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Psychiatric morbidity and cognitive representations of illness in chronic daily headache

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Abstract

Objectives: We studied patients with chronic daily headache (CDH) attending a headache clinic. Our hypothesis was that patients with anxiety or depression would have poorer functional status and differing cognitive representations of illness than would those without psychiatric morbidity. **Methods:** The sample consisted of 144 consecutive new patients. Patients underwent a semistructured interview and completed a prospective headache diary, the Hospital Anxiety and Depression Scale (HADS) and other health-related questionnaires. **Results:** Sixty patients (42%) were probable cases of anxiety or depression on the basis of their HADS score. These HADS-positive cases had longer, more severe headaches, were more worried about them, were more functionally impaired and believed that their illness would last longer. Principal components analysis revealed that the HADS-positive cases believed that psychological factors play a role in their headaches. **Conclusions:** Psychological morbidity is high amongst CDH patients who attend specialist clinics. In addition to identifying those with high levels of psychological distress, the HADS can be used to predict those likely to have worse headaches and poorer functional ability.

Keywords: Chronic daily headache; Benign headache; Depression; Anxiety; Illness Perceptions; Psychiatric morbidity

Introduction

Chronic daily headache (CDH) is a term used to describe primary headaches that recur daily or almost daily. Depending on the definition used, CDH occurs in between 2.2% and 4.7% of the general population and is more prevalent amongst women [1–4]. Neurologists are frequently asked to see such patients, with more than 50% of referrals to specialist headache centres fulfilling criteria for CDH [5]. A simple but commonly accepted definition of CDH is the experiencing of headaches on 15 or more days per month [6]. This definition has obvious similarities with the 'chronic tension-type headache' (CTTH) and 'CTTH with co-existing migraine' as outlined in the International Headache Society's (IHS) guidelines [7] but also includes those patients with chronic, frequent headaches who might fall outside of IHS diagnostic criteria.

In recent years, the relationship between psychopathology, functional status and headaches has begun to be explored. In all types of headache, depression and anxiety have been found to be significantly greater when the headaches are frequent, and this, in turn, is associated with diminished quality of life [8]. Enduring headache symptoms also seem to be associated with higher levels of psychiatric comorbidity [9]. Tension headache is a common somatic symptom in patients presenting with medically unexplained symptoms to medical outpatients [10]. Tension headache has also been highlighted as a syndrome with considerable overlap with other functional somatic syndromes, such as irritable bowel syndrome, chronic fatigue syndrome and fibromyalgia [11].

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CDH (or CTTH), as a diagnostic group, has been studied less than migraine is; nonetheless, there is some evidence that CDH sufferers have higher rates of psychiatric comorbidity than do other headache sufferers [12]. Verri et al. [13] used the *Structured Clinical Interview for DSM-IV Axis I Disorders* (patient edition) to assess 88 CDH patients attending a headache clinic for the first time and compared them with migraine patients. They found that 90% of CDH patients fulfilled criteria for a psychiatric diagnosis, with particularly high rates of generalised anxiety (69%) and major depressive (25%) disorders, although the prevalence of somatoform disorders was low (6%). The CDH sufferers differed in their psychiatric diagnostic profile from the migraine group, but the overall rates of psychiatric disorder did not differ. Juang et al. [14] used the Mini-International Neuropsychiatric Interview in clinic patients with CDH and found that up to 78% had a psychiatric disorder, although the rates of generalised anxiety disorder were much lower and major depressive disorder higher than in the Verri et al. study [13].

Quality of life is undoubtedly reduced in people with chronic headache, with one study demonstrating that quality of life scores were worse than for patients with chronic diseases such as arthritis and diabetes [15]. It also seems that CDH and CTTH patients score more poorly on standard quality of life measures than migraine patients do [16,17]. Additionally, people with CDH report missing work days and experiencing reduced effectiveness at work because of their condition [18]. Therefore, given the relatively high prevalence of CDH, it represents an important, albeit non-life-threatening, condition.

