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Hangover headache: accompanying symptoms. Vågå study of headache epidemiology

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Abstract As part of the Vågå study of headache epidemiology, the symptomatology of hangover headache has been studied in 1122 parishioners in the age group 18–65 years; male/female ratio 1.14. The following criteria for hangover headache were adhered to: (1) intoxication by alcohol, (2) headache, and (3) onset of headache >3 hours after discontinuation of drinking. As demonstrated elsewhere, headache was present in 64% of the cases. Throbbing was present in 85% of those affected, nausea in 60% and vomiting in 25%, with significant male preponderance for all three. Photo- and phonophobia were more rarely present. Not only does hangover headache seem to be more frequent

in males – as previously demonstrated; it also seems to be more severe in males. Ninety per cent of the hangover headache victims felt that the gastro-intestinal symptoms originated in the gastro-intestinal tract and were not secondary to the headache.

Key words Alcohol • Hangover headache • Hangover • Gastro-intestinal symptoms

Introduction

A relatively high alcohol intake can give rise to two different kinds of headache:

There may be an “alcohol-induced headache” (IHS [1] code 8.1.4), characterised by headache occurring “within three hours after ingestion of alcohol”. In principle, such a headache can be caused by a direct dilatory effect on blood vessels [2] – or, there may be an activation of an inherent headache, maybe preferably of a headache with a vascular component, like migraine.

A probably entirely different reaction pattern is “hangover headache”, in the IHS [1] codification given a completely different code: 8.3.1.; “alcohol withdrawal headache”. This headache appears upon falling blood alcohol concentrations and appears to have a symptomatology essentially at variance with that of alcohol-induced headache. Hangover headache may seem to be prevalent in countries with a “Nordic” alcohol consumption pattern [3, 4], grossly characterised by periodic excessive drinking – with alcohol-free intervals.

The drinking pattern seems to be entirely different in southern Europe [5], where it rather is characterised by

daily/almost daily intake of, at least partly, lesser quantities of alcohol.

“Hangover headache” and “hangover” should not be mixed up. Hangover headache is probably the most common ingredient of hangover [6]. But hangover is characterised by manifold symptoms and signs, probably not secondary to the headache, such as: tremulousness, palpitations, tachycardia, sweating, loss of appetite, anxiety and even blackouts [6, 7].

In the present context, the following items will in particular be focused on. What is the frequency of accompanying symptoms, like phono- and photophobia and throbbing, and of gastro-intestinal (g-i) symptoms, such as nausea, vomiting and diarrhoea? Are the g-i symptoms likely to be subordinate to hangover headache as such? Or do they derive more directly from the alcohol, via its influence on the g-i tract?

The combination of a throbbing headache and g-i symptoms, as in hangover headache, is also characteristic of migraine. Both headaches may be characterised as headaches with a vascular component. What is the extent of the similarity between the two headaches? Dalesmen gave their impression of a putative interrelationship between their ordinary headache and hangover headache.

Material and methods

This study was carried out by the principal investigator (O.S.) during the years 1995–1997 in Vågå, a parish in the mountainous part of southern Norway [8]. A total of 1122 18–65-year-old dalesmen were examined with regard to hangover headache; the selection criteria have been detailed previously [3]. Of the 1122, 714 or 64% had hangover headache [3]. The gender ratio (M/F) was 1.14 [3].

The dalesmen were interviewed in a face-to-face situation, according to a strict protocol. A physical examination/short-version neurological examination followed, as detailed elsewhere [3]; a long-version neurological examination was included if medically indicated. This part of the Vågå study is in principle a retrospective study.

The criteria used for hangover headache were:

1. “Is preceded by intake of sufficient alcohol to make that particular individual drunk” (IHS: 8.3.1 [1]).
2. Among the various hangover symptoms, headache should be an obligatory ingredient.
3. Headache followed after a respite, i.e. >3 hours after discontinuation of alcohol consumption.

Criteria 2 and 3 have been added to the IHS criteria.

The chi-square test was used for statistical calculations.

Symptoms related to hangover headache

In this context, the participating parishioners were asked about: nausea, vomiting and diarrhoea; throbbing, phono- and photo-

phobia. In other words: palpitation/tachycardia, tremulousness, anxiety, etc., were not asked about. They were at the time of making the protocol considered as extraneous matters in the context of hangover headache *per se*.

