A KNOWLEDGE ASSESSMENT QUESTIONNAIRE RELATING TO RISK FACTORS FOR CHRONIC DISEASE OF LIFESTYLE FOR HIGH SCHOOL LEARNERS: VALIDITY AND RELIABILITY

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ABSTRACT

Objective:

The author aimed to develop a valid and reliable questionnaire that would measure the knowledge of learners relating to risk factors for chronic disease of lifestyle such as stroke, diabetes and hypertension. The questionnaire was intended to be used as part of a health education programme aimed at improving the knowledge of learners as it relates to risk factors for chronic diseases of lifestyle.

Method:

The development of the questionnaire was guided by Williams' nine steps of questionnaire design and was influenced by the national curriculum of education's life orientation programme and literature. A 31 item questionnaire was designed and presented to an expert panel. Content validity was done by the expert panel and face validity was tested through informal discussions with high school learners. Reliability testing was done using the test-retest method and Kappa co-efficient was used to test stability of the items. The questionnaire was administered to 40 high school learners but only 30 did the test the second time.

Results:

The questionnaire yielded a reliability analysis that revealed internal consistency with a Cronbach's alpha of 0.897. The average score obtained by learners using this questionnaire was 14.

Conclusion:

The questionnaire can be used for learners with a grade 10 education. The questionnaire also highlighted that learners had a moderate knowledge relating to risk factors for chronic diseases of lifestyle and the need for appropriate information interventions was emphasized.

Key words: knowledge, questionnaire, chronic diseases, risk factors

Introduction

Non-communicable diseases (NCD's) are the leading cause of death in the world (WHO,2003). In Africa it is increasing to the levels of communicable diseases causing a

double burden of disease. In the Western Cape, South Africa, non-communicable diseases (NCD's) are the leading cause of death (Bradshaw, Schneider, Norman and Bourne, 2006). The diseases identified included cardiovascular disease (stroke), diabetes and obesity. These can be identified as chronic diseases of lifestyle influenced by factors such as globalization and urbanization. Surveys conducted in schools in the Western Cape revealed the existence of a high prevalence of risk factors for non-communicable diseases among adolescents and young people (Frantz, 2006). Research has indicated that adolescents are at the vulnerable age of engaging in risky behaviour without realizing the consequences of their actions. Various research has shown that by addressing the risk factors for non communicable diseases, this will assist in decreasing the incidence of NCD's (Nissen, Berrios and Puska, 2001). Risk factors include physical inactivity, alcohol use, smoking, unhealthy diet over a long period and psychosocial stresses. The question that arises is how do we address this problem as South Africa is facing a triple burden of disease with infectious diseases such as HIV/AIDS, violence related injuries and now the increasing NCD's. Large scale interventions have been conducted in developing countries including South Africa to address the growing prevalence of NCD's (Doak, 2001) and it was concluded that there is a need to focus on programmes that address the needs and concerns of specific communities and then use culturally appropriate interventions. Chronic disease such as stroke, hypertension and diabetes are preventable diseases of lifestyle and should be prevented at an early age.

Education of the population on the risk factors of these chronic diseases can assist in controlling and preventing escalation of these diseases. Health professionals play a role on the education of these populations to assist in reducing the effect of these diseases. Physiotherapy is central to patient education and plays a role at all levels of health care. Schools are one setting where health professionals such as physiotherapists can play a role in advocating for the prevention of non communicable diseases and more specifically diseases of lifestyle. In order to implement effective health education programmes one need to measure client knowledge prior to an intervention and following an intervention. The primary aim of this study was to design, validate and test the reliability of a questionnaire for young people regarding diseases such as hypertension, stroke and diabetes. The questionnaire designed would be used as an assessment tool for knowledge prior to the implementation of health education programme relating to risk factors for chronic diseases such as diabetes, hypertension and stroke. It is important to have clear objectives, a research question and target population before designing the questionnaire (Williams, 2003). Piloting of a questionnaire is essential to determine if it will work for the desired population and assisting in identifying administrative and analytical problems (Boynton,2004).