The purpose of our study was to evaluate the psychiatric morbidity, functional status and cognitive representations of illness (or illness perceptions) amongst patients with CDH using a cross-sectional design. We expected to reproduce the findings that CDH patients experience high levels of psychiatric morbidity and poor functional status, but also hypothesised that patients with higher levels of psychiatric morbidity would have more negative illness cognitions (e.g., that their headaches would last for longer or they would have less control over the headaches). We also speculated that those with the highest levels of psychiatric morbidity would be unlikely to make psychological attributions of causality for the headaches, due to the fact that they were presenting to a medical clinic.

Methods

The study sample was drawn from consecutive new patients attending the King's College Hospital headache clinic between November 1999 and February 2001. One hundred and sixty-four patients fulfilled the criteria for CDH [6] and were assessed for inclusion in the study. As part of a larger study [19], patients were excluded if there was a medical contraindication to MRI scan (e.g., pacemaker and pregnancy) or if the doctor (AD) felt that there was a clinical justification for neuroimaging. Three patients declined to enter the study, 13 were deemed unsuitable because of previous MRI scan, pregnancy or language difficulties, and a further 4 were not considered because of lack of clinic time. In total, 144 patients entered the study.

To prospectively measure the severity of headache, the patients were sent a headache diary 6 weeks before the consultation. The headache diary gathered information on the number of days in 1 month with headache, number of hours of headache and intensity of headache. The peak intensity of headache represented the maximum headache intensity (for that headache) using a scale from 0 to 10, with 10 representing the *most severe headache possible*. A headache index, reflecting both severity and length, could then be calculated for each patient as follows:

$$\text{Headache index} = \frac{(\text{no. of hours with headache}) \times (\text{intensity})}{\text{no. of days recorded in diary}}$$

The upper possible limit of the headache index was 240.

All patients took part in a semistructured interview to elicit details of ethnicity, social class, psychiatric and medical history. Participants were also asked to complete the following instruments:

1. *Hospital Anxiety and Depression Scale* (HADS; [20]): a self-assessment scale for detecting anxiety and depression, which was specifically developed for use in the hospital medical outpatient setting. It yields two subscale results, one reflecting anxiety and the other depression. People scoring 11 or above on either subscale of the HADS have a high probability of reaching psychiatric 'caseness' [20]. There is considerable overlap between anxiety and depressive disorders [21], and we therefore used a cut-off of 11 for either subscale (not combined) and termed those patients scoring above the cut-off as 'HADS positive' and those below the cut-off as 'HADS negative'.

2. *Health Anxiety Questionnaire* (HAQ; [22]): reflects health anxiety. It consists of 21 questions, giving four subscale results: (a) health, worry and preoccupation, (b) fear of illness and death, (c) reassurance-seeking behaviour and (d) extent to which symptoms interfere with a person's life.

3. *Revised Illness Perception Questionnaire* (IPQ-R; [23]): measures cognitive representations of illness based on the self-regulation model of Leventhal et al. [24]. It consists of five scales: timeline (perceived duration of illness), consequences (expected effects and outcome), personal control (how one controls the illness), treatment control (expected effects of treatment) and illness coherence (perceived understanding of the illness). In addition, there were 18 possible causal items, such as 'stress or worry', 'it runs in my family', 'a germ or virus', 'diet or eating habits', 'chance or bad luck' and 'poor medical care in the past', presented on five-point Likert scales ranging from *strongly agree* to *strongly disagree*. The IPQ-R has been applied across many patient groups with chronic illness [23].

4. *Medical Outcome Study Short Form 36* (SF-36; [25]): measures eight multi-item variables: physical functioning (10 items), social functioning (2 items), role limitation due to physical problems (4 items), role limitation due to emotional problems (3 items), mental health (5 items), energy and vitality (4 items), pain (2 items) and general perception of health (5 items). For each variable, the final figure is expressed from 0 (*worst*) to 100 (*best*).

5. *Visual Analogue Scales* (VAS) of worry about headache and general health: used to assess the degree of worry about headache and general health. The patients were asked to mark on a visual analogue scale of 0–100 their response to the following questions: "How worried are you about your headaches" and "Do you think there is something seriously wrong with your health". A score of 100 represented "I'm 100% worried" or "I'm completely sure that something is seriously wrong".

