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Grading of headache intensity. A proposal

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Abstract Current severity (intensity) grading in headache is based upon a 4-grade category scale that includes the zero grade. For ordinary scientific and practical work, a low-sensitivity scale may suffice. However, in given instances, such grading may be insufficient; one might for instance need to know more exactly where the healthy state ends and where headache starts. This may in particular concern epidemiological studies and mass screening. The placement of the “divisory bar” will naturally have a clear impact on the prevalence of headaches, especially the mild ones such as tension-type headache. A 7-step scale is proposed with “excruciating headache” at the top (e.g. cluster headache and chronic paroxysmal hemicrania). Below the mild category of the IHS scale, two categories have been proposed: I, minimal unpleasantness, *without* any reduction of thriving and without

procrastination; and II, discomfort/heaviness *with* reduction of thriving and procrastination. The bar for discriminating between the healthy state and a headache disorder with an impact upon social life should probably be put between categories I and II on the scale. In situations where increased sensitivity of intensity grading is desirable, such a scale may be useful. This scale has been extensively used during the Vågå study of headache epidemiology, where it has been easy to apply. Consistency tests showed acceptable reproducibility values.

Key words Headache • Headache intensity • Visual analog scales • Likert-type scales

Introduction

In principle, rating scales for headache can be divided into linear scales, e.g. visual analogue scales (VAS), and category scales, e.g. Likert-type scales [1]. They can both be administered in two ways, either as an interviewer-administered or as a self-rating scale. In a category scale, the number of response categories can be chosen arbitrarily, in keeping with the operational definition of the item or situation to be measured.

It is probably appropriate to use *intensity* when assessing the pain level per se; *severity* would be more appropriate when assessing the entire situation of the patient (e.g. including malaise, photophobia, phonophobia, vomiting). Current severity and intensity grading in headache, as suggested by the International Headache Society (IHS), is based upon a 4-grade category scale that includes the zero grade. In given instances, such grading may be insufficient.

In the present communication, a 7-step scale is proposed. In this scale, “excruciating headache” is at the top (VI). Below the “mild” category of the IHS scale, two cate-

gories are proposed: I, “minimal unpleasantness”, and II, “discomfort/heaviness”, without and with “procrastination”, respectively. Realizing that more than just cosmetic changes are proposed vs. existing headache scales, it is opportune to scrutinize some of the background for the proposal. In the present context, intensity will be dealt with *across* headache diagnoses. The grading of specific disorders will be dealt with in appropriate contexts.

Linear scales: some pros and cons

Linear scales are based on an unsophisticated concept: two fixed end-points and a line between them. The line may be un-interrupted or divided into a varying number of subsections. In recent years, VAS have been widely employed for the assessment of pain intensity level [2–4]. The simplicity of VAS construction and the easiness with which it can be implemented give an easy access to data with an appearance of trustworthiness. The lower end-point in such scales may seem methodologically rather unproblematic (but not quite, *vide infra*); the upper end-point, however, is rather far from being unproblematic. The latter point has been defined as “the worst imaginable” or “unbearable” pain or in other, similar terms [5]. Not everybody knows, instinctively or by experience, what exactly worst imaginable head pains are like. The example of anchoring the upper end of the 10-cm scale on the VAS to, for example, the pain experienced when “slamming your fingers in a car door”, is far from being an ideal one for the following reasons: not everyone has had that experience; the incident may have happened so long ago that the memory of it is deficient; and the trauma in all probability has been of varying impact and intensity in various individuals.

Individual pain level rating will probably largely depend upon previous experience. Patients who know what an excruciatingly severe headache is like will probably tend to rate the intensity of another, coexisting or future headache differently from those who have only experienced mild or moderate headaches. Patients who once claimed to have the worst imaginable head pain, have later developed a most intense pain (i.e. stage VI); they *then* arrived at the conclusion that their previous pain had been only mediocre. It may also be difficult to separate intensity of pain from *continuity* of pain: a mediocre pain may seem formidable when persistent.

For the foregoing reasons, VAS are frequently inapt for interindividual comparisons [5] in, for example, headache research, where one may need to ascertain the *absolute* pain level. It may be more suitable for intra-individual comparisons, e.g. when following the effect of anaesthetic blockades in search of cervicogenic headache (CEH) cases [3], or

when trying to provoke headache in the solitary patient [4]. In such situations, one searches for relative and not absolute levels. However, even unsophisticated, intra-individual comparisons may pose problems if the interval between studies is extensive.

A comparison of the VAS and category scales, as outcome measures in drug treatment of migraine attacks, showed a high correlation between the two, as regards median values [6]. This study, and other similar ones, do not however have a bearing on the problems raised in the present article, e.g. inadequacy of VAS regarding absolute values and probably mainly when the upper and lower extremes are concerned.

