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Anger and emotional distress in patients with migraine and tension-type headache

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Abstract The objective was to evaluate the prevalence and the characteristics of anger and emotional distress in migraine and tension-type headache patients. Two hundred and one headache patients attending the Headache Center of the University of Turin were selected for the study and divided into 5 groups: (1) migraine, (2) episodic tension-type headache, (3) chronic tension-type headache, (4) migraine associated with episodic tension-type headache and (5) migraine associated with chronic tension-type headache. A group of 45 healthy subjects served as controls. All the subjects completed the State-Trait Anger Expression Inventory, the Beck's Depression Inventory and the Cognitive Behavioral Assessment. Anger control was significantly lower in all headache patients ($p<0.05$) except in migraineurs. Patients with migraine and tension-type headache showed a significantly higher level of angry temperament and angry reaction ($p<0.05$). In addition, chronic tension-type headache and migraine associated with tension-type headache patients reported a higher level of anxiety ($p<0.05$), depression ($p<0.001$), phobias ($p<0.001$) and obsessive-compulsive symptoms ($p<0.01$), emotional liability ($p<0.001$) and psychophysiological disorders ($p<0.001$). Our study shows that chronic tension-type headache and migraine associated with tension-type headache patients present a significant impairment of anger control and suggests a connection between anger and the duration of headache experience.

Key words Migraine • Tension-type headache • Anger • Depression

Introduction

It is well recognised that negative affective states, like anger, hostility and fear, are deeply involved in the emotional experience of pain [1]. Increased anger and hostility have been widely observed in patients with chronic illnesses like cardiovascular diseases and arthritis and several authors have suggested that these symptoms may influence the disease progression [2–4]. Fromm-Reichman [5] suggested that a personality disposition associated with unconscious conflicts plays an important role both in the frequency and in the intensity of anger experience in chronic pain patients, but others suggested

that anger may be a reaction to the distress symptoms [1]. Several studies supported the evidence that inhibition of anger is related to major pain severity, emotional distress and overt pain behaviours [6, 7].

Anger is described as a complex affective state generated by disapproval of actions with negative consequence for the self or for persons one cares about [8, 9]. An important distinction regards state-anger versus trait-anger. State-anger is a transitory emotional phase whereas trait-anger pertains to a relatively stable pattern of personality attributes. Anger reflects a phenomenon composed of internalised anger, externalised anger and anger control. Internalised anger (*anger-in*) reflects the tendency to suppress angry feelings. In contrast, externalised anger (*anger-out*) reflects the tendency to engage in aggressive behaviour toward objects or persons in the environment. Finally, anger-control refers to the ability to monitor and prevent the experience of anger.

Negative affective states have been deeply investigated in patients with headaches. In a sample of chronic headache patients a direct link between depression and disability in everyday life was found [10]. The authors suggested a direct path between suppressed anger and depression. Anger seems to increase disability also in other patients suffering from chronic pain [11]. Some studies have shown that patients with tension-type headache have a higher degree of anger and depression than healthy controls [12, 13]. A recent study [14] found that headache patients suppress their anger more than people without headache even after controlling for levels of depression, anxiety and trait-anger. The authors concluded that suppressed anger is the strongest predictor of headache. Patients with migraine and tension-type headache present scores on anger suppression scale (*anger-in*) significantly higher than patients with tension-type headache and depression is correlated significantly with the anger-in score in all the patients [15]. It has been reported that migraine patients experience anxiety and/or guilt after expressing anger and are more inhibited in expressing anger feelings than controls and people who do not suffer from chronic headache [16]. Finally, the intensity but not the frequency of headache was found to be related to higher levels of depression, emotional distress and reduced quality of life [17].

In our study we used a large battery of psychological tests, some of them to assess psychological variables widely investigated in other research (depression, anxiety, anger and general emotional distress), others to deeply analyse specific personality aspects such as obsessive-compulsive traits, phobias, somatic symptoms, emotional and behavioural styles (the "Eysenck dimensions") which have been taken less into account. Results could give a contribution to better characterising the different therapeutic approaches in different subtypes of headache patients.