6. *Symptom Checklist:* a tick list of 40 common somatic symptoms (e.g., painful eyes, dizziness and joint pains).

We assigned the patients to the status of either HADS positive or negative, thereby dividing them into two groups: those who were highly likely to be psychiatric cases and those who were less likely to be cases. This then allowed us to explore whether HADS-positive status had any associations with other psychological and functional variables.

Statistical analysis

All data were analysed using STATA Version 6 [26]. Initial descriptive analysis examined demographic details, which was then compared between those that were HADS positive and negative, using either *t* test (for continuous data) or chi-squared test (for categorical data). The headache diary data, somatic Symptom Checklist, HAQ, SF-36 and IPQ were analysed with respect to HADS status using *t* test. A one-way between-groups analysis of covariance (ANCOVA) was then used to control for headache severity in the relationship between HADS status and the HAQ, SF-36 and IPQ subscales.

A principal components analysis was undertaken for the 18 causal items for all patients who had completed the IPQ-R. Varimax rotation was used. A screeplot was used for factor selection (all factors had an Eigenvalue of greater than 1.2). All items loaded for >.55 onto one factor and less than .40 on any other factor. A weighted factor score was then calculated for each of the four principal factors, and the mean factor score was compared between the HADS-positive and HADS-negative groups using *t* test.

Results

Demographics

Of the 144 patients, 111 (77%) were female and 33 (23%) were male, a ratio of 3.4:1. Eighty-four patients (58%) were married or cohabiting, whilst 57 (40%) were single, a further 3 (2%) were divorced or separated. Ninety patients (62%) were employed at the time of initial consultation. The mean age of the sample was 38.3 years (S.D. = ±12.3).

Ninety-seven patients (67%) were white (white-British/Irish/European), 27 (19%) were of black ethnic origin (black–British/African/Caribbean), 7 (5%) were of Asian origin (Asian-British/Indian/Pakistani/African) and 13 (9%) were classified as other (including mixed origin and Cypriot).

Instruments

Health Anxiety and Depression Scale (HADS)

The mean total HADS score was 15.4 (S.D. = 7.7; $n = 144$). The mean subscale score for depression was 6.2 (S.D. = 4.3) and for anxiety was 9.2 (S.D. = 4.4). Using an a priori cut-off of 11 on either HADS depression or anxiety subscales, 60 patients (42%) were HADS positive (probable cases of anxiety and depression) and 84 (58%) were HADS negative. More patients scored 11 or greater on the anxiety subscale than on the depression subscale (36% vs. 15%), with 11% scoring 11 or greater on both subscales. There was no significant difference in age ($P = .32$), gender ($P = .34$), marital status ($P = .17$), social status ($P = .66$) or ethnic grouping ($P = .61$) between the HADS-positive and HADS-negative groups. However, employment status did differ significantly between the groups, with a higher proportion of unemployed patients being HADS positive than were employed patients [56% vs. 33%; $\chi^2 = 6.86$ (1 *df*); $P = .01$].

The HADS status of the patients (i.e., whether they were HADS negative or positive) was then used to explore other variables, including headache severity, symptom checklist, cognitive representations of illness, health anxiety and functional status.

HADS status and headache severity

The HADS-positive patients scored more highly than the HADS-negative patients did on all measures of headache severity, reporting longer and more intense headaches (see Table 1). The relationship between the total HADS score and the headache index was explored using Pearson

Table 1
Comparison of headache diary data ($n = 129$) and Symptom Checklist ($n = 132$) in those that were HADS positive and negative (*t* test)

	HADS + ve ($n = 52$) Mean (S.D.)	HADS − ve ($n = 77$) Mean (S.D.)	*P* value
Headache index	50.7 (56.8)	24.8 (25.4)	<.01
Mean headache duration (h)	7.1 (6.1)	4.5 (4.4)	<.01
Peak intensity	7.4 (2.0)	6.6 (2.1)	.03
	HADS+ve ($n = 56$) Mean (S.D.)	HADS − ve ($n = 76$) Mean (S.D.)	
Symptom Checklist	15.6 symptoms (5.5)	10.0 symptoms (5.4)	<.01

Table 2
Results of SF-36 ($n=132$) by HADS group—corrected for headache severity using ANCOVA