Category scales in headache practice and research

In the present context, we shall concern ourselves with category scales only, since such scales – probably – are best suited in interindividual comparisons in headache work and for discriminating between the healthy state and headache.

The prototype of present-day headache intensity rating scales is the Likert scale [1]. In its classic form, it contains five stages. It can be adapted to the situation in headache with the following stages, e.g. zero, mild, moderate, severe, and extreme. If the various steps in category scales only are given a designation: e.g. severe and extreme, as in this example, without any further, distinguishing descriptors, the scale will be insufficient. A scale with “identified” categories has, at the outset, certain advantages. These categories can then, later on, be symbolized by figures, e.g. from 0–4 or 0–5; but they are still categorical scores. In principle, such a scale could include fewer, or more, separate steps. If the number of categories is reduced, the scale may not be discriminative enough. If the number of categories is unduly increased, the discrimination between the solitary categories may be at stake.

The IHS grading of headache intensity [7] contains 4 steps, including the “zero” step: mild, moderate, and severe (Table 1). In this system, severity is characterized by one descriptor: activity. The single steps are, probably, defined as follows: *severe*, prohibits daily activities; *moderate*, inhibits daily activities but does not prohibit activities; and *mild or moderate*, may inhibit activities. Since moderate already has been described as “inhibiting daily activities”, the auxiliary verb *may* probably is assigned to the mild category [7].

Presently used, oligo-step category scales are made with the same last. They have the tremendous advantage that they are easy to grasp – at least at face value – and easy to implement. The limited number of separate steps lessens the chances of error. However, while VAS contain too many

Table 1 Headache intensity scales having from 4 to 8 different categories

IHS system (4 categories)	Additional categories			Category
	Excruciatingly intense headache ^a (5 categories)	Discomfort/heaviness and minimal unpleasantness (7 categories)	Prostration (8 categories)	
–	Excruciating	Excruciating	Excruciating	VI
Severe	Severe	Severe	Severe with prostration ^d	VA
	–	–	Severe without prostration	VB
Moderate	Moderate	Moderate	Moderate	IV
Mild	Mild	Mild	Mild	III
–	–	Discomfort/heaviness ^b	Discomfort/heaviness	II
–	–	Minimal unpleasantness ^c	Minimal unpleasantness	I
Zero	Zero	Zero	Zero	0

^aAs in cluster headache and chronic paroxysmal headache

^bPictured as the first step of ailment, i.e. social behaviour may be influenced and procrastination is present

^cPurely subjective experience: no influence on social behaviour and “no headache”

^d*Absolute* (passive) bedrest, vomiting, and “excluding the outer world”. The sub-division of category V into two categories with (A) and without (B) prostration is tentative and is not included in the final proposal (Table 4)

The heavy horizontal line is drawn between discomfort/heaviness and minimal unpleasantness. It represents the dividing line between the healthy state and an ailment influencing social life

steps, this category scale possibly contains too few, under given circumstances.

A questionnaire with more separate steps for head pain, developed by Waters and O’Connor [8, 9], contains a total of 7 steps (+ the zero). The responses can be along two different lines of characterization. The one line was based on intensity, ranging from 1, very mild and 2, mild to 7, almost unbearable. This scale in principle should be more sensitive than the previously mentioned ones and seems to represent a step in the right direction. However, the various stages were still described in vague terms. A tie to semi-absolute or absolute criteria for pain level seems to be lacking. This scale, however, also contained another set of 7 characterizations, referring to the degree of interference with daily activities, which range from 1, “I hardly notice my headaches” to 7, “I am fit for absolutely nothing when I have a headache”. This version contained other instructions, such as 4, “Sometimes I am unable to continue my normal activities because of my headaches”, and 5, “My headaches sometimes interfere a lot with what I am doing”. The wording is admittedly different in 4 and 5, but the nuance between them may be incomprehensible or imperceptible to both patient and investigator. Any ambiguity will influence the discriminatory power of such a scale negatively. The Waters scale also contains a diagnostic scale; this field is taken care of by the IHS scale nowadays [7]. One suspects that although the intentions have been the best ones, the scale may have been too intricate for daily use. There has probably been only limited use of Waters’ scale [8, 9] in recent years.

Shortcomings of existing category scales: requirements for a headache intensity scale

Lack of refinement and sensitivity of the oligo-step scales may have obvious, counterproductive effects in given situations. If one wants to have a nuanced picture of a headache or to monitor it through various phases of an attack, one might need a scale consisting of more than just a few steps. Each step should be defined in accordance with objective, traceable features and not only based on subjective estimation by patient and observer.

