5]. Kautzky – Willer A, Harreiter J and Pacini G: Sex and gender differences in risk, pathophysiology and complications of type 2 diabetes mellitus. Endocrine Rev. 2016 Jun; 37(3):278-316.
[6]. Mani M. P. Impact of Gender on Care of Type-2 Diabetes in Varkala, Kerala. [Dissertation] .Achutha Menon Centre for Health Science Studies: Sree Chitra Tirunal Institute for Medical Sciences and Technology; 2008.
[7]. Long P, Long NG K, Kedia A, Gren H L, Smith A and Biswas J.A cross sectional study of diabetic knowledge in West Bengal, India: an analysis based on access to health care. International Journal of Diabetes in Developing Countries. 2015Dec; 35(4):614-619.
[8]. Saleh F, Mumu J S, Ara f,Begum A H and Ali L. Knowledge and self care practices regarding diabetes among newly diagnosed type 2 diabetics in Bangla desh : a cross sectional study. BMC Public Health. 2012; 12:1112.
[9]. Oregon Diabetes coalition. Oregon progress report on diabetes. Department of Human services, Health services, Oregon diabetes prevention & control program, Portland, Oregon, 2006.
[10]. Guillemein F,Bombardier C,Beaton D.Cross- cultural adaptation of health-related quality of life measures: literature review and proposed guidelines.JclinEpidemiol.1993; 46:1417-1432.
[11]. Wild D, Grove A, Martin M, et al. Principles of Good Practice for the Translation and Cultural Adaptation Process for Patient-Reported Outcomes (PRO) Measures: report of the ISPOR Task Force for Translation and cultural adaptation. Value Health.2005; 8:94-104.
[12]. psych.wfu.edu/furr/716/Reverse –scoring.doc
[13]. Mc Hugh M.L.: Interrater reliability: the kappa statistic.Biochem Med (Zagreb). 2012 Oct; 22(3): 276–282.
[14]. Ahmad B., Ramadas A., Quek K.F.The development and validation of diabetes knowledge questionnaire for the Indigenous population in Malaysia. Med J Malaysia.2010Dec; 65(4):273-6.
[15]. Simmons D, Mandell C,Fleming C,Gatland B,Leakehe L.Evaluation of a diabetes knowledge and behavior(DKB) questionnaire. Asia Pacific J Clin Nutr.1994; 3:193-200.

[16]. Eva Menino G, Maria dos AD and Maria Clarisse CL.Validation of Diabetes Knowledge Questionnaire (DKQ) in the Portuguese Population. Diabetes and Obesity International Journal2017Mar; 2(S1):S1-2.
[17]. Nunally J, Bernstein I. Psychometric theory. New York: Mc Graw Hill Higher INC; 1994.
[18]. Streiner D. Starting at the beginning: an introduction to coefficient alpha and internal consistency. Journal of personality assessment.2003; 80:99-103.
[19]. Bhattacherjee A. Social Science Research: Principles, Methods, and Practices. 2 nd ed. Open Access Textbooks; 2012.
[20]. Bolarinwa OA. Principles and methods of validity and reliability testing of questionnaires used in social and health science researches. Niger Post grad Med J. 2015; 22:195-201.
[21]. Hussain R, Rajesh B, Giridhar A, Gopalakrishnan M, Sadasivan S, James J, Vijayan PP, John N. Knowledge and awareness about diabetes mellitus and diabetic retinopathy in suburban population of a South Indian state and its practice among the patients with diabetes mellitus: A population-based study. Indian J Ophthalmol [serial online] 2016 [cited 2018 Jan 11]; 64:272-6.
[22]. Dussa K, Parimalakrishnan S, Sahay R: Assessment of diabetes knowledge using diabetes knowledge questionnaire among people with type 2 diabetes mellitus.Asian J of Pharmaceutical and Clinical Research. 2015; 8 (Issue -2).
[23]. Chinnappan S,Sivanandy P, Sagaran R, Molugulu N. Assessment of Knowledge of Diabetes Mellitus in the Urban Areas of Klang District, Malaysia .Pharmacy. 2017: 5(11); 1-8.
[24]. Mehrotra R, Bajaj S, Kumar D, and Singh KJ: Influence of education and occupation on knowledge about diabetes control. Natl Med J India. 2000; 13: 293-296.
[25]. Al shafaeel M.A.,Al –Shukaili S.,Rizvi S.G.A.,Al Farsi Y.,KhanM.A.,Ganguly S.S. et al.Knowledge and perceptions of diabetes in a semi-urban Omani population.BMC Public Health.2008;8:249.
[26]. Walter FM, Emery J, Braithwaite D, Marteau TM: Lay understanding of familial risk of common chronic diseases: a systematic review and synthesis of qualitative research. Ann Fam Med. 2004; 2: 583-594.
[27]. Simons, Gary F; Charles D Fennig (Eds) .2017. Ethnologue: Languages of the world, Twelfth edition .Dallas, Texas: SIL International. Online version: http:// www.ethnologue.com.
[28]. Sonali Majumdar (Das), Sarmistha Mukhopadhyay, Anil Baran Singha Mahapatra, Saibendu Kumar Lahiri, Munna Das:Knowledge regarding diabetes among women residing in Kolkata, West Bengal , India . IOSR April 2014; 13(4{version -2}): 41-46.

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