SF-36 subscale	HADS-negative group Mean (S.D.)	HADS-positive group Mean (S.D.)	F	P value
Role limitation due to emotional problems	$n=50$ 72.3 (43.5)	$n=73$ 46.1 (38.0)	10.48	<.01
Mental health	$n=52$ 68.4 (16.0)	$n=77$ 52.0 (15.5)	28.64	<.01
Energy and vitality	$n=55$ 45.0 (18.9)	$n=77$ 35.3 (19.9)	7.52	<.01
Social functioning	$n=53$ 63.3 (26.1)	$n=77$ 52.7 (28.1)	4.44	.04
Physical function	$n=46$ 77.8 (24.3)	$n=72$ 66.6 (29.7)	4.36	.04
General health perception	$n=53$ 55.6 (20.3)	$n=77$ 47.5 (22.0)	3.77	.06
Role limitation due to physical problems	$n=47$ 48.1 (42.1)	$n=78$ 34.6 (42.0)	2.57	.11
Pain	$n=55$ 43.0 (24.6)	$n=74$ 40.4 (25.4)	0.30	.59

correlation coefficient, demonstrating a positive correlation ($r=.44$; $P<.001$). The HADS-positive group also reported significantly more somatic symptoms from the 40-item Symptom Checklist (see Table 1).

The HADS-positive group scored higher in answer to the VAS question "How worried are you about your headaches" [mean = 72% (S.D. = 28) vs. 61% (S.D. = 30); $P=.02$] and to the question "How worried are you about your health" [mean = 50% (S.D. = 33) vs. 38% (S.D. = 31); $P=.02$].

HADS status and HAQ

One hundred and twenty-seven patients completed the HAQ. A difference in health-related anxiety was reflected in the HAQ results, whereby HADS-positive patients ($n=53$) scored significantly higher than the HADS-negative patients ($n=73$) did on the following subscales: 'life interference' [mean = 5.1 (S.D. = 2.4) vs. 3.3 (S.D. = 2.1); $P<.001$], 'health, worry and preoccupation' [mean = 7.8 (S.D. = 5.4) vs. 4.8 (S.D. = 3.7); $P<.001$] and 'fear of illness and death' [mean = 5.8 (S.D. = 4.7) vs. 3.6 (S.D. = 3.6); $P<.005$]. The exception to this was the 'reassurance-seeking subscale' of the HAQ, which did not differ between the two groups [mean = 1.8 (S.D. = 1.6) vs. 1.4 (S.D. = 1.4); $P=.2$]. After adjusting for the headache index, these same subscales remained significantly different between the HADS-positive and HADS-negative groups. This demonstrates that those with higher levels of psychiatric morbidity also experience higher levels of health-specific anxiety.

HADS status and SF-36

One hundred and thirty-eight patients completed the SF-36. All, except one, subscales of the SF-36 were significantly lower in those that were HADS positive, implying a lower level of functioning in those domains. Physical functioning domains were affected, as well as the social and physical functioning domains. The pain subscale was lower in those that were HADS positive, although this did not reach significance ($P=.08$). However, after adjusting for headache index, two further subscales of the SF-36 (the role limitation due to physical functioning and general health perception subscales) were no longer significantly different between the HADS groups. See Table 2 for the results after controlling for headache severity.

HADS status and IPQ-R

One hundred and twenty-six patients completed the IPQ-R. The 'timeline' subscale of the IPQ-R differed significantly between the HADS-positive and HADS-negative groups [mean = 21.0 ($n=51$; S.D. = 4.3) vs. 18.1 ($n=68$; S.D. = 4.8); $P=.001$], as did the 'consequences' subscale [mean 20.6 ($n=50$; S.D. = 4.3) vs. 18.1 ($n=66$; S.D. = 4.5); $P<.005$]; that is, the HADS-positive group believed that their illness would last longer and have more severe personal consequences. The remaining three subscales of the IPQ-R ('personal control', 'treatment control' and 'illness coherence' subscales) did not significantly differ between the HADS-positive and HADS-negative groups. These results were unchanged after controlling for headache severity.