From a phenomenological point of view, the attacks of cluster headache are in a class of their own. This should be marked by a separate rubric in the upper part of a scaling system. Also in the lower part of the scale, there seem to be inadequacies. A personal experience may serve to underline this problem in existing scales. There may seem to be a lack of extra steps between the mild (“may inhibit activities”) and zero categories. One might want to mitigate the complaints of tension-type headache (TTH) patients by means of a special therapy, including even cases within the mild category [7]. After treatment, a patient claims to be improved, but has some residual discomfort. The dilemma is that in the IHS scale there is only one category to indicate improvement, namely zero. Since there is a remnant of the discomfort, however, zero preferably should not be used. Lack of sensitivity of the present scaling system impedes the recognition of this, admitted-

ly minor, change. Improved sensitivity of the lower part of the scaling system should then probably be a task of some priority.

Along the same line, during the Vågå study of headache epidemiology [10], the following situation was not infrequently encountered: the parishioners simply refused to be defined as headache sufferers, in spite of having some unpleasantness. A compelling task was, therefore, where to establish the *border* between normality and unpleasantness or discomfort. Existing scales gave no firm directions in this matter. Any imprecision or misplacement as regards this border may lead to appreciable misjudgement as to categorization and, consequently, as to the total number of individual headache sufferers. The desirability of guidelines in this respect has, therefore, been growing.

In the present context, the maximal intensity of attacks has generally been taken into account. Heed has also been paid to what was usual; little or no heed has been paid to the most lenient attacks of each sufferer. The maximal intensity is probably the most determinative factor for headache diagnosis. As an example, in cluster headache, the excruciatingly intense headache attacks decisively and correctly knit it to the topmost category, not the moderately intense attacks that the same patient may experience at other times [11].

Factors that can be used as determinants for pain level

If a variety of elements and characteristics of the attack are taken into account (multiaxial approach), it should be possible in a meaningful, rational, and even reproducible way to discriminate between more than 3 intensity stages. Such elements are summarized here, and the factors are listed in Table 2.

1. Behaviour modifications; work/social situation.
2. Accompanying phenomena, such as vomiting (these phenomena have an “independent role” in the IHS system [7]; vomiting could even be semi-quantified [12]).
3. Analgesics use.
4. The affected individual’s own estimation of intensity.

The presently proposed headache intensity scale is based on the same reasoning as the German saying: “Den Baum kennt man an seinen Früchten” (“one recognises the tree by its fruits”). Based on the influence of headache mainly upon behaviour, one may, in a semi-objective way, make deductions as to intensity (e.g. \pm bed, \pm work; element 1). Because of the single individual’s relative inability to put own suffering into the right perspective, element 4 should probably not be given full credit as far as the higher stages of headache are concerned. However, the

Table 2 Factors of possible importance for the intensity assessment. The factors of putative value, as aids in intensity grading, have been arranged in a surmised sequence of importance. Although the sequence of factors is debatable, it seems likely that the 5–6 upper ones carry more weight (indicate a higher intensity) than the lower ones. Probably, a *grading* of photo-/phonophobia and vomiting (10) may be of value in intensity assessment (not included because of lack of existing specifications).

Immense restlessness
Bed-rest
with prostration
without prostration
Nocturnal awakening, due to headache
Working ability, various degrees of reduction
Vomiting
Analgesics use
Thriving/well-being reduction
“Irritability”
Tempo reduction
Efficacy reduction
Social isolation, self-inflicted
Procrastination

patient’s narration may be of particular value for the lower grades of headache/discomfort. Elements 1–3 may be the important ones, and in particular element 1, which has a bearing on more than half of the single factors in Table 2.

Does the affected individual feel like a patient? Does the headache bother him? Or, can it be neglected, repressed or forgotten during work, conversation, watching television, etc. Must even easy work be postponed: procrastination?

Other factors, such as vomiting, element 2, are associated with the climax of some headaches, like migraine. Vomiting is *not* a regular part of the worst headaches, such as cluster headache (CH) and chronic paroxymal hemicrania (CPH). The extent of analgesics use (element 3) and the effect thereof are of importance for the assessment of pain intensity. However, the individual threshold for using analgesics varies largely.

Proposal for a scale of headache intensity. Which shortcomings should be abated?