Materials and methods

Two hundred and one consecutive headache patients (60 men, 141 women) attending the Headache Center of the University of Turin were involved in the study. According to the International Headache Society (IHS) diagnostic criteria [18], patients were divided into 5 subgroups: (1) migraine (n=51, 18 males, 33 females, 7 with aura, 44 without aura; mean age±SD, 35.2±11.3 years), (2) episodic tension-type headache (n=31, 11 males, 20 females; mean age±SD, 40.3±18.0 years), (3) chronic tension-type headache (n=26, 11 males, 15 females; mean age±SD, 51.8±15.0 years), (4) migraine associated with episodic tension-type headache (n=52, 12 males, 40 females; mean age±SD, 39.5±12.0 years) and (5) migraine associated with chronic tension-type headache (n=41, 8 males, 33 females; mean age±SD, 43.7±14.7 years). 45 healthy subjects recruited from the same urban area (21 males, 24 females; mean age±SD, 38.6±11.1 years) served as controls. None of the controls had ever experienced headache attacks or other neurological and psychiatric disorders. Table 1 shows the demographic and clinical characteristics of headache patients and healthy controls.

The patients underwent an extensive physical and neurological examination. Laboratory studies (sedimentation rate, whole blood count, liver and renal functions) and X-rays of skull and spine were obtained. A standardised record of all clinical and psychological characteristics of all headache patients, suitable for computer analysis, was obtained.

Psychological evaluation was performed in a single session using the following tests:

1. State-Trait Anger Expression Inventory Scale (STAXI) [19]. It consists of 44 items divided in six scales and two subscales. The state-anger (S-anger) scale measures the intensity of anger experienced during a particular distress while trait-anger (T-anger) scale evaluates a general disposition of a person experiencing angry feelings. The anger-temperament (T-anger/T) and the anger-reactive (T-anger/R) are two subscales of the trait-anger scale: the latter indicates a general propensity to experience anger when a person is provoked by others while the anger-temperament measures the same aspect but without any criticism by others. The anger-in (AX/In) and the anger-out (AX/Out) scales evaluate the modality of anger expression: suppressed in the first case, expressed toward other people or objects in the second one. The anger-control (AX/Con) is an index of the ability to control the experience and the expression of angry feelings. Finally, the anger-expression scale (AX/EX) is a general index of how often anger is aroused.
2. Beck Depression Inventory (BDI) [20], a 21-item self-rated scale showing cognitive, behavioural and somatic aspects of depression; total score was obtained by summing all the items, rated from 0 to 3.

Table 1 Demographic and clinical features of headache patients and controls

	Controls	Migraine	Episodic tension-type headache	Chronic tension-type headache	Migraine and episodic tension-type headache	Migraine and chronic tension-type headache
Number	45	51	31	26	52	41
Age (years), mean±SD	38.6±11.1	35.2±11.3	40.3±18.0	51.8±15.0	39.5±12.0	43.7±14.7
Males, *n* (%)	21 (47)	18 (35)	11 (35)	11 (42)	12 (23)	8 (20)
Females, *n* (%)	24 (53)	33 (65)	20 (65)	15 (58)	40 (77)	33 (80)
Marital status, *n* (%)						
Single	28 (62)	19 (36)	10 (50)	5 (24)	13 (23)	7 (24)
Married	14 (31)	28 (54)	9 (45)	12 (57)	41 (73)	19 (66)
Divorced	3 (7)	3 (6)	0 (0)	0 (0)	1 (2)	1 (3)
Widow	0 (0)	2 (4)	1 (5)	4 (19)	1 (2)	2 (7)
Education, *n* (%)						
Low	11 (24)	24 (46)	9 (45)	15 (71)	29 (52)	18 (62)
Moderate	20 (43)	26 (50)	7 (35)	6 (29)	21 (37)	9 (31)
High	15 (33)	2 (4)	4 (20)	0 (0)	6 (11)	2 (7)
Age at onset of migraine (years), mean±SD	–	19.7±10.0	–	–	14.4±9.4	23.2±11.9
Duration of migraine attacks (h), mean±SD	–	32.0±32.6	–	–	33.6±35.5	40.8±42.0
Migraine attacks per year, mean±SD	–	59.5±67.9	–	–	70.5±78.0	83.9±110.0
Age at onset of tension-type headache (years), mean±SD	–	–	25.8±16.9	29.8±16.6	25.5±9.2	38.9±19.0
Duration of tension-type headache attacks (h), mean±SD	–	–	28.5±28.6	28.3±28.2	26.1±31.8	44.1±54.2
Tension-type headache attacks per year, mean±SD	–	–	82.2±47	328.1±93.9	109.6±96.6	281.3±133.8

