Questionnaire for the identification of back pain for epidemiological purposes

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Abstract

Objectives—To design a questionnaire for the identification and assessment of severity of back pain for epidemiological purposes, and gain preliminary experience of its use.

Methods—A group of specialists, experienced in the epidemiology and clinical assessment of back pain, designed the questionnaire, and tested it individually. It was also given cross sectionally by interview to a population of male coal mine workers.

Results—The questionnaire comprised a maximum of 12 questions on the presence, radiation, frequency, and severity of back pain with reference to difficulty with specific activities, interference with normal work, and absence from work. 471 coal miners answered the questionnaire (66% of those invited). 56% (265 men) of the responders reported pain or ache in the back during the previous 12 months, and the incidence of first ever attacks during the same period was reported to be 34%. 69% reported having had back pain at some time. The responses to the questionnaire were partially validated by comparison with certified sickness absence for two days or more attributed to back pain. In men who were symptomatic in the previous 12 months, for the question relating to absence from work because of back pain, the sensitivity was 82% and specificity was 84%.

Conclusion—The questionnaire is easy to administer and generates clear cut data that could be useful for epidemiological or screening purposes. Preliminary, limited, studies of its validity are reasonably encouraging, although further validation is required. It is hoped that researchers will find the questionnaire useful, will extend its validation, and continue to develop it.

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Although many epidemiological studies of back pain have been conducted, they have been characterised by many methodological difficulties. These include different definitions of back pain, the lack of a standard questionnaire, and inadequate validation. Therefore a

need is recognised for a generally accepted standard questionnaire to assess frequency of back pain in groups of individuals and to enable comparisons of frequency with causative and other factors. As no such questionnaire was available, a working group of British specialists experienced in the epidemiology, ergonomics, and clinical assessment of back pain was convened by the Institute of Occupational Medicine (IOM). The principal aim of the working group was to standardise epidemiological studies of frequency of back pain in groups of people. A questionnaire was devised that would identify individuals with back pain, enable studies of the relation of back pain with possible causative and other factors, and provide information on duration, frequency, and severity of pain.

Methods

A working group was convened on three occasions. It comprised the following participants: Professor J Anderson, Dr P Buckle, Dr R Graveling, Professor SF Hughes, Dr M Jacobsen, Dr M H Lloyd, Dr E MacDonald, Professor R Porter, Professor A Seaton, Dr C A Soutar, and Dr J D G Troup. Some developmental work and pilot tests were undertaken by individual members of the group, and further development and the study of coalminers was carried out by the IOM.

Table 1 shows the final questionnaire with illustrated frequencies of responses from a sample population. "Back" was defined as that part between the shoulder blades and lower margin of the buttocks (figure). From an epidemiological point of view the primary questions are 1a (Have you had a pain or ache in your back during the past 12 months?) and 7 (Have you had a pain or ache in your back previously, before the last 12 months?) The use of both words "pain" and "ache" was considered desirable to ensure the initial identification of those with greater and less degrees of severity of pain (severity could be assessed by the answers to subsequent questions). The 12 months boundary between recent and previous pain was chosen arbitrarily. As recollection of the circumstances surrounding the onset of pain in the distant past was likely to be inaccurate or incomplete, studies of recent pain were considered more likely to identify relations between onset of pain and possible causative factors.

The subsidiary question 1b (When you had that pain or ache, did it go into your leg or foot?) was intended to identify lumbar nerve

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Table 1 Questionnaire, and frequencies of answers from 471 coalminers

	Question	Yes	No	Not applicable or not answered
1a	Have you had a pain or ache in your back during the past 12 months? If No go to question 7	265	206	0
1b	When you had that pain or ache did it go into your leg or foot?	89	176	206
2a	Did you have that pain or ache in your back on most days every month during the past year? If Yes go to question 3	78	187	206
2b	Have you had more than one separate attack of back pain or ache in the last 12 months? if No go to question 3	117	70	284
2c	How many separate attacks of this back pain or ache have you had during the past 12 months? 2 or 3 attacks	57		354
	4 or more	60		
2d	How long did the longest attack last for? less than week	69		354
	1 week or more	48		
3	When your back pain or ache was at its worst during the past 12 months did you have difficulty carrying out any of the following activities?			
	Walking	129	163	206
	Sitting	142	123	206
	Standing	113	152	206
	Lying	107	158	206
	Dressing yourself	113	152	206
	Stooping	212	53	206
	Climbing stairs	71	194	206
	Getting out of a chair	184	81	206
4	During the past 12 months has your back pain or ache interfered with your normal work?	82	183	206
5	Have you been absent from work because of back pain during the past 12 months?	71	194	206
6a	Have you seen your own doctor about your back pain during the past 12 months?	88	177	206
6b	Have you seen anybody else for treatment of your back pain during the past 12 months?	65	200	206
7	Have you had a pain or ache previously, before the last 12 months?	248	223	0

