Development of a questionnaire (OPQ) to assess patient’s knowledge about osteoporosis

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Abstract

Objective: to develop a self-administered questionnaire (OPQ) to assess the patient’s knowledge about osteoporosis. Methods: an initial item pool of 71 questions was developed with input from clinicians involved in the management of patients with osteoporosis. It was piloted in ten patients for face validity and comprehension. The questionnaire was then administered to 50 first-time attendees at a specialist osteoporosis unit. After item analysis using index of difficulty and index of discrimination, 20 items were selected for the final questionnaire (OPQ). These were in the areas of general information (5), risk factors (7), consequences and treatment (four each). Results: the average index of difficulty and index of discrimination (D) of the 20 items was 0.56 (> 0.75 is suggestive of a poor discriminator) and 54.8% (D value of 50% is associated with highest level of item discrimination) respectively. This means that all the items actively discriminated between high and low scorers. The Flesch readability index was 74.3 (a score between 70 and 100 means a document is easily understood) and the reliability coefficient was 0.84 (acceptable range 0.8–0.9). Criterion validity (verification that the scale measures what it claims to measure) was confirmed by the method of contrasted groups where members of an osteoporosis awareness charity had a significantly higher score than the first time attendees (13.6 ± 4.3 vs. 8.5 ± 5.4; P = 0.003). Conclusions: we have developed a self-report, 20-item questionnaire (OPQ) to assess the patient’s knowledge about osteoporosis. Psychometric analysis has shown that the items have a satisfactory index of difficulty and discrimination. The OPQ is internally reliable, valid and easily understandable. It can be used to identify individuals in need of educational interventions as well as assess the effectiveness of education efforts as a part of management of osteoporosis. © 2000 Elsevier Science Ireland Ltd. All rights reserved.

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1. Introduction

Osteoporosis is now recognised as a major problem of health care. It is estimated that 30% of postmenopausal women suffer from it [1]. Over
In the last decade there has been increasing awareness of this condition, both in the medical profession and among the general public. For the effective management of osteoporosis, patients must be aware of the various risk factors, as well as potential treatment options including their side effects and usefulness. Considerable effort is directed towards patient education both formally as information leaflets and videos and informally through the popular media.

Patient education is defined as ‘a planned combination of learning activities designed to help people with disease or illness make changes conducive to health’ [2]. It is expected that education will result in better health status through changes in health behaviour [3]. Patient education programmes are acknowledged as an effective way of imparting disease related knowledge to the patients [4]. They have been demonstrated to increase knowledge [5,6], improve compliance [7], change behaviour [8] and decrease levels of a variety of disease symptoms [9]. While knowledge is often not sufficient for behaviour change and forms only one component of the prediction model, it can be considered as a necessary condition [10].

Results of a multidisciplinary programme involving patient education suggests that the participating patients develop more effective ways of coping, comply with physician recommendations and know more about osteoporosis [11].

It is recognised that in order to design the most effective patient education programme it is necessary to establish the level of information already acquired by patients [12]. Levels of knowledge and subsequent patient education efforts can only be adequately evaluated by adopting a psychometrically sound instrument to assess knowledge. A large number of such instruments have been developed to measure arthritis related knowledge in patients with rheumatoid arthritis [4,13,14], osteoarthritis [15,16] and ankylosing spondylitis [17].

There are reports of patient’s knowledge and perception about osteoporosis in the literature [18–24]. These have not used a validated instrument and were a part of studies conducted for a different purpose, e.g. to assess women’s knowledge and attitudes about the use of hormone replacement therapy [18,19]. Thus, there is a lack of a validated questionnaire to assess the knowledge specifically related to osteoporosis.

The objective of our study was to develop and validate a comprehensive questionnaire to assess patient’s knowledge about osteoporosis that could be used in a self-report format.

2. Material and methods

The development of the questionnaire proceeded through the following stages.