IPQ-R causal items

A principal components analysis was undertaken for the 18 causal items for all patients who had completed the IPQ-R, to elicit underlying attributional structure. Varimax rotation produced four factors that accounted for 53% of

Table 3
Results of the principal components analysis of the IPQ-R causal attributions (STATA)

	Factor 1	Factor 2	Factor 3	Factor 4
Psychological attributions ($\alpha=.83$)				
Stress/worry	.77	−.09	−.00	−.30
Family problems/worries	.81	.11	.00	−.09
Overwork	.83	−.03	.07	−.03
My emotional state	.73	.07	.24	−.28
External attributions ($\alpha=.59$)				
A germ or virus	−.11	.65	−.02	−.07
Chance or bad luck	.18	.62	−.08	.16
Poor medical care	.27	.60	−.25	−.16
Accident or injury	.04	.57	.37	−.05
Altered immunity	−.17	.64	.18	−.22
Risk factor attributions ($\alpha=.72$)				
Alcohol	.11	.09	.64	−.21
Smoking	.19	.02	.78	−.06
Behavioural attributions ($\alpha=.64$)				
Diet or eating habits	.08	−.05	.01	−.77
My own behaviour	.33	.13	.04	−.72
My personality	.36	.15	.15	−.58

Table 4
Factor scores and HADS status

Principal factor	HADS + ve Mean (S.D.)	HADS − ve Mean (S.D.)	*t* Test	*P* value
Psychological attributions	0.26 (1.00)	−0.18 (0.97)	2.06	.04
External attributions	0.23 (1.01)	−0.16 (0.97)	1.80	.08
Risk factor attributions	0.21 (1.14)	−0.14 (0.87)	1.64	.11
Behavioural attributions	−0.00 (1.12)	0.00 (0.92)	−0.02	.99

the variance. Factor 1 accounted for 26% of the variance and was labelled as 'psychological attributions'. It included four out of a possible seven psychological items, which were 'stress or worry', 'family problems or worries', 'overwork' and 'my emotional state'. The three remaining items were 'my own behaviour', 'my personality' and 'my mental attitude'. Factor 2 accounted for 12% of the variance, and we termed this 'external attributions'. Factor 3 accounted for 8% of the variance, and we termed this 'risk factor attributions'. Factor 4 accounted for 6% of the variance, and we termed this 'behavioural attributions'. Four items from the questionnaire did not load onto any factor and were dropped from the analysis. The factor loadings for individual items and their factors are shown in Table 3.

In an exploratory analysis, adjusted factor scores were calculated for each of the four principal factors ('psychological', 'external', 'risk factor' and 'behavioural' attributions). To assess whether psychiatric morbidity was associated with these factors, the mean value for each factor score was compared between the HADS-positive and HADS-negative groups. Patients who were HADS positive were significantly more likely to attribute their headaches to psychological causes than did those patients who were HADS negative. The two groups did not differ significantly for the remaining three attributions, although the 'external attributions' factor approached significance (i.e., the trend was for the HADS-positive group to be more likely to endorse these items; see Table 4).

Discussion

There is a high level of psychiatric morbidity in patients with CDH attending headache clinics; 42% of patients in this study were identified as likely cases of psychiatric disorder. Psychiatric morbidity (HADS-positive status) had important associations with other aspects of the patients' presentation. First, HADS-positive patients reported considerably worse headaches and acknowledged a higher number of other somatic symptoms. This confirms previous findings that headache patients with higher levels of psychiatric distress have worse physical symptom ratings [8]. This also confirms the well-established finding that individuals who score highly on measures of depression and anxiety report more somatic symptoms [28]. Second, the HADS-positive patients exhibited higher levels of health-specific anxiety and were functioning at a poorer level. Finally, analysis of the IPQ-R revealed differing cognitive illness representations and patterns of causal attribution in the HADS-positive group. However, the cross-sectional design of this study makes it difficult to determine the direction of causality for these assessments.