root irritation (sciatica) suggestive of a prolapsed intervertebral disc. The series of questions 2a-d was intended to characterise the degree of constancy or intermittency of the pain, and enable a classification of frequency of attacks and duration of the longest attacks to be made. Questions 3, 4, and 5 explored the degree to which the pain interfered with normal life, and question 6 on whether medical or other advice was sought; the answers to

the questions could be used to classify severity of the pain.

A study of the relations between specific activities at work and risk of back pain provided a need and an opportunity to seek partial validation of the questionnaire, by comparisons with recorded sickness absence data. Details of this cross sectional study of coalminers have been reported separately.¹ Briefly, the main purpose of the study was to compare frequency of back pain in men working in different transport and haulage (supplies) systems of two collieries. The collieries were both in Nottinghamshire and were similar in terms of seam heights and nature and volume of materials handled. Colliery Y used predominantly overhead monorail material haulages, although it used other types of haulage as well. Colliery Z used conventional haulage systems with extensive locomotive and rope haulages. The survey took place at the time of a strike elsewhere in the industry but the cooperation of management and unions was successfully enlisted. All the 716 men in predetermined categories associated with transport and haulage at the two collieries constituted the target population and were invited to participate by an individual letter. The questionnaires were given to all the men by the same trained interviewer who had been monitored by one of the authors during a pilot study. The interviewer also obtained a systematic and detailed occupational history.

To conduct an indirect validation of part of the questionnaire, a confidential survey of sickness absence in the two collieries was carried out. This involved reviewing the sickness

Diagram of the back (shaded area) as shown to respondents by the interviewer.

Table 2 Joint representation of answers to question 1a and 7

	Question 1a (back pain during past 12 months)		
	Yes	No	Total
Question 7 (back pain previously):			
Yes	189 (a)	59 (b)	248 (a + b)
No	76 (c)	147 (d)	223 (c + d)
Total	265 (a + c)	206 (b + d)	471 (N)

absence data of all the workers who had been invited to participate in the questionnaire survey. Absences in the year immediately before the survey (corresponding to the period specifically targeted by the survey) as well as the year before that were reviewed. The diagnoses were noted and back pain or related diagnostic statements were identified. The causes of many one day absences were incompletely documented in the sickness absence records at the collieries and therefore only absences of two days or more were noted for the purposes of the validation exercise. Relations between these data and the questionnaire responses were examined by cross tabulations and contingency table analysis. The sensitivity of a question about whether recorded sickness absence was related to back pain was calculated as the proportion of men with certified absence attributed to back pain who responded positively to the question under consideration. Specificity was calculated as the proportion of men without certified absence attributed to back pain who replied negatively to the question. The positive predictive value was calculated as the proportion of men who replied positively to the question, who did have a certified absence attributed to back pain.

Results

Four hundred and seventy one men attended, 66% of those invited. There was little evidence of an important response bias in relation to certified sickness absence, as the proportion of men with at least one recorded absence attributed to back pain during the previous 12 months was 11% (53 men) among attenders, and 9% (22 men) among non-attenders. The mean (SD) age of the attenders was 34 (9.5, range 19–54), and

mean (SD) duration of work underground was 18 (10, range 3–39) years.