2.1. Development of the item pool

In order to ensure appropriate content validity, four clinicians involved in the management of patients with osteoporosis were asked independently to identify facts related to osteoporosis they would hope their patients to be aware of. It was also confirmed that this information is provided through a wide range of information leaflets available locally. These were classified into the five categories of, general information; risk factors; investigations; consequences and treatment.

Based on the above-given data, an item pool of 71 multiple-choice questions was developed into a prototype questionnaire. This contained questions on general information (18), risk factors (14), investigations (5), consequences (16) and treatment (18). Each item consisted of a stem question with four possible response alternatives. For each item a single correct response was identified and scored 1 point. Incorrect responses were scored as −1 and a ‘do not know’ response as 0. The latter option was included to increase patient compliance on the questionnaire. The total score was calculated from the sum of the individual item scores. The maximum possible score was 71.

The prototype questionnaire was reviewed by a clinical psychologist, clinicians and members of the nursing and technical staff of the unit and executive members of a patient interest group for comprehensibility. The questionnaire was then piloted in a sample of ten patients for face validity and comprehension. The questions were revised in
the light of advice and comments from these quarters.

The next stage was to obtain results from a large sample of patients so that the individual items could be tested.

2.2. Patient selection

Fifty patients fulfilling the following criteria were provided with an information leaflet about the study and gave informed consent before enrolment. The inclusion criteria were (i) first time attendees at the outpatient department on our unit referred for the assessment of osteoporosis; (ii) age over 50 years and (iii) English as first language. The study had the approval of the local Ethics committee.

All the questionnaires were completed during a routine clinic visit, before the clinician’s assessment.

2.3. Analysis of items

The index of difficulty and index of discrimination was calculated for all the individual items.

The index of difficulty is defined as the proportion of patients answering the item correctly. It was calculated by the formula: number of correct responses/total number of responses [25]. The reason for measuring item difficulty is to choose items of suitable difficulty level which will help in assessing as accurately as possible each individual’s level of knowledge. An item with an index of difficulty more than 0.75 is deemed to be a poor discriminator.

Item discrimination refers to the degree to which an item differentiates correctly among the respondents. In this case, it is between patients who have good or poor knowledge about osteoporosis. For the determination of index of discrimination, the respondents were first categorised into three groups based on their total scores for the entire pool of 71 items. These comprised of those with scores lying in the lowest quartile, the highest quartile, and the remainder and constituted a choice distribution table. For each item, this table was then utilised to calculate the $D$-value, a parameter of item discrimination, by subtracting the proportion of respondents answering correctly in the lowest quartile from the proportion answering correctly in the highest quartile [25]. A mean $D$-value of 50% across the entire test is associated with the highest level of item discrimination.

Only questions that demonstrated satisfactory indexes of difficulty and discrimination would be included in the final osteoporosis questionnaire (OPQ).

The readability of the OPQ was assessed using the Flesch Reading Index. The Flesch Reading Index is based on the average number of syllables/word and of words/sentence. The scores range from 0 to 100, with standard writing averaging between 60 and 70; a score between 70 and 100 suggests a document is more easily understandable [26].

The reliability of the OPQ was assessed using the Kuder-Richardson formula 20. It is a test of internal consistency and results from homogenous groups are expected to reach coefficient values between 0.8 and 0.9 [25].

2.3.1. Criterion validity

Further validation of the OPQ was done by the method of contrasted groups [25]. For this purpose, the scores of first time attendees were compared with those of members of an osteoporosis awareness charity using non-parametric test for group comparison (Mann-Whitney $U$-test). It was expected that the latter would have more knowledge about osteoporosis than the former.

3. Results

Of the 71 items tested in the prototype questionnaire, 51 demonstrated unsatisfactory indexes of difficulty and/or discrimination and were excluded from the final questionnaire (OPQ). Some items on the borderline of acceptability on these measures were retained where they were believed to cover aspects fundamental to osteoporosis knowledge. None of the questions in the category of investigations reached satisfactory levels and were excluded from the OPQ.
3.1. Indexes of discrimination and difficulty

Of the 51 excluded items, 35 were discarded because the indexes of discrimination were too low (mean D-value 25%) and a further 16 had indexes deemed to be too high (mean D-value 74%). The average D-value for the final 20 questions retained in the OPQ was 54.8% (range 41.6–66.6%).