Pain intensity in cluster headache: excruciating pain (category VI)

As demonstrated by Russell, there is a considerable variation as regards pain level, even in headaches like CH [11] and CPH [13], not only inter-, but also intra-individually. There may even be cases of sustained, “mild” CH,

Table 3 Proposed additional categories for a headache intensity scale

Category	Characterization
VI Excruciating	Impossibility to stay in bed or at rest, because of the intensity of the pain: frenetic, partly bizarre behaviour. Occasionally, on the border of self-mutilation, or even exceeding it.
V Severe	
A With prostration	Patient in the horizontal position in a dark and soundless room, with throbbing headache and (profuse) vomiting. “Shutting out the external world”, declining any nutrition; absolute quietude, all in an attempt to avert an exacerbation.
B Without prostration	Patient bedridden, whole time or part time, but lacking the special circumstances mentioned for category VA.
II Heaviness/discomfort	Presence of (a) procrastination, (b) reduction of thriving, and (c) isolation tendency, in spite of more or less complete ability to work in regular work. At least one of the traits (a)-(c) should be present, to satisfy the criteria for category II.
I Minimal unpleasantness	If the individual concentrates on the issue “is there (still) something wrong with my head?”, he may notice a tiny change, but not if the mind is otherwise occupied with reading, watching television, etc. Social functions are uninfluenced, inclusive of regular work. There is no procrastination.

consistent with performing regular work [14]. Thus, even in these 2 disorders, generally linked with the designation “excruciating headache”, the severity may be distributed through the categories from “mild” to “excruciating”. These facts should, however, not divert the attention from the mainstream of CH: the typical, utterly intense pain. While bed-rest may represent the uppermost stage for most headache categories, it is no part of the picture for the worst attacks in the vast majority of CH patients. The tremendous pain at the maximum makes it impossible to stay put in bed. The patient becomes immensely restless, almost frenetic (Table 2), the behaviour at times even includes some type of self-mutilation or destruction (“suicide headache” [15]). This type of pain exceeds the regular “severe” group level. It represents another dimension on the pain scale than the “bed-stage” of the migraine attack (see also Russell [16]). This category should be added on the top of the scale: category VI (Tables 1, 3).

Prostration (category VA)

Under category V (“severe”), subgroups with and without prostration could be added (Tables 1, 3). In the prostration group, the patient is bedridden with profuse vomiting and remains more or less incommunicative and totally immobile, “shutting out/omitting the outer world”, almost a “noli me tangere” situation. The adoption of the absolute stillness also serves the purpose of trying to avoid exacerbation, characterized by more throbbing and vomiting. This sub-

grouping is tentative and it is, accordingly, not included in the final proposal in Table 4. Prostration as a feature of severe migraine attacks has been emphasized by many researchers in the field [17–19]. Although the rationale for it already seems rather clear, the practicability of including this subgroup should be tested.

Border between normal and a state of suffering (category I)

When applying the current, oligo-stage severity scales in the Vågå study of headache epidemiology [10], it was not easy to determine the border between minimal headache and relative well-being. Many parishioners with occasional complaints clearly above zero simply refused to be labelled as headache patients. Their situation ought to be defined in a meaningful way. One had to search for a cut-off point on the continuum from headache freedom to definite headache.

The influence of head discomfort upon social behaviour may be decisive in this connection. There is a situation/state that will be noticeable only when the mind mainly is concentrated upon it. If the mind gets minimally involved in other matters, the slightly unnatural situation will not be noticed. This condition will have no social or occupational consequences as regards regular work (Tables 3, 4). The individual copes entirely with this minimal unpleasantness, and there is no procrastination. This state of minimal unpleasantness seems to be the first step above zero. Category I may characterize the third (and last) day of a migraine attack.

Table 4 Proposed 7-category headache intensity scale. The IHS categories severe (V), moderate (IV) and mild (III) have been kept (see also Table 1). The only change proposed for those categories is that “severe has” tentatively been replaced by categories with and without prostration (see Tables 1, 3). The *heavy, horizontal line* represents the border between “health” and “a transitory ailment involving the head” by the present definition. +, present; -, absent; +(-), sometimes present

Category		Restlessness, extreme	Bed rest ^d	Analgesics use	Inability to work	Reduction in ability to work	Ability to work, but Procrastination ^b		Reduced thriving ^c	Isolation tendency ^d
							Reduced tempo	Reduced efficacy		
VI	Excruciatingly severe	+	-	+ ^e	+	-	-	-	-	-
V	Severe ^f	-	+	+	+	-	-	-	-	-
IV	Moderate	-	+(-)	+	-	+ ^g	+	+	-	-
III	Mild	-	-	+(-)	-	+(-) ^h	+	+	+	+
II	Heaviness/discomfort ⁱ	-	-	-	-	-	-	+	+(-)	+(-)
I	Minimal unpleasantness ^j	-	-	-	-	-	-	-	-	-
0	No pain	-	-	-	-	-	-	-	-	-

^a Even short bed rest suffices, if it is due to headache (and not lassitude or tiredness). It also applies to another situation: would have gone to bed, had there been an opportunity

^b Work that ought to have been carried out (spare time work) is not being carried out due to the discomfort, i.e. work that would need a little extra physical exertion or mental concentration. No influence on regular work

^c Well-being/thriving not optimal; irritability

^d Reduced interest/ability to enjoy TV-watching and social, familial activities, leading to transitory “withdrawal”