Table 1 summarises how those who attended the survey answered the seven questions. This shows that 265 men (56%) reported pain or ache in the back during the previous 12 months and that 89 (34%) of them reported radiation of pain into the leg or foot, implying nerve root irritation. In 78 (29%) of those 265 with pain, it was present on most days of every month during the previous year. In 117 (44%) it consisted of more than one separate attack, and in 60 (23%) it consisted of four or more attacks. In 48 (41%) of those 117 with two or more separate attacks, the longest attack lasted one week or longer. When the pain was at its worst 258 (97%) of those who had pain had difficulty in carrying out one or more of a variety of everyday activities. The tasks with which difficulty was most commonly associated were stooping and getting out of a chair. In 82 (31%) the pain had interfered with normal work during the previous 12 months.

Cross tabulation of the responses to questions 1a and 7 (table 2) generates indices of interest in the epidemiological study of back pain. Thus $(a + b + c)/N$ is the proportion of the sample that reported that they had had back pain at any time. (The complement, d/N , is that fraction of the population that reports no back pain, ever, up to time of survey.) The period prevalence rate for the 12 months preceding the survey is $(a + c)/N$. The number of men who reported attacks during the preceding 12 months and earlier are given by a. "First ever" attacks of back pain in the 12 months before the survey are enumerated by c. Thus the incidence rate over the 12 months preceding the survey is $c/(c + d)$. Therefore for these miners, 69% reported that they had had back pain at some time. The prevalence of the condition in the 12 months immediately preceding the survey was 56%, and the incidence of first ever attacks during the same period was 34%.

This quantitative comparison in the distribution of the subgroups a, b, c, and d was applied to different combinations of responses to questions and to subgroups of the mineworkers. Thus table 3 shows that the disproportion in frequency between the groups was very unlikely to be due simply to chance ($\chi^2_3 = 28.07$, $P < 0.001$). Further analysis of

Table 3 Responses to questions 1a and 7 in four subgroups of the coalminers

			Colliery Y		Colliery Z		Total
			Underground workers	Surface workers	Underground workers	Surface workers	
Response to questions:	1a	7					
a	Yes	Yes	39	74	21	55	189
b	No	Yes	12	30	6	11	59
c	Yes	No	20	20	21	15	76
d	No	No	48	44	25	30	147
N = a + b + c + d			119	268	73	111	471
No back pain reported (%) 100 d/N			40	26	34	27	31
12 Month period prevalence rate (%) 100 (a + c)/N			50	56	58	63	56
12 Month incidence rate (%) 100c/(c + d)			29	31	46	33	34

Table 4 Relation between certified sickness absence attributed to back pain and answers to questions 5 (have you been absent from work because of back pain during the past 12 months?) and 1a (have you had a pain or ache in your back during the past 12 months?)

	Records of sickness absence related to back pain					
	Colliery Y		Colliery Z		Both collieries	
	Yes	No	Yes	No	Yes	No
Question 5:						
Yes	22	19	14	16	36	35
No	5	107	3	79	8	186
Question 1a:						
Yes	27	126	17	95	44	221
No	8	126	1	71	9	197
Total	35	252	18	166	53	418

table 3 showed that between group differences were attributable primarily to a relatively high proportion (21/73 = 29%) of underground workers at colliery Z who had their first attacks of back pain in the 12 months preceding the survey. This was reflected in a high incidence rate but unremarkable period prevalence rate for that subgroup. Possible interpretations of this finding, and of more detailed observations in the study of coalminers' back pain, have been discussed elsewhere.¹

RELIABILITY OF THE QUESTIONNAIRE

Table 4 shows responses to question 5 (Have you been absent from work because of back pain during the past 12 months?) at both collieries and in relation to the information obtained from medical records of the year concerned about actual absences from work attributed to back pain. The positive predictive value of the question was 51% overall and showed little variation between the two collieries (54% and 47%). As question 5 was asked only if there was a positive reply to question 1a, the sensitivity and specificity of this question could be assessed only with reference to data from that subgroup. On this basis, the sensitivity of the question was 82% and specificity was 84%. If it was assumed that all those who answered no to question 1a were thereby implying a negative response to question 5, then the corresponding sensitivity and specificity indices, referring now to the combination of questions 1a and 7, were altered. Specificity was increased to over 90%, but the sensitivity of the two questions to the occurrence of actual absences of at least two consecutive days related to back pain was

reduced and differed between the collieries (63% and 78%).