Methods

Nine steps in the designing of the questionnaire have been defined and these are reflected in Table 1. The current study followed these guidelines in formulating the questionnaire. The aim was to design a questionnaire that was able to measure

the knowledge of grade 10 – 12 high school learners as it relates to risk factors for chronic diseases of lifestyle such as stroke, hypertension and diabetes. The questionnaire design was based on literature (Williams, 2003; Evans & Oakshott; 2003). The original questionnaire comprised of demographic data, 5 general knowledge questions relating to chronic diseases of lifestyle; 5 questions on hypertension; 11 questions on diabetes and 10 questions on stroke. A total score of 26 could be obtained for the knowledge questionnaire. Specific areas covered in the questionnaire included lifestyle changes, risk factors and signs and symptoms. The questions were simple for easy understanding.

Table 1: Stages of questionnaire design (Williams, 2003)

Define research question and study population
Decide how questionnaire will be administered
Formulate your questions
Formulate the responses
Design the layout
Pre-pilot the questions and layout
Pilot study to test for validity, reliability and acceptability
Design coding scheme
Print questionnaire

The questionnaire was presented to health professionals and educators who dealt with education of the clients regarding chronic diseases of lifestyle. This aided in testing content validity of the questionnaire. These participants provided comment on the clarity of the questionnaire and content in terms of appropriateness for the level of learners it is aimed at. Face validity was assessed through informal discussions with a convenience sample of grade 11 and 12 learners.

Reliability testing was done using three stages. One form of testing reliability of a questionnaire is to test for stability and this involves administering the questionnaire to the same group on two separate occasions with an adequate time interval. The questionnaire was thus tested on 40 grade 12 learners and then re-tested 2 weeks later on the same group to assess reliability of the questionnaire. Reliability of the questionnaire can also be assessed for single items using the Kappa agreement and finally for summary scores for the complete questionnaire to determine internal consistency. Cronbach's alpha was used to assess the internal consistency of the questionnaire. Alpha values above 0.70 were considered good. To assess the test-retest reliability of the questionnaire an intraclass co-efficient (ICC) with 95% confidence interval was calculated. An ICC above .75 was considered excellent reliability; between 0.4 and 0.75 indicates fair to good reliability and an ICC below 0.44 indicates poor reliability.

To prepare for data analysis, questions were scored so that high values reflected high knowledge. Scoring for the knowledge scales was on a scale of 1-3 with 1=yes; 2=no and 3=I don't know. Kappa co-efficients was used for dichotomous answers and categorical data. Analysis of the Kappa was presented as 0.81-0.99 = almost perfect agreement; 0.61-0.80 = substantial agreement; 0.41-0.60 = moderate agreement; 0.21-0.40 = fair agreement and 0.01-0.20 = slight agreement and <0 = less than chance agreement. The scores of each section and the final scores were classified into three categories namely poor knowledge (<50%), adequate knowledge (51-70%) and good knowledge (>70%). Ethical approval was obtained from the University of the Western Cape and informed written consent was obtained from the school principal and all participants.

Results

The initial questionnaire was administered to 40 high school learners and the retest two weeks later was presented to the same group. However, the response rate on the second round was only 75% (30/40). Of the respondents 43% (13) were male and 57% (17) were female. The average age of the participants was 17.4 with a range of 16-18. Basic demographic data of the participants is presented in Table 2 below.

Table 2. Characteristics of participants (N=30)

Variable	*n (%)*
Gender	
Male	13 (43%)
Female	17 (57%)
Age	
16 years	1 (4%)
17 years	15 (50%)
18 years	14 (46%)
Heard of chronic diseases of lifestyle	
Yes	20 (67.%)
No	10 (33%)
Heard of stroke	
Yes	26 (87%)
No	4 (13%)
Heard of diabetes	
Yes	27 (90%)
No	3 (10%)
Heard of Hypertension	
Yes	20 (67%)
No	10 (33%)

Validity

The questionnaire was tested for content and face validity. Content validity refers to the subject matter of the instrument and considers how appropriate the items are in covering the subject. On the other hand face validity refers to how reasonable the items and overall questionnaire are for its target group from the perspective of the expert panel. The panel consisted of 2 life orientation teachers, a questionnaire development expert and a researcher familiar with the content area. Ten learners from a local high school were used to test the questionnaire for clarity, understanding of the questions, readability of the individual items and the overall questionnaire and this contributed to the face validity of the questionnaire.