^e Can naturally also include “specific” medication

^f This grade could be divided into two subgroups: (5A) with prostration (“excluding the external world”) and (5B) without prostration

^g The same as in the IHS scale: “inhibiting, but not prohibiting” work

^h “May inhibit” work (IHS)

ⁱ Discomfort being felt continuously and not only upon concentration of the mind

^j The unpleasantness is so mild that mental concentration is necessary to sense it

Heaviness/discomfort (category II)

There may, however, still be room for another step (category II) below the “mild” step. The discomfort/heaviness in this category is steadily felt, not only upon concentration of the mind. This is one of the features distinguishing it from category I (Tables 3, 4). Further distinguishing traits vs. category I are: reduced thriving and tendency to social isolation. There is also procrastination and putting off. The initiative to do work at *für-Abend* (in spare time) is reduced because of the discomfort in the head (and not because of laziness, lassitude). What should or can be done today is postponed until tomorrow. However, tempo and efficacy at regular work are seemingly uninfluenced (at variance with what is the case with mild headache [7]).

The terms that some of the parishioners used for their condition would - translated - best correspond to heaviness (*tung i huggué, kei i huggué*) and discomfort (*ubehag*). There was no definite, suitable rubric for this in the existing scheme. This issue also amounted to a semantic problem:

tension headache and tension-type headache both refer to *headache*. These parishioners would not admit to any actual pain or ache in the head. For lack of a better designation, we have, therefore, termed this stage “heaviness/discomfort”.

The border between relative wellbeing and a socially significant state of head discomfort should probably be placed just above the minimal unpleasantness category, in other words between categories I and II (Tabb. 1, 4). Head discomfort by definition should probably as a minimum have a negative influence upon social activities and functioning and spare time activities. Category II, like category I, may characterize the third (and last) day of a migraine attack.

Other multistage headache intensity scales

Blau Cumings in 1966 [20] originally graded attacks (of migraine) into five separate stages: 0, symptom freedom; 1,

awareness, i.e. an unpleasant sensation in the head without pain; 2, ache; 3, throbbing pain; and 4, throbbing pain, with either nausea or photophobia. While their original design contained 4 stages and the zero stage, another stage (discomfort) has actually been added later by Blau [21]. In the updated version, therefore, there were 6 steps: 0, symptom freedom; 1, awareness; 2, discomfort; 3, mild pain; 4, moderate pain; and 5, severe pain. It may even be that their “awareness” is a better term for the first step above 0 than the one proposed by us (minimal unpleasantness). Although the wording is different, the basic ideas seem congruent in their concepts. These gradings have actually been contrived independently. (We had read the articles [20, 21] when they appeared, but had “forgotten” them until they were retrieved when completing the present work). Others [5] have recommended a 7-point scale, like we do.

The validity of a scale like the proposed one is admittedly hard to assess; there is no gold standard. A comparison with other grading systems has been deemed to be beyond the scope of the present work.

There is probably a clear short-coming with regard to equidistance between the discrete categories. The distance between, for example, categories I and II is probably small and fleeting. The distance between categories V and VI may be huge (cfr. Russell [16]).

The distribution of intensity values in the Vågå study

The headache intensities of 1829 parishioners in the Vågå study were scored on the proposed 7-category scale (Fig. 1). When rated according to a highest usual level, the curve has a bimodal distribution, in which the first peak is linked to pain-

freedom. From the start at minimal unpleasantness (category I), there is another peak of intensity at IV. Actually, the peak intensity is at 4.5, if the scale is divided into half steps (3.5, 217 parishioners; 4.0, 277; 4.5, 363). Still from I to VI, the shape of the curve is far from being Gaussian (Fig. 1).

It seems obvious that neglecting or misplacing the categories at and below III may have a rather drastic impact on the overall outcome of a headache epidemiology study. Parishioners below category III made up 39.9% of the series, whereas parishioners at categories II or below made up 29.5% of the series, and those ≤ 1.5 made up 26.9% of the series. In other words, close to 27% of the whole series did not seem to reach the level that one can equate with the lowest level of *head pain*.

Consistency test

This grading of intensity has been used systematically in the Vågå study of headache epidemiology [10]. In connection with that study, tests of reliability of the grading system were carried out in two ways: (a) blinded recheck of work-ups (Table 5); and (b) blinded recheck of parishioners. Both were carried out by the principal investigator (O.S.)