Of the 51 excluded items, 24 items had an index of difficulty more than 0.7 (mean 0.86). For the 20 questions in the OPQ, the average index of difficulty was 0.56 (range 0.2–0.7).

3.2. The final 20 item questionnaire (OPQ)

The 20 item questionnaire consisted of five items on general information, seven items on risk factors and four each on consequences and treatment. The number of patients (%) achieving a correct response in given in brackets next to each item in the questionnaire (Appendix A). The final 20 items were reviewed by the original clinicians to ensure that the items retained continue to reflect the main issues required, i.e. it maintained the appropriate content validity.

3.3. Readability

The Flesch Reading Index on the 20 items revealed a score of 74.3, reflecting a level of readability easier than standard writing.

3.4. Reliability

The reliability coefficient using the Kuder–Richardson formula 20 was found to be 0.84.

3.5. Criterion validity

There was a significant difference between the scores according to the hypothesised pattern. The average ± S.D. score in the first time attendees was 8.5 ± 5.4 compared with 13.6 ± 4.3 in the members of the osteoporosis awareness charity (P = 0.003).

4. Discussion

A self-report, 20 item multiple choice questionnaire (OPQ) to assess the patient’s knowledge about osteoporosis has been developed. Psychometric analysis has shown that it consists of items with satisfactory readability, index of difficulty and discrimination.

The OPQ is internally reliable and assesses patient’s knowledge under the areas of general information, risk factors, consequences and treatment. A patient knowledge questionnaire such as OPQ can assist clinicians and health educators in identifying those individuals who may be in need of educational interventions. The OPQ may also provide a valid and reliable method to evaluate the effectiveness of education programs both within individuals and at-risk groups.

The OPQ is primarily intended for use in general practice and clinics managing patients with osteoporosis. It has been developed in a specialist osteoporosis referral unit where attendees would be expected to have some knowledge of the condition. Therefore, it contains items with relatively high (items 2, 6, 7, 10–12) and low (items 5, 16, 20) index of difficulty that are thought to be essential patient knowledge. There is no gold standard of knowledge available and the accepted way of ensuring content validity is by reference to a pool of questions/items constructed by highly experienced clinicians specialising in the area, as was implemented in this study.

A study comparing three different methods of teaching has revealed that an individual program is the most effective [27]. Using the OPQ, we have demonstrated deficiencies in knowledge about osteoporosis in patients who are at a risk of developing it, i.e. female patients over the age of 50 years [28]. Patients’ own perspective of the adequacy of their knowledge can be misleading. It is difficult to know what you do not know. Whilst there is evidence of a significant correlation between subjective and objective assessment of knowledge (r = 0.46; P = 0.001), the former accounts for only 20% of the variance in the latter [28]. These findings further stress the need for individual assessment of patient knowledge in osteoporosis.
While knowledge gain about certain risk factors like excessive alcohol intake (Q3), excessive dieting (Q4) and lack of exercise (Q7) has the potential to improve the women’s physical health, it is also important that women have adequate knowledge about more immutable factors such as early menopause (Q2) and genetic factors (Q9). Knowledge not only helps to facilitate changes in behavior, but also eases adaptation to and coping with a chronic health problem by understanding factors for which one is not responsible. Misconceptions in these areas may be particularly problematic and therefore, are important if evaluation of the impact of education considers psychological as well as physical health.

It is perhaps of interest that even women who were members of the osteoporosis awareness charity and therefore, having special interest in the area showed considerable scope for improvement in their knowledge base.

