Original Article

Development and Validation of a Tool to Assess Perceptions and Practices Regarding Hypertension and Associated Comorbidities among Primary Health Care Providers of a Rural Community in India

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Abstract

Background: Primary health-care providers can play a crucial role in the prevention and early detection of non-communicable diseases. Knowledge, attitude, and practice (KAP) survey of primary health-care providers is needed to assess their gaps in knowledge, and identify barriers for effective implementation of the national program. However, such KAP instruments are lacking. **Objective:** The aim of this study is to develop, validate and assess the reliability of a questionnaire to determine the KAPs of primary health-care providers about hypertension and associated comorbidities **Materials and Methods:** This study was conducted in the following steps: item construction and psychometric testing, by validity and reliability analysis. **Results:** The final KAP questionnaire comprised 25 knowledge items, 12 attitude items, and 8 practice items. Exploratory factor analysis using principal axis factoring with varimax rotation revealed four dimensions in the attitude section explaining 35.93% and two dimensions in practice sections explaining 65.96% of the total variance. Cronbach's alpha coefficient for attitude and practice session measured 0.65 and 0.85, respectively. A Kuder Richardson value of 0.70 was obtained for the knowledge section. ICC coefficients were 0.56 ($P < 0.00$) for knowledge, 0.77 ($P < 0.00$) for attitude and 0.88 ($P < 0.00$) for practice sections indicating moderate-to-good correlations. Overall, the instrument developed had acceptable validity and reliability. **Conclusion:** Overall, the instrument developed had acceptable validity and reliability to assess the perceptions and practices of primary healthcare providers about prevention and control of hypertension and associated comorbidities in the community.

Keywords: Hypertension, primary health care providers, questionnaire, validation

Introduction

Rising levels of obesity and unhealthy lifestyle choices with South Asian ethnicity, has resulted in an alarming rise in noncommunicable diseases (NCDs).[1-4] Cardiovascular diseases and diabetes together comprise one-fourth of all leading causes of mortality in India.[5,6] The majority remain undetected in the community despite the availability of effective preventive and therapeutic measures. Lack of resources and personnel make their detection an even bigger challenge.[7,8] Primary health-care providers working at the grassroots level can play an important role in their prevention and early detection after adequate training.[8-13]

The ongoing National Programme (NPCDCS) to prevent and control NCDs is still in its early stages. Knowledge, attitude, and practice (KAP) survey of primary health-care providers who form the backbone of this program are useful to identify gaps in knowledge, their needs, problems, and barriers. However, there is a lack of such validated and reliable KAP instruments. This study aims to develop and validate a questionnaire used to determine the knowledge and attitude of primary health-care providers about hypertension and

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associated comorbidities and to assess their practices toward its prevention and control in the community.

Materials and Methods

An observational type of study with a cross-sectional design was used to develop and measure the validity and reliability of the above questionnaire.

Study population and sample size

All primary health-care providers enlisted under the district CMOH office chosen from three purposively selected blocks in the North 24 Parganas district in West Bengal, India. Anganwadi workers, Village Health Guides, refusal to give consent, on leave or reporting sick were excluded. A total of 200 eligible participants were enrolled in the study for psychometric analysis. The sample size was consistent with the recommended minimum sample size for exploratory factor analysis (EFA) as most studies of questionnaire validation use 2–20 "subjects to item ratio" for factor analysis.[14]

Questionnaire development

A questionnaire was developed to collect data on perceptions and practices regarding hypertension and its risk factors, associated comorbidities, caregivers current role in patient counseling activities, and control of hypertension and diabetes besides sociodemographic characteristics.

Item pool generation

The conceptual framework for the English questionnaire was prepared after a review of the literature using journal databases. A qualitative study by Focus group discussions with primary health-care providers and in-depth interviews of Medical Officers of 3 Primary health centers in the selected blocks were done. This was followed by the Delphi technique among a group of experts from various disciplines such as Community Medicine, Medicine, Endocrinology, and Cardiology. Based on those results, a consensus on the items to be included in the questionnaire was obtained. The questionnaire was then translated to the local language, i.e., Bengali, by forward-translation and back-translation by experienced translators. Each step after the translation was followed up by a review of experts, and revision was incorporated.

Content and face validity

The questionnaire was then rated individually by a team of 3 public health experts for content relevance, clarity, and accuracy using 3 point Likert scale and content validity was calculated based on Lawshe's formula using a cut-off score of 0.99 when retaining a specific item. Opinion of five public health nurses was taken regarding feasibility, formatting, and comprehensiveness of the questionnaire.

Finally, a questionnaire in Bengali, which comprised 12 sociodemographic questions, 34 knowledge items, 17 attitude items, and 10 practice items was developed and was tested to determine construct validity and reliability.

Construct validity

An EFA with principal axis factoring (PAF) and varimax rotation was used for questions in the attitude and practice domains, to identify the dimensionality of the items. Kaiser–Meyer–Olkin (KMO) test value of >0.6 and Barlett's test of sphericity ($P < 0.001$) was used to check for sampling adequacy.[12,13]

The number of factors to retain was determined by considering the Eigenvalues (>1) and the Scree plot.[14] Items with factor loadings >0.3 were considered acceptable and remained in the constructs.[15]

Reliability

Reliability assessment was made by measurement of internal consistency and stability over time was assessed using test-retest method.