Migraine and hangover headache

The symptomatology of hangover headache has some similarity to the migraine symptomatology, in that both headaches exhibit a throbbing quality of the headache and g-i symptoms as key manifestations. Photophobia is another characteristic migraine symptom. Hangover headache victims were urged to give their opinion as regards the degree of similarity between their spontaneous, ordinary headache attacks, in particular migraine, and hangover headache.

Hangover headache and g-i symptoms

Dalesmen with hangover headache and g-i symptoms were asked whether they felt that such symptoms occurred subsequent to the hangover headache as such, or: were they more likely to be a direct effect of alcohol upon the g-i system?

Results

Nausea, vomiting and diarrhoea

Vomiting was present in 25% of the cases and was present significantly more frequently in males than females (M/F ratio: 1.98) (Table 1). Nausea was present much more frequently than vomiting and was invariably present in those with vomiting.

Naturally, nausea was present in many cases without vomiting (Table 1). Nausea was also present in more males than females. It is remarkable that 18 of the hangover headache victims at times had vomiting without having headache.

Diarrhoea seemed to be present in some cases only (Table 2). This latter part of the study has a somewhat anecdotal character. Minor changes in bowel movement pattern may require the close attention on the part of the actual individual in order to be discovered. It is our impression that what it may amount to in hangover headache is mainly a minor change in faecal consistency. Possibly, real watery diarrhoea mostly occurs in connection with heavy intoxication – or in sensitised individuals. Diarrhoea clearly seems to be a less important ingredient of hangover headache than nausea and vomiting (Table 2). The panorama of symptoms during an episode will naturally to a large extent depend upon the extent of the headache and upon the extent of intoxication.

Table 1 Symptoms accompanying hangover headache (n=714)

	Total	Percentage	Females	Males	M/F ratio
Nausea	425	60	161	264	1.64*
Vomiting	176	25	59	117	1.98*
Photophobia	150	21	67	83	1.24
Phonophobia	161	23	72	89	1.24
Throbbing headache	608	85	236	372	1.58*

*Sex ratio vs. that in those questioned: i.e., 1122 (males: 599; females: 523); M/F ratio 1.14 ($p < 0.0005$)

Table 2 Relative frequency of g-i symptoms

Symptom	Kaivola et al. [10]*	Present work
Nausea	++(+)	60%
Vomiting	++	25%
Diarrhoea	+	<1% (n=3)

*Only relative values are presented, because of the incompatibility of the two measuring systems (a coarse assessment made by the present authors).

Diarrhoea was apparently rare

Photophobia and phonophobia

Photophobia was present in 21% and phonophobia in 23% of the 714 dalesmen. It is remarkable that for both photophobia and phonophobia, there seemed to be only a moderate male preponderance (Table 1). Of the hangover headache victims with vomiting (n=176, Table 1), 76 – or 43% – had photophobia. The percentage of photophobia in those with vomiting (43%) is, nevertheless, double that in the entire series (=21%) (Table 1). The other way around, approximately half of the dalesmen with photophobia during hangover headache (n=76 out of 150) had vomiting.

Throbbing

Throbbing of the headache was the most characteristic trait of hangover headache (Table 1). The M/F sex ratio differed significantly from the sex ratio among all those questioned for hangover headache, 1.58 and 1.14, respectively. The localisation could apparently vary from individual to individual: forehead, vertex and posterior areas. The forehead seemed to be the predominant site. Interestingly, in the local dialect, another term for hangover headache is “skallebank”, which literally means a pounding sensation in the forehead.

Vomiting and throbbing headache

In hangover headache, individuals with vomiting, 145 – or 82% – also had a pounding headache. In hangover headache,

there, in other words, seems to be a high concurrence of these two manifestations. The male preponderance (98 males vs. 47 females; ratio: 2.09) was even more clear with the combination of these factors than for each of the solitary factors (Table 1). Two different points of view may put this observation into perspective: first, this percentage of throbbing is not higher than the percentage of throbbing in the entire material, i.e., 85% (Table 1); secondly, in 463 cases there was throbbing headache in the absence of vomiting. The inferences from these observations should be drawn with great caution.