Reliability

Of the 31 items, 26 items were subjected to the Kappa test to assess the magnitude of agreement between test and retest on knowledge questions. Five items had poor agreement with a Kappa co-efficient below 0.20. These questions were rephrased following the validity testing of the questionnaire and this rephrasing impacted on the outcome of the agreement of these questions. One question still yielded a Kappa of 0.2 and it was decided to exclude it from the final questionnaire leaving only 10 questions in that section (diabetes). The majority of the items (16) had a Kappa co-efficient between 0.45 and 0.60 yielding a moderate agreement. Seven (7) items yielded a substantial agreement between 0.61 and 0.8 and one (1) item had an agreement of 0.81. The kappa agreement for each item per section is presented in Table 3. The questions with low Kappas (0.45-0.6) were discussed with the expert panel and a statistician to assess the reason for weak agreement and to decide whether to exclude those questions. It was decided to leave the questions as the knowledge of the participants could have influenced the outcome.

The reliability of the questionnaire based on summary scores from each subject was excellent. Table 4 reflects the ICC for each section and the overall score.

The internal consistency for each section demonstrated a Cronbach's alpha of 0.73 for hypertension; 0.868 for diabetes and 0.874 for stroke. Mean knowledge scores from the pilot

study showed an overall mean score of 14.2 for all participants. The mean score for males was 14 (8-23) and for females was 14.35 (7-23). The classification of the knowledge for each section for both tests is presented in the Table 5 below. Most learners tended to be classified as having 50-70% of the knowledge.

Table 3: The Kappa agreement for each question

Question	Item	Kappa
10	Hypertension is another name for high blood pressure	0.56
11	The following blood pressure is considered to be high 130/80	0.58
12	Hypertension can be treated with medication, exercise & weight loss	0.70
13	Lifestyle changes such as stopping smoking and weight loss can decrease blood pressure	0.56
14	Damage to the kidney is a sign of high blood pressure	0.64
15	Diabetes is commonly known as "sugar" sickness	0.81
16	The following is normal blood glucose levels 3.8-7.7	0.49
17	Eating to much sugar and other sweet foods is a cause for diabetes	0.58
18	Diabetes can be cured	0.59
19	Shaking and sweating are signs of high sugar levels	0.77
20	The kidneys produce insulin	0.60
21	The usual cause of diabetes is lack of effective insulin in the body	0.75
22	Diabetes causes poor circulation	0.58
23	Medication is more important than diet and exercise in controlling diabetes	0.45
24	There are 2 types of diabetes namely Type 1 and Type 2	0.54
25	**Diabetes can damage my Kidneys**	**0.23**
26	The most common type of stroke is when the blood supply to the brain is blocked	0.48
27	Another name for stroke is cerebrovascular accident	0.66
28	Signs of stroke include blurred vision, paralysis on one side of the body and severe headache	0.56
29	You are at risk of getting a stroke if you are obese	0.48
30	The most common known risk factor for stoke is high blood pressure	0.45
31	If you drink alcohol you are less likely to get a stroke	0.47
32	To reduce the risk of stroke you need to eat well and exercise regularly	0.66
33	Right arm paralysis could be a physical disability of stroke	0.48
34	If you stop smoking you can decrease the risk of having a stroke	0.74
35	Diabetes and stroke are closely linked	0.70

Table 4: Reliability of summary scores for the questionnaire

Section	ICC	95% CI of the ICC range
Hypertension	0.73	0.67-0.87
Diabetes	0.87	0.72-0.94
Stroke	0.87	0.74-0.94
Overall score	0.89	0.78-0.95