It is clear that not only in cluster headache and CPH (as demonstrated by Russell [11, 13]), but also in migraine (as demonstrated by Edmeads and co-workers [22]), there may be a considerable variation as regards the intra-individual variation in intensity of attacks. A higher degree of consistency could have been achieved in our work if, for instance, *only* the most intense attacks systematically had been taken into account at the examination. In our work, emphasis has been placed on the usual highest level of pain intensity, and

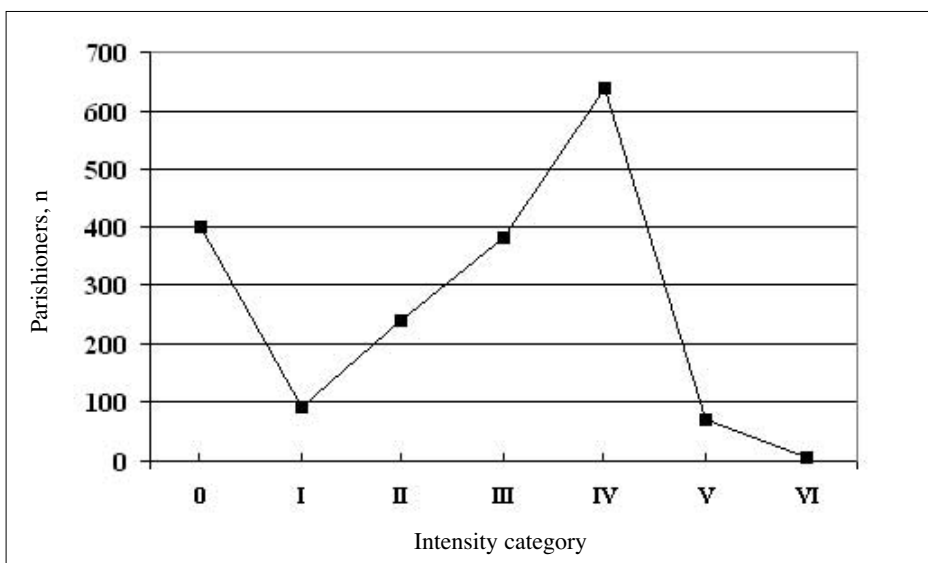


Fig. 1 Distribution of 1829 parishioners in the Vågå study by headache intensity on a 7-category scale. The curve from categories I to VI has a shape significantly different from a normal distribution ($p < 0.0000001$, Kolmogorov-Smirnov one sample test)

Table 5 Intensity rating. Recheck of records (n=100)

Agreement	Examinations I and II
100% agreement	85
Allowing an error of 0.5+	12
Occurrence of <0.5+ error*	3
Total	100

*In two cases, an alteration of 1+; in one case, an alteration of 1.5+ Binominal distribution with confidence interval. Statistics based on 100% agreement: 0.85 (0.76-0.91); statistics allowing 0.5+ deviation: 0.97 (0.91-0.99)

mostly on the last one, since the highest level may be the most “diagnostic” one (cfr. cluster headache). The shape of the intensity distribution curve would have been quite different had the whole spectrum of intra-individual headache intensity been taken into consideration.

Recheck of work-ups

The interval in time between examination and recheck of records was 4–5 years. The intensity of a migraine attack was at the first examination frequently rated as being of grades IV-V, due to the varying intensity, even of high-level attacks. If in such case, a value of V was obtained on recheck, this would be considered satisfactory: in other words, a deviation of 0.5 was considered acceptable. A deviation of 1 was, however, not considered satisfactory.

With the acceptance of a 0.5 deviation, there was a consistency of 97% (Table 5). If an absolute congruence between the two results were demanded, 85% would satisfy these conditions. Nine of the 15 with a deviation ≥ 0.5 belonged to the “lower part” of the scale (categories 0-III), but none of them belonged to categories V or VI (Table 5).

Recheck of parishioners

These parishioners were rechecked after a mean interval of 14.8 months (range, 4–23). Details of the selection process of the 41 parishioners have been presented elsewhere [10]. Two parishioners were excluded in this connection; one already at the outset of the assessment. This parishioner had during the interval developed cervicogenic headache, which led to an intensity increment from I-II to IV. Another parishioner apparently had one headache early in life (level around IV) and a mild one in more recent years (levels II-III). The first had mainly been focused on the last examination, and unfortu-

Table 6 Agreement between examinations I and II for 39 parishioners

Examination I and II	Subjects, n	(rate; 95% CI)
Agreement	31	(79; 64–91)
Identical exams	18	(46; 30–63)
Difference of 0.5 category	13	(15)
Disagreement >0.5 category	8	(21)
Exam I>II	5	(13)
Exam II>I	3	(8)

Lin's r (c)=0.896; 95% CI: 0.822–0.943 [23]

nately vice versa. With acceptance of a 0.5 deviation between the two assessments, there was concurrence in 31 of the 39 remaining parishioners, i.e. in 79.5% of cases (Table 6).

Discussion

A hierarchical system of headache symptoms and signs?