Putative causal relationship between headache and g-i symptoms

Questions were asked about the interrelationship between headache and g-i symptoms. Of those hangover headache victims who presented with a combination of nausea and vomiting (n=176), 72% responded to these questions. Close to 90% of these favoured an explanatory model, where g-i symptoms and headache develop independently (possibility a; Table 3; Fig. 1, alternative III). They supported the idea that nausea/vomiting are caused by a direct alcohol effect on the g-i tract. These dalesmen argued fairly convincingly for their view. One of their main arguments for separating g-i symptoms and headache was that the severity of the g-i symptoms did not necessarily fluctuate *pari passu* with the headache intensity. In individuals who had experienced multiple hangover headache episodes, on certain occasions, g-i symptoms could antedate the headache or could persist with only a minimal headache or even in the absence of any headache. Even

Table 3 Dalesmen with the combination of nausea (N)/vomiting (V) during hangover headache (n=176): dalesmen's own assessment of causality

	Number	Percent
(a) N/V due to local g-i irritation	114	89.8
(b) N/V secondary to headache	13	10.2
Total	127	

The above questions (a+b) were not answered by 49 dalesmen. In the whole group, i.e., 176 dalesmen, 64.8% (114 of 176) favoured model (a)

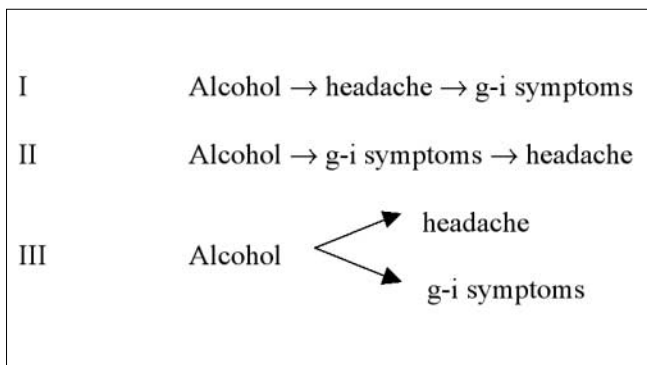


Fig. 1 Possible interrelationships between alcohol, headache and g-i symptoms. Alternative III seems to be the most likely explanatory model

abdominal pain could be a domineering symptom. This counts clearly against alternative I (Fig. 1). In many cases, it could be the other way around; cf.: nausea was present in no more than approximately 60% of the cases (Table 1), and such observations make the sequence of events, depicted in Figure 1, alternative II, unlikely. Those who favoured alternative I (Fig. 1) did not present such clear arguments in favour of their view. Most of them wavered; they might as well have been put into a group of non-commitment in this matter.

Similarity of the dalesmen's ordinary headache and hangover headache

Of hangover headache victims with considerable g-i symptoms, 129 answered questions regarding similarity of the hangover headache to their ordinary headache, mostly migraine and tension-type headache: 72% of them felt convinced that the drinking spree headache differed from their ordinary headache.

Discussion

Hangover headache was found in 64% of the dalesmen [3]. Hangover headache seems to be frequent also in other Nordic countries [4]; in the Danish epidemiology study [4], there was a prevalence of 72%.

Gender and the extent of hangover headache

As previously demonstrated, there is a significant male preponderance in hangover headache [3], and, as demonstrated herein, there is a significantly higher percentage of

males with nausea/vomiting than of males in the entire series. There was a similar, although somewhat less marked tendency for throbbing (Table 1). A still higher male preponderance was found among hangover headache victims with the combination vomiting/throbbing headache. With the prevailing drinking pattern among the dalesmen, hangover headache, therefore, may not only be more frequent in males than in females; it seems to be qualitatively different in the male: males seem to have a more severe variant. One plausible cause for this discrepancy is that the quantity of alcohol ingested by males may outweigh that ingested by females, even taking body size into account. Interestingly, among American college students, a "heavy" drinking style seemed to be more frequent in males than in females [9].

Headache and g-i symptoms: interdependent or independent?

Two of the principal manifestations of the hangover headache seem to be: the headache *per se* and the g-i manifestations. The g-i manifestation most frequently met with seemed to be nausea; at an intermediary level, there was vomiting, and a minor fraction seemed to suffer from diarrhoea. The same relative positioning was found in a formal study of 30 hangover victims [10] (Table 2). In a recent review [7], there was a diarrhoea prevalence of 36%. It should be emphasised that the latter figure concerns "hangover" and not "hangover headache". This figure may, nevertheless, seem somewhat high according to our experience (Table 2).

This coexistence of nausea and vomiting in hangover headache seems to be consistent with the view that there is a common source of symptom generation for the two manifestations of hangover headache. This constellation seems to be the same as in migraine, where headache and g-i symptoms also frequently coexist. Also in migraine, nausea seems to be present when vomiting is present.

A temporal dissociation may, nevertheless, to some extent exist in migraine: nausea may appear with moderate headache; or the other way around, e.g., on the last day of a migraine attack, the nausea may be gone. A more or less absolute separation between these two groups of symptomatology is utterly evident in cluster headache and CPH, two separate headache disorders in the excruciatingly severe group. Generally, g-i symptoms are hardly likely to be a function of headache intensity solely.