Further areas of interest with the use of the OPQ that were not addressed in this study are the associations between a patient’s knowledge and their level of education and/or socio-economic factors. We are currently using the OPQ to study the association between patients’ knowledge and anxiety and depression. The ability of the OPQ to measure change after an educational intervention needs to be studied as well before it can be subjected to wider use in clinical practice and health services and epidemiological research.

Appendix A. Osteoporosis questionnaire

This questionnaire has been designed to assess the amount of knowledge, you have about osteoporosis. You are not expected to know the answers to all the questions. If you do not know the answer or are unsure about it, please mark ‘Do not know’. You do not need to write your name. The information obtained will be treated in the strictest confidence and used only for research. Please put a tick (✓) in the box against the one answer you think is the most correct. THERE IS ONLY ONE CORRECT ANSWER.

Number of patients (%) providing a correct response is given in brackets next to each item.

1. A woman cannot take Hormone replacement therapy (HRT) if she: (68)
   - Is above 60 years of age
   - Has breast cancer
   - Has hot flushes
   - Don’t know

2. Early menopause is a risk factor for osteoporosis because of: (72)
   - Psychological distress
   - Lack of sex hormones
   - Neither of the above
   - Don’t know

3. An excessive intake of which of the following is most likely to cause osteoporosis: (70)
   - Leafy green vegetables
   - Multivitamins
   - Alcohol
   - Does not know

4. Excessive dieting: (70)
   - Can cause osteoporosis
   - Is good for your bones
   - Has no effect on bones
   - Don’t know

5. Side effects of HRT include: (24)
   - Clots in the leg veins
   - Low back pain
   - Vaginal dryness
   - Don’t know

6. More women than men are reported to have osteoporosis because: (72)
   - They actually do get osteoporosis more than men do
   - Men are not aware of it
   - Women are more concerned about their health problems than men
   - Don’t know

7. Osteoporosis is more likely to develop in people who: (72)
   - Exercise regularly
   - Exercise occasionally
   - Do not exercise at all
   - Don’t know

8. Which of the following types of exercise will NOT strengthen bones much in osteoporosis: (38)
   - Swimming
   - Running
Walking
Do not know
9 What is the LEAST likely cause of osteoporosis: (54)
• Weather changes
• Genetic factors
• Lack of exercise
• Do not know
10 Osteoporosis and osteoarthritis are: (72)
• Different names for the same disease
• Differ only in the parts of the body that are affected
• Are different conditions with few similarities
• Do not know
11 The condition characterised by fragile or brittle bones is commonly known as: (76)
• Arthritis
• Osteoporosis
• Spondylitis
• Do not know
12 The following is NOT a common complaint in patients with osteoporosis: (76)
• Low back pain
• Loss of height
• Swelling of the feet
• Don’t know
13 A woman over 60 years is LEAST likely to develop: (24)
• Osteoporosis
• Arthritis
• Bone cancer
• Don’t know
14 All types of hormone replacement therapy (HRT): (72)
• Help prevent progress of osteoporosis
• Cause regular menstrual bleeding
• Have no effect on bones
• Don’t know
15 Our bones are strongest at the following age: (38)
• Below 20 years
• Between 20 and 50 years
• over 50 years
• Don’t know
16 Having broken your wrist: (38)
• Your chance of breaking the other wrist is lower
• You are more likely to break the other wrist.
• The chances of further fractures remains unchanged
• Don’t know
17 If your mother or father have had osteoporosis: (68)
• You are more likely to suffer from it
• It does not affect your chance of suffering from it
• You are less likely to suffer from it.
• Don’t know
18 If you have an overactive thyroid: (20)
• It does not affect the bones
• You are more likely to suffer from osteoporosis
• You are less likely to suffer from osteoporosis
• Don’t know
19 Muscle weakness: (56)
• Does not affect your chance of breaking bones
• Has no effect on the chance of falling over
• Makes you more likely to break bones
• Don’t know
20 You are more likely to fall over if you take: (42)
• Sleeping tablets, e.g. Diazepam
• Hormone replacement therapy
• Aspirin
• Don’t know

References