If it were at all possible, a hierarchical system of headache manifestations would have been highly preferable: from the mildest to the most sinister manifestations of headache. If symptom A were present, symptom B would by the same token also be present, but not necessarily the other way around. Table 2 is made up according to one putative such system. In headache intensity assessment, this sequence of events - at least grossly - holds true for the bedrest/ability to work interrelationship. But, generally, such a hierarchical system may not be practicable, at least not at this stage of insight and understanding. A few examples illustrate why.

In migraine, the worst level is the state of prostration, with bed rest and absolute quietude. In cluster headache, the situation generally is the opposite one: the unrest seems to increase *pari passu* with the pain degree. Therefore, although bedrest/prostration is a measure of pain level in migraine, it is no measure of pain level in cluster headache. Although, as Blau [21] stated, “a pain that takes a patient to bed is usually severe”, this does not imply that any severe migraine pain leads to bedrest. Bed rest may depend upon *opportunity*. A mother whose children run around in the house and need caretaking cannot just flatly go to bed. The farmer's wife may have to partake in the work in the barn and cow-stall also during an attack: she leans towards the cow during milking, but bending the head forwards accentuates nausea; she leaves her place for a moment to throw up - and is back milking. The traditional “bed question” should, therefore, probably be qualified and rephrased: “would you have gone to bed provided the circumstances would allow it?”

Drug treatment (e.g. with acetylsalicylic acid and over-the-counter drugs) is generally tried prior to bedrest. This was also frequently the case in the Vågå study, but the sequence might also be the opposite one.

More philosophical questions have not been addressed, such as: is the pain level that leads to bedrest of a similar degree in all patients? Probably it is not. Nor can pain of the same intensity be assumed to influence behaviour to the same extent, invariably [24] (e.g. the maximal cluster headache pain).

Other factors have a confusing, partly devastating impact upon such a hierarchical sequence. Vomiting for example as a rule “sets in” above “the tension-type headache level” and is a regular part of the worst migraine attacks. But again, it is generally not a part of cluster headache and CPH attacks, and it is usually not part of the worst attacks. So, although vomiting is important in migraine diagnosis, it is only partly useful in intensity assessment. It is even debatable whether it is correct to include it in intensity scales at all; it is an independent variable in the IHS system. Nor has it been utilized in the present context.

Nocturnal awakening is relatively “high” on the list in Table 2. A combination of protractedness and intensity of the pain may be mandatory to wake up the patient, and the duration may be as decisive as the pain level. This may explain why migraine patients frequently wake up with pain, while trigeminal neuralgia patients rarely do. Nocturnal awakening is probably not apt for an “inter-disease” comparison of absolute pain levels.

In headache work, one will probably have to resort to a multi-axial system to obtain adequate separation into categories.

Headache intensity: the spectrum

Intensity evaluation in headache is a difficult matter [25], wrought with many deficiencies and shortcomings (reviewed by Stewart et al. [26]). The terrifying pain experienced at the climax of cluster headache and CPH attacks does not take the superior insight of the connoisseur to assess. The tiny, vague unpleasantness or annoying feeling of the late part of long-hour work days or extensive motor-ing may, although it is ubiquitous, be much harder to assess.

Most biological phenomena in man exhibit some type of Gaussian distribution. Does headache intensity across headache diagnoses follow a similar curve? If intensity assessment is based on the typical highest level of pain during attack, the shape of the curve will be like that shown in Fig. 1; the curve, in other words, is far from exhibiting a Gaussian-like shape. This also goes for the part of the curve upwards of 1+, after which point discomfort and pain begin.

The problem of headache intensity can, however, be approached in quite different ways. If the single subject is monitored with regard to headache intensity at regular intervals over time, the intensity can be expressed as density. We have a hunch that, in that case, headache intensity in many (most?) headaches at the grassroots level may behave more like the wind. Hourly wind velocity assessment in a given area over years, e.g. in Vågå, where such measurements really have been carried out (meteorologist S. Høgåsen, Vågåmo, personal communication, 1997), will give a picture with most dots near the baseline, the density decreasing, almost potentially, as one departs from the baseline. Gentle wind, up to mild breeze (the first 3 categories of the Beaufort scale) is much more common than the 3 last categories of the Beaufort scale.

This probably also regards headache: generally, mildness will dominate with hourly assessments. Categories V (actually VA and VB) and VI combined will be clearly overshadowed by groups 0 and I. Even when based on the usual highest levels of intensity, a clear tendency to such an inter-relationship between categories V-VI and 0-I was found (Fig. 1). If >8700 observations, i.e. hourly observations over 1 year, were made in the solitary headache patient, e.g. an average, “pure migraineur”, only 5%–10% of the observations (400–800 observations or less) would probably be in the upper strata of the curve, the vast majority being in the lower part.

The same would go for cluster headache (the episodic form) where the outcome probably would be even more polarized.