The factor analysis of the 18 causal items from the IPQ-R revealed four factors. Moss-Morris et al. [23] performed a similar factor analysis of causal items from 711 patients with chronic physical illness, which also revealed four factors. The first factor in this study ('psychological attributions') accounted for 26% of the variance; this compared with a very similar first factor in the Moss-Morris study [23], which accounted for 33% of the variance. However, the subsequent factors ('external', 'risk factor' and 'behavioural attributions') did not compare directly with theirs; this may be because the CDH sample was less heterogeneous than were the patients with chronic disease (i.e., a true difference in causal attribution in the different patient populations) or because the CDH sample was smaller.

We had speculated that HADS-positive patients would be less likely to attribute their headaches to psychological factors, but this was not confirmed by this study. The HADS-positive group was actually more likely to cite psychological factors as causal in their illness than the HADS-negative group was; this was despite the HADS-positive group having more somatic symptoms. This suggests that the HADS-positive group acknowledges the presence of psychiatric symptoms and is able to link these to their headaches. The 'external attributions' factor consisted of items that are generally perceived to be beyond the control of the individual, such as 'accident or injury' or 'poor medical care in my past'. The HADS-positive group was also more likely to endorse these attributions, although this did not reach significance. Overall, CDH patients appear to accept that psychological stressors play a role in their headaches, which may be useful when planning treatment for these patients, in general, and the HADS-positive subset, in particular. We would hypothesise that HADS-positive CDH patients would accept and benefit from treatment that included anxiety management techniques, problem solving or other cognitive–behavioural strategies in their treatment.

Our hypothesis that patients with higher psychiatric morbidity would have more negative illness cognitions was partly confirmed. The 'timeline' and 'consequences' subscales of the IPQ-R differed significantly between the HADS-positive and HADS-negative groups; that is, the HADS-positive group felt that their illness would last longer and have more severe personal consequences. The HADS-positive group reported worse headaches of longer duration, which may have influenced their expectations for the future;

however, the 'timeline' and 'consequences' subscale results remained positive after controlling for headache severity. This might have an important influence on treatment and rehabilitation, as patients' cognitive representations have been shown to have subsequent effects on behaviour. For example, in one study of myocardial infarction patients, higher IPQ 'timeline' and 'consequences' scores predicted a later return to work [29].

The HADS-positive patients scored more highly on the VAS of worry about headaches and health, indicating that health anxiety was elevated in addition to general anxiety. This was borne out by the fact that three out of the four subscales of the HAQ were significantly more likely to be positive amongst those that were HADS positive, even after controlling for headache severity. The HAQ is based on the cognitive model for health anxiety and specifically measures health (as opposed to general) anxiety [22]. Our data imply that health-specific and general anxiety appeared raised in the same subset of patients.

After controlling for headache severity, five out of eight subscales of the SF-36 were significantly negatively associated in those that were HADS positive. As there is considerable correlation between several SF-36 subscales and the HADS score [30], this is not surprising, as both measure aspects of mental health. Nonetheless, the HADS-positive group was more functionally impaired, overall, including on the physical function subscale, even after controlling for headache severity. The HADS result may therefore be used as a guide to poor functioning. The poor functional status of the HADS-positive group might offer one explanation as to why they were less likely to be employed.

The main limitation of this study is the absence of a diagnostic interview for detecting psychiatric disorders. However, the HADS has been shown to achieve excellent case-finding ability amongst patients with coexisting physical disorders [27]. We used a HADS cut off of 11 (on either the anxiety or depression subscale), which gives a high specificity for caseness [20], although the associated lower sensitivity means that some cases of anxiety or depression may have been included in the HADS-negative sample. This would not affect the direction of the results, although it could reduce the significance of the findings.

In summary, we found high levels of psychiatric distress amongst CDH patients attending a specialist headache clinic. By stratifying the sample by HADS score (using a cut-off of 11), we were able to look at the effect of high levels of anxiety and depression on other physical and psychological parameters. HADS-positive patients reported worse headaches and more somatic symptoms, had higher levels of health-specific anxiety and had poorer physical, emotional and social functioning. HADS-positive patients were also more likely to attribute their headaches to psychological factors and had a greater expectation that their headaches would last a long time and have severe consequences; these illness cognitions could be addressed to help patients with their symptoms. Future research should focus on optimal management strategies or patients with CDH, which are likely to differ for patients with different levels of psychiatric morbidity.

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