Internal consistency

For the knowledge section of the questionnaire item difficulty index (IDI) and discrimination index (DI) were determined. The acceptable range for IDI was set between 20% and 80% with DI value >0.3 which is generally considered good.[16,17]

Kuder Richardson (KR-20) coefficient with scores >0.60 was used to determine the reliability of the knowledge section.[18]

For the attitude and practice sections item to total correlations were determined and a cutoff of 0.2 was used.[16,19]

The reliability of the questionnaire was analyzed by Cronbach's alpha coefficient, coefficients >0.60 were acceptable for exploratory research.[20]

Test-retest reliability

The test-retest reliability of the questionnaire was initially assessed on a sample of 50 providers selected purposively from a different Block (Amdanga). The retest was administered after 3 weeks to avoid any recall bias using the same questionnaire, wherein 28 participants returned and completed the retest.

Description of questionnaire

Questions evaluating knowledge were 34 items were analyzed as "correct-1" or "incorrect-0." Questions in the attitude domain comprised 17 items and 10 items in the Practice domain with 5-point Likert type responses. Negatively phrased items were scored reversely.

Procedures

The purpose of the study was explained to the study participants and their written informed consent was obtained. This was followed by administering the questionnaires to them.

All data were analyzed using Statistical Package for the Social Sciences version 16 (SPSS Inc., SPSS for Windows, Chicago, USA).

Results

The mean age of participants was 44.72 ± 8.41 years, and mean years in service was 18.17 ± 11.39 years. 43.5% were graduates, followed by 30.5% educated up to higher secondary level with 95.0% being married.

Content and face validity

All items were contextually relevant, and no item was deleted. All items in the questionnaire were comprehended easily after minor modifications. The time spent to complete the questionnaire was 45 min.

Construct validity

EFA was carried out using PAF with varimax rotation to determine the underlying constructs of each section. For the attitude section, KMO measured 0.69, and Bartlett's test significance was <0.000, indicating that the sample was adequate for factor analysis.

The scree plot revealed four dimensions with reported eigenvalue ≥1 in the attitude section, with 12 items retained from the initial 17 items in the attitude scale. The four factors together explained 35.93% of the total variance in the scale. Table 1 shows the item loadings of the four factors identified in the attitude domain.

In the practice section, assumptions to conduct EFA were also met as the KMO score measured 0.81, and Bartlett's test significance was <0.000.

EFA of the Practice section revealed two dimensions in the Scree plot with eigenvalue ≥1 following which eight items

Table 1: Exploratory factor analysis of items in attitude domain (*n*=200)

Number	Attitude items	Loading on 4 factors			
		F1	F2	F3	F4
A	Attitude towards dietary choices				
1	100 g of rice and 100 g of vegetables provide the same energy/calories	0.56			
2	Daily intake of fruits and vegetables is not necessary for patients with hypertension	0.49	0.32		
3	Salt intake should be reduced to prevent hypertension	0.74			
4	Diet should be modified for patients with Diabetes and hypertension	0.39			
B	Attitude towards physical activity				
1	Regular physical activity is not needed for hypertensive patients engaged in routine daily activities		0.61		
2	Once medication for hypertension and/or diabetes is started, physical activity is no longer necessary		0.77		
C	Attitude toward control of disease				
1	Routine screening of blood pressure and blood sugar is needed>30 years of age			0.64	
2	Medication can be stopped once high blood pressure is under control			0.82	
D	Attitude toward primary health care providers'(ANM) role in disease management				
1	Prevention and control of hypertension and Diabetes is the job of doctors alone				0.54
2	ANMs should be able to identify common life-threatening complications of patients with hypertension and diabetes and refer them				0.72
3	Regular counseling and follow-up by primary health-care providers improves patient satisfaction and disease outcome				0.59
4	My health center is not well equipped to provide primary care for hypertensive and diabetic patients				0.36

ANM: Auxiliary nurse midwife

Table 2: Exploratory factor analysis of items in practice domain (*n*=200)

Number	Practice items	Loading on 2 factors	
		F1	F2
A	Counselling measures to patients regarding disease prevention/control		
1	How often did you counsel overweight patients about weight reduction and maintenance of correct body weight in the past 1 month?	0.77	
2	How often did you ask patients about their addiction to tobacco and/or alcohol in the past 1 month?	0.83	
3	How often did you counsel patients about quitting tobacco and/or avoiding alcohol consumption in the past 1 month?	0.80	
4	How often did you teach patients about undertaking moderate intensity daily physical activity in the past 1 month?	0.75	
5	How often did you teach patients about incorporating changes in their diet (low salt intake and higher intake of fruits and vegetables) in the past 1 month?	0.63	
B	Frequency of monitoring of clinical parameters in the past 1 month		
1	Measurement of weight		0.84
2	Measurement of blood pressure		0.69
3	Measurement of blood sugar		0.62