A similar trend has actually been nicely demonstrated by Waters [8] in “men, all ages” (presumably mostly migraine patients): the 5 lowermost severity scales (out of 14) made up 63%, vs. 10% for the upper 7 scales. We will revert to this in connection with the Vågå study. It becomes important to stipulate the border between these mild headache forms and normality.

Intensity variability in a specific headache, inter- and intra-individually

Migraine without aura severity has, by the IHS [7], been stipulated to be of two grades: “moderate” or “severe”. It is not stated whether this pertains to the usual or maximum attack, or to all attacks in all patients. If the attack duration factor and two of the pain characteristic criteria of migraine without aura are fulfilled, e.g. unilaterality and pulsating pain, then - according to the IHS - the diagnosis as regards the “non-autonomic part” of the migraine attack is established. The severity criterion in such a case actually does not count. It could, in theory, be a very mild headache (there would, however, then probably be no pounding, of migraineous origin). The severity level stipulated as “moderate” or

“severe” in the IHS criteria [7], nevertheless, probably gives more than just a hint as to what is considered usual. If so, this criterion could have been given a higher rank, so that it just cannot be skipped (like in the aforementioned example).

In university level headache specialist practice circles, the impression seems to prevail that migraine is a rather intense, cumbersome, socially inactivating, and, in the long run, a rather hard-to-handle disorder. However, “the grassroots level” migraine patients that one does not get exposed to in a specialist practice make up the vast majority of migraine cases. At the grassroots level, the failure to seek medical advice may be overwhelming [10]. This corresponds to Waters’ experience. This failure to seek medical advice even concerns cluster headache [27].

In Vågå [10], the attitude of the parishioners caused extra problems: Headache was not generally considered as a disease, the exception being “classic” migraine. Headache was considered at the same level as fractures, i.e. as self-limiting inconveniences. Attack, even severe attacks, should preferably not be treated with drugs. One should preferably go to work, even when considerable complaints were present already in the morning; the general attitude was: “headaches are usually at their maximum after the *end* of the working day”. The scaling of headache intensity under such circumstances may not be an easy undertaking.

One should be careful with generalizations on the basis of a material like this. Nevertheless, the problem of defining the lowermost border of what is headache is a universal one and has been given due consideration in this context. Ultimately, one may have to apply a certain degree of personal judgement and flexibility in the assessment.

The intensity of the complaints is an essential aspect of headaches. Four-step intensity rating scales are useful tools in rough assessments, where no sophistication is needed. The herein presented version has accommodated three (four) further categories: two have been accommodated in the transition zone between headache/discomfort on the one hand and pain freedom on the other. Presumably, the line between the healthy state and a discomfort in the head should be drawn just below the stage when phenomena, such as spare time procrastination has started to appear. Given the widely varying concepts as to what is headache among the lay, it is particularly important to draw such a line in headache epidemiology work where these mild forms may be a considerable constituent. Particularly, in headache epidemiology studies

based on questionnaire, one may already at the outset get into the wrong track. The initial question may be: “Have you had headaches?” and is to be scored as yes or no, without further, penetrating questions being posed. Whether the question is answered in the positive or negative, the definition of headache will, grossly, be left to the test person. In specialist practice, the situation is an entirely different one: the headache individual has defined himself or herself as a patient at the moment of consultation.

Furthermore, a category for excruciatingly severe headache has been added (stage VI). The severe category (stage V) can, tentatively, be subdivided into categories with and without prostration. These sub-divisions are tentative and have not been included in the final proposal (Table 4).

Axes of psychosocial stressors and social functioning were considered to be outside the scope of the present analysis, that only purports to assess single attack intensities, as one of the parameters of the IHS diagnostic system.

The multi-axial system scale (Table 4) begins with pluses (+) in the left, upper corner and ends with pluses in the lower, right corner. It thus professes to be a gliding, sequential scale. Reservations to such a smooth, streamlined model have been duly emphasized.

The increased sensitivity of the present 7-category scale may make it particularly useful in situations where a more nuanced picture of headache intensity is desirable. With a certain flexibility added to the system, it will be operative and even well functioning. However, every part of this attempt has to be weighed. It would surprise us if this proposal were to be the ultimate version of headache severity grading.

The present scale is intended for the “westernized” society. Obviously, cultural peculiarities as far as expressing pain are concerned may enter into the picture. Such differences may be marked enough to necessitate more than just minor deviations from the present scoring system, in order to make it operative in other settings.

Acknowledgements We are indebted to GlaxoSmithKline of Norway, Pharmacia & Upjohn, and the Alf Harborg Foundation, Department of Neurology, St. Olavs Hospital, Trondheim, Trondheim University Hospital, for generous support during the various phases of the investigation. We are also grateful to the personnel at the Vågå Health Centre at Vågåmo for their aid. Last, but not least, we thank the inhabitants of Vågå for their collaboration.

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