Table 4 also shows the relation between the information from medical records about sickness absence related to back pain during the year and the responses to question 1a. The associations between positive answers to the question and the recorded absences were highly significant at both collieries ($P < 0.005$). Although question 1a was not specific to absences from work due to back pain (53% of the miners whose records showed no such absences nevertheless reported some discomfort due to back pain during the year concerned); yet it proved to be fairly sensitive to the occurrence of such absences: 83% of those whose records showed certified absences due to back pain recalled at survey that they had experienced some pain or ache in their backs during the year.

Question 4 (during the last 12 months has your back pain or ache interfered with your normal work?) was more specific to the event of interest as an absence from work due to back pain might be interpreted as interference with normal work. If negative answers to question 1a were assumed to imply negative answers to the (unposed) question 4 then table 5 shows that the specificity of question 4 was indeed fairly high (88%). Sensitivity was relatively poor, as more than one third of the men who had been absent from work due to back pain either did not recall those events or did not interpret those absences as interference with their normal work.

Discussion

Reported prevalence of back pain varies widely both among miners^{2,3} and in other occupational groups.^{4,5} In part, this is because of the use of different questionnaires and the definitions of back pain.⁶ It was decided, in common with some other authors,^{7,8} to use a very simple definition for epidemiological purposes—that the subject admitted to pain or ache in the back: "the back" being defined pictorially. A series of meetings resulted in a sequence of simple questions that allowed definition of severity and, to some extent, type of pain. Although studies that require more clinical detail would need supplementary questions, the approach described here has the potential to standardise the basic part of the questionnaire for future epidemiological studies.

The study has attempted to validate the back pain questionnaire by comparison with sickness absence. Sickness absence records themselves may be inaccurate, and record only back pain accompanied by absence. Nevertheless they offer some independent basis, although limited, for interpreting the results of the questionnaire. Most other questionnaire based studies have not provided evidence of validity of the methods. Hendler *et al* had attempted to validate the complaint of back pain in neurosurgical patients by comparison with physical tests.⁹ Such studies are limited and evaluate self selected groups of

Table 5 Relation between certified sickness absence attributed to back pain and answers to question 4: (during the past 12 months has your back pain or ache interfered with your normal work?)

	Records of sickness absence related to back pain					
	Colliery Y		Colliery Z		Both collieries	
	Yes	No	Yes	No	Yes	No
Question 4:						
Yes	21	29	13	19	34	48
No	6	97	4	76	10	173
Subtotal	27	126	17	95	44	221
Question 1a:						
No	8	126	1	71	9	197
Total	35	252	18	166	53	418

patients, rather than the general working population. Our results suggest that positive responses to the questions referred to real, rather than perceived, events in most of those surveyed, with high specificity to episodes serious enough to justify absence from work for at least two days. The sensitivity of the question that referred explicitly to occurrences that interfered with normal work was surprisingly moderate, at only 64%. This may have been due, in part, to the fact that records of one day absences from work were not considered in the validation procedure. Other factors that may have contributed to the relatively low sensitivity of question 4 include possible misinterpretation of what was intended by the phrase "interfered with your normal work", and imperfect recall.

Forgetfulness for earlier attacks of low back pain has been noted by Biering-Sorensen and Hilden,¹⁰ and there is some evidence from the results of this study that the miners may not have remembered attacks of back pain that occurred three or more years before the survey. The incidence rate of first time attacks was 34% a year (table 2). If sustained over three consecutive years in a population with no previous back pain, this would imply that at the end of the period 71% would have experienced at least one episode; a figure close to the 69% prevalence calculated from table 2. The responses to the questionnaire by these miners indicate a high frequency of back pain which in most cases is not trivial.

Although the questionnaire was developed and applied for the purpose of determining frequency of back pain as an adverse health outcome, the sequence of questions 1b, 2, 3, and 6 may be used to explore clinical, as well as epidemiological aspects of the problem and to grade severity. In principle, there is no reason why the questions should not be supplemented by others, perhaps more specific to

aspects of the problem that may be of particular interest in any one study.

The results indicate that the questionnaire may be useful for epidemiological and screening purposes. It is hoped that other researchers will use the questionnaire and report their experiences, including translating it into other languages. Other opportunities to use it are being sought and it is hoped that the questionnaire will prove to be an acceptable and standard epidemiological tool.

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