3. Cognitive Behavioral Assessment (CBA 2.0) [21] is a comprehensive battery of psychological scales, validated on the Italian population. It consists of 10 primary scales and 2 secondary scales (scales 1 and 4: anamnesis, 84 items). The primary scales are: scales 2 and 3, State-Trait Anxiety Inventory (STAI), a 40-item self-rated scale evaluating anxiety as a reaction to episodic stress conditions (STAI-X1) and as a predisposition producing anxious behaviour (STAI-X2); scale 5: Eysenck Personality Questionnaire short form (EPQ), which consists of 48 items and 4 subscales (R-E, intratensive–extratensive; R-N, emotional liability; R-P, antisociality and maladjustment; R-L, simulation); scale 6: Psychophysiological Questionnaire short-form (QPF/R) consisting of 30 items for the evidence of psychophysiological disorders; scale 7: Phobias Inventory short form (IP), a 58-item scale (IP-R) divided into 5 subscales (IP-1, calamities; IP-2, social phobia; IP-3, repellent animals; IP-4, departure; IP-5, physicians and blood); scale 8: QD consisting of 24 items for depressive symptoms; scale 9: Maudsley Obsessive-Compulsive Questionnaire (MOCQ) which consists of 21 items (MOCQ-R) evaluating obsessive-compulsive symptoms; scale 10: State-Trait Anxiety Inventory, X1/R form consisting of 10 items evaluating the amount of anxiety at the end of the battery. In the present study, we used a computerised version of CBA 2.0 and only the primary scales were administered [22].

Statistical analysis

The Statistical Package for the Social Sciences [SPSS] for Windows was used for the statistical analysis. A first one-way ANOVA was run in order to evaluate differences in demographic and clinical features in the sample. Bonferroni's post hoc was used for multiple comparisons. In order to compare all test scores we performed a second one-way ANOVA followed by Dunnett's post hoc analysis. Healthy subjects were used as the control category. Finally, a third one-way ANOVA was run excluding the control group. Multiple comparisons between the headache groups were examined through Bonferroni's post hoc. The level of statistical significance was taken as $p \leq 0.05$.

Results

The clinical characteristics of headache patients and controls are shown in Table 1. Although the male–female distribution is not the same among the subgroups, the difference is not statistically significant (χ^2=10.73; ns). As far as educational level is concerned, results showed significant differences between subgroups (χ^2=34.033; p<0.001). Specifically all the subgroups of patients, except for patients with episodic tension-type headache, showed a lower level of education in comparison to controls (p<0.004).

Patients suffering from chronic tension-type headache were found to be significantly older than the other groups of patients (p≤0.05); this difference was not significant only in comparison to patients with migraine associated with chronic tension-type headache. Moreover, the latter were older than patients with migraine (p≤0.05). Patients with migraine associated with chronic tension-type headache revealed a significantly longer history of headache (p≤0.05) compared to migraine, episodic tension-type headache and migraine associated with episodic tension-type headache patients. Patients with chronic tension-type headache also had a longer history of headache (p≤0.05) compared to the migraine group. No significant differences were found in the duration of headache attacks between the different groups. Chronic tension-type headache patients with or without migraine showed a significantly higher number of headache attacks per year in comparison to patients with migraine, episodic tension-type headache and migraine with episodic tension-type headache (p≤0.05).