Lance [11, 12] seems to be of the opinion that the g-i symptoms are not secondary to the head pain in migraine. As far as we are concerned, the g-i symptoms in migraine, nevertheless, hardly originate "locally", i.e., in the g-i tract proper: they are more likely to have a "central" background, the activation mechanism differing from that of the head pain. Or: they may be caused by blood-borne substances.

Temporal aspects tell something about the interrelationship between the two lines of symptom generation, also in hangover headache. Although it was not systematically asked about, many dalesmen (close to half of those who spontaneously provided such information) experienced nausea/vomiting in the late evening or early night, hours ahead of the head pain. In a few cases, abdominal pain could at times be the domineering symptom, while headache was lacking at that stage. In such cases, the headache *per se* would be a most unlikely cause of the g-i symptoms. The g-i symptoms are then likely to “live their own life” (more or less excluding alternative I, and to some extent favouring alternative III, Fig. 1). It is well established that alcohol may produce local effects in the g-i tract: thus, congestion of the gastric mucosa and increased acid production – which eventually may be followed by acute gastritis [13].

For the aforementioned reasons and based upon the dalesmen’s overall judgement (Table 3), one is strongly inclined to believe that although g-i and headache phenomena frequently coexist in hangover headache, the headache and the g-i symptoms develop along two independent lines, like in alternative III, Fig. 1.

Migraine and hangover headache

Hangover headache and migraine may both be headaches with a vascular component, with a throbbing headache as one of the key manifestations. Migraine is also the major, primary headache category that exhibits the most marked tendency to nausea/vomiting [11, 14]. The triad: throbbing, nausea and vomiting is a characteristic trait of both headaches. What is otherwise the extent of the similarity between the two headaches? Could hangover headache be an activation of migraine – or of a “migrainous tendency”?

Photophobia is also one of the most characteristic migraine traits, present in approximately 80% of cases [11, 14]. In migraine, vomiting and photophobia seem to coexist, i.e., when vomiting is present, photophobia will frequently follow suit. Supposedly, if vomiting is present in migraine, the attack is a relatively severe one. There was a much higher frequency of photophobia in hangover headache cases with vomiting than in the whole material (Table 4). The interpretation of this observation is far from straightforward. This may mean that in hangover headache, photophobia and vomiting are not interdependent; possibly, these two manifestations may derive from two different lines of symptom generation. It may seem that the situation in migraine and hangover headache differs, as regards these parameters. Nevertheless, both in migraine and in hangover headache, one may speculate that presence of vomiting may be an expression of severity of the attack and with severe attacks,

Table 4 Frequency – in per cent – of nausea, photophobia and throbbing in: hangover headache with vomiting as an obligatory symptom and whole hangover headache series, without obligatory vomiting

Variable	With vomiting	Whole series
Nausea	100	60
Photophobia	43	21
Throbbing	82	85

photophobia will occur more frequently also in hangover headache.

Both in migraine and in hangover headache, throbbing headache is a frequently occurring component. In hangover headache, however, vomiting and throbbing were far from invariably linked, in that 463 of those with throbbing headache (n=608) had no vomiting. The observation that there was little or no difference concerning the frequency of throbbing in the entire series and in those with vomiting (Table 4) tends to indicate that throbbing is an inherent part of hangover headache as such, and not secondary to the g-i symptomatology, as represented by its most dramatic manifestation – vomiting. In hangover headache with this combination of symptoms, there was a clear male preponderance, i.e., 2.09, still higher than when only one of the factors was present.

There are other, more robust arguments that present themselves when evaluating whether hangover headache and migraine without aura have an essentially different symptomatology or not. There seemed to be more males than females with hangover headache (sex ratio 1.50; n=714 [3]) and the other way around in migraine, with only 25% males (n=40 [14]). Gender will, however, not be helpful in the differential diagnostic in the solitary case.

Hangover headache is a bilateral (97%), not infrequently global headache, in contradistinction to what is the case in migraine. In Ekbom’s study of migraine (n=40), 80% had a constant unilaterality, while if those with “mostly unilateral headache” were added, 95% had unilateral headache [14]. The figures for laterality are obviously different from the present ones.

Most dalesmen felt that hangover headache clearly differed from their ordinary headache, mostly migraine and tension-type headache.

Hangover headache does not seem to be an activation of an inherent migrainous headache.

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