Table 5: Classification of knowledge

Section	< 50%		50-70%		>70%	
	T1	T2	T1	T2	T1	T2
Hypertension	9(30%)	8 (27%)	**15(50%)**	**16(53%)**	6 (20%)	6(20%)
Diabetes	11(37%)	11(37%)	**16(53%)**	**16(53%)**	3(10%)	3(10%)
Stroke	6(20%)	5(17%)	**16(53%)**	**16(53%)**	8(27%)	9(30%)
Overall Score	10(33%)	8(27%)	**17(57%)**	**20(67%)**	3(10%)	2(6%)

T1=Test 1
T2= Test 2 (2 weeks later)

Discussion

There is a growing interest of health care providers and researchers in the prevention of chronic diseases of lifestyle and this highlights the need for appropriate intervention programmes. However, the success of information based intervention programmes is dependent on the evaluation of the programmes to assist in improving the programmes and thus the need for valid and sensitive outcome measurements. The study presented here is intended to contribute to this effort by attempting to provide a valid and reliable tool to assess knowledge relating to risk factors for chronic diseases. Great care should be taken when designing questionnaires or outcome measurement tools and it has been highlighted that critiquing of questions is important (Rosen and Olsen, 2006). In addition, reliability and validity of a questionnaire is of equal importance for evaluating its generalisability.

It is important to note that when designing an assessment instrument the target population as well as the objectives of the study is important considerations. The reliability of this questionnaire was assessed using temporal stability and internal consistency. This is similar to other studies which developed knowledge questionnaires for physical activity (Verbunt, 2008); nutrition (Whati et al. 2005); rheumatoid arthritis (Hennell et al 2004); diabetes (Fritzgerald et al 1998) and HIV (Carey et al 1997). All the studies used Cronbachs' alpha to measure internal consistency although the Pearson correlation to measure test-retest stability was also used (Carey et al 1997). In this study test-retest reliability based on summary scores for each section was excellent (ICC= 0.73-0.874) using the intra-class correlation. When looking at each individual item's agreement, there was a large majority of items which yielded only moderate agreement using the Kappa co-efficient

Validity of this questionnaire has been shown through a process of appropriate testing. The procedures outlined in the methods section including the consultation with experts in the area and the compilation of literature regarding risk factors for chronic diseases of lifestyle ensured the content validity of the questionnaire. The questions were found to be understood by learners who have and do not have a Biology background.

The questionnaire has shown a variation of final scores ranging from 7–23 and most of the learners had between 50 and 70% knowledge. This is an indication for the need to evaluate knowledge and implement successful interventions. Knowledge interventions are effective as a tool to access clients understanding of conditions in order to implement appropriate interventions or health education programmes. These interventions aimed at improving knowledge could ultimately contribute to compliance in disease management and prevention.

A limitation of the study is the sample size for test-retest as well as the moderate response rate during the second round. In addition, this questionnaire was designed around the possibility of the implementation of a health questionnaire focused in risk factors for chronic diseases of lifestyle and specifically hypertension, diabetes and stroke. This questionnaire can however facilitate assist in determining knowledge levels and be used as an instrument against which to evaluate improving knowledge and creating awareness among an at risk population about risk factors for chronic diseases of lifestyle.

Clinical Implications

When using this questionnaire to assess knowledge it needs to be remembered that the questionnaire was designed with the specific aim to use it as a assessment instrument prior to a health education programme. Health professionals must realize that improvement of knowledge does not necessarily translate into behaviour change.

Conclusion

The development of this questionnaire was aimed at assisting health professionals advocating for prevention of non communicable diseases and specifically chronic diseases of lifestyle such as hypertension, diabetes and stroke to assess the knowledge of the targeted population prior to implementing effecting preventive strategies. Reliable and valid assessment of knowledge will allow for "more precise evaluation of programmes designed to reduce risk-conferring behaviours" (Carey et al 1997).

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