Table 3: Difficulty index and discrimination index of knowledge items ($n=200$)

Sample questions : Knowledge items	Difficulty Index	DI
Q5. Intake of fibre in diet helps in keeping cholesterol in check in hypertensives	0.40	0.31
Q13. Cessation of smoking can lower blood pressure in hypertensives	0.78	0.31
Q14. Risk of hypertension is increased in persons with a positive family history	0.70	0.34
Q15. Regular physical activity can reduce weight and promote longevity in hypertensives	0.46	0.60
Q19. Nurturing hobbies can reduce mental stress among hypertensive patients	0.60	0.44
Q21. A person with BP above 130/100 may have hypertension	0.71	0.46
Q22. Hypertension can lead to damaged eyes and stroke	0.20	0.26
Q32. Sweating an palpitation could indicate low blood sugar in diabetic patients	0.44	0.35
Q34. Sudden loss of vision could be a sign of stroke	0.36	0.31

DI: Discrimination Index

were retained from the initial ten items in the Practice scale. The two factors together accounted for 65.96% of the total variance in the scale. Table 2 shows the item loadings of the two factors identified in practice domain.

Internal consistency

Item analysis was conducted on the knowledge domain. Out of 34 items, 25 items were retained in the knowledge domain. The difficulty index ranged from 0.25 to 0.79 and the DI ranged from 0.15 to 0.66 [Table 3].

The item-total correlations for each item in the attitude and practice sections were above cut-off 0.2 and no items were removed.

A KR value of 0.70 was obtained for the knowledge section, whereas the overall Cronbach's alpha coefficient for attitude and practice session measured 0.65 and 0.85, respectively.

Test-retest reliability

The test-retest reliability assessed by intra class correlation coefficients were 0.56 ($P < 0.00$) for knowledge, 0.77 ($P < 0.00$) for attitude, and 0.88 ($P < 0.00$) for practice sections indicating moderate-to-good correlations.

Discussion

The questionnaire was assessed for face validity, content validity, and construct validity. Although content validity alone, does not measure an instrument's validity by itself, demonstration of content validity is a fundamental requirement of all assessment instruments.[21] For content validity, consensus of an expert panel was analyzed using Lawshe's formula to calculate the content validity ratio, and all items in the original format were retained.[22]

For construct validity, commonly used methods for factor extraction include-principal components analysis, PAF, maximum likelihood, unweighted least squares, etc., however, maximum likelihood or PAF will give the researcher the best results.[19,23] EFA of the Attitude and Practice sections indicated only two attitude items showing slightly lower factor loadings between 0.3 and 0.4, which was acceptable (>0.3). For practice items, all factor loadings were >0.4. Thus, it was decided to retain 12 items in the attitude section and 8 items in the practice section of the KAP questionnaire for further data analysis.

The knowledge items were constructed in a manner that assessed the primary health-care providers' awareness about general questions on risk factors to more specific questions about hypertension and its comorbidities such as diabetes, obesity, cardiovascular diseases, and its complications. In item analysis, the difficulty of an item measures the proportion of the persons who answer a test item correctly with higher proportion, indicating lower difficulty.[24]

Item discrimination compares the extent to which items discriminate among high and low scorers groups with a score >0.2 regarded as acceptable.[17,25]

In item analysis, 21 knowledge items were in the category of the middle level of difficulty and acceptable DI and was thus able to distinguish between high scoring and low scoring respondents. Four items with DI <0.2 were retained as they assessed knowledge about comorbidities.

Reliability reflects consistency and replicability over time with more measurement errors making the test less reliable.[26] The internal consistency of the knowledge domain was assessed using KR-20 as the items were scored dichotomously, and it was found to be satisfactory. The Cronbach alpha reliability coefficient of both attitude and practice sections were similarly found to be acceptable. Although Cronbach's alpha coefficient of >0.7 is used most commonly, reliabilities as low as 0.50 are satisfactory for short tests of 10–15 items, tests with >50 items should have reliabilities of 0.80 or higher.[27]

The results indicate that the practice section of the questionnaire had a high-reliability coefficient of 0.85, while the attitude section had a relatively lower reliability coefficient of 0.65, which was, however, within the acceptable threshold for exploratory research (>0.6).[18] Further research can be done to improve reliability by increasing the number of items in the attitude domain and increasing the sample size. Overall, the instrument showed good test-retest reliability.

Conclusion

The strength of this study is the development of a validated and reliable instrument that can identify primary health-care providers' gaps in knowledge and practices and advocate measures towards improving their role in prevention and control of NCDs. This tool simultaneously measures the promotion of preventive measures as well as delivering services towards control of hypertension. Most tools focus on preventive and control measures individually.

However, all aspects of KAP regarding prevention and control of hypertension could not be covered in detail. It is possible that some of the knowledge questions could have been answered by guessing. Further evaluation of this instrument in urban and different rural settings is necessary.

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Conflicts of interest

There are no conflicts of interest.

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