Table 2 shows univariate results for the STAXI in healthy subjects and in patients with headache. Dunnett's post hoc revealed that, in comparison to controls, anger control was significantly impaired in all headache patients examined except for migraine patients. Trait-Anger scores were significantly higher in patients with migraine associated with chronic tension-type headache. Both Anger-Temperament and Anger-Reaction scales were significantly higher in patients with migraine associated with episodic and chronic tension-type headache. No significant differences were found in State-Anger, Anger-In, Anger-Out and Anger-Expression scores between controls and headache patients.

Table 3 shows univariate results for the BDI, the STAI-X1 and -X2, and the CBA 2.0. Compared to controls, patients with chronic tension-type headache and patients with migraine associated with episodic and chronic tension-type headache have a significant increase in scores for depression (BDI, QD), anxiety (STAI-X1 and X2), phobias (IP-R, IP-2, IP-4), emotion liability (EPQ/R-N), psychophysiological disturbances (QPF-R) and obsessive-compulsive symptoms (MOCQ/R, MOCQ/R1, MOCQ/R3). Moreover, patients with migraine and tension-type headache had higher scores on two other phobias scales: IP1 and IP5. We also found a significant impairment on STAI-X2, on EPQ/R-N and on MOCQ/R, /R1 and R3 scales in patients with episodic tension-type headache. One-way ANOVA performed on the headache group, excluding the controls, revealed significant differences in the T-anger scale (F=2.49; p=0.044) as regards the STAXI, Beck (F=6.69; p=0.000), STAI-XI (F=8.09; p=0.000), STAI-X2 (F=7.39; p=0.000), QD (F=7.71; p=0.000), EPQ/RN (F=4.34; p=0.002), QPF/R (F=7.14; p=0.000), IP-R (F=3.87; p=0.000), IP-1 (F=2.77; p=0.029), IP-2 (F=4.35; p=0.002), IP-4 (F=4.93; p=0.001), MOCQ/R (F=4.61; p=0.001), MOCQ/R1 (F=4.78; p=0.001), MOCQ/R3 (F=3.92; p=0.004) and STAI-X3 (F=7.54; p=0.000). Bonferroni's post hoc

Table 2 State and Trait Anger Expression scores in controls and in headache patients

	Controls	Migraine	Episodic tension-type headache	Chronic tension-type headache	Migraine and episodic tension-type headache	Migraine and chronic tension-type headache	*F* value	*p*
State Anger Scale	13.6±7.3	11.1±2.4	11.7±2.9	13.0±5.3	12.7±3.8	12.8±4.8	1.66	ns
Trait Anger Scale	18.0±7.2	18.1±3.9	19.0±4.3	19.5±5.5	20.4±4.8	21.0±5.9*§	2.31	0.045
Angry temperament	6.2±2.2	6.5±1.9	6.9±2.1	7.4±2.4	7.5±2.2*	7.6±2.6*	3.02	0.012
Angry reaction	8.1±2.9	8.5±2.4	8.4±2.2	8.6±3.1	9.6±2.7*	9.8±3.2*	2.57	0.027
Anger-in	17.3±5.1	17.1±4.5	18.7±5.6	17.9±5.2	19.5±4.5	19.6±5.2	2.21	ns
Anger-out	13.0±3.7	14.0±3.0	13.5±2.9	13.7±3.6	14.2±3.5	13.7±3.4	0.73	ns
Anger control	26.0±5.0	23.3±5.5	22.8±4.9*	22.6±6.0*	22.8±5.6*	23.0±5.1*	2.51	0.031
Anger expression	22.4±11.0	24.1±9.4	25.5±8.8	25.0±9.4	26.7±9.5	26.5±9.8	1.25	ns

*p≤0.05 in comparison with controls (Dunnett's post hoc)
§p≤0.05 in comparison with migraine patients (Bonferroni's post hoc)

Table 3 Beck's Depression Inventory, State and Trait Anxiety Inventory and Cognitive Behavioral Assessment in controls and in headache patients

	Controls	Migraine	Episodic tension-type headache	Chronic tension-type headache	Migraine and episodic tension-type headache	Migraine and chronic tension-type headache	*F* value	*p*
BDI Depression	6.0±5.5	7.5±5.8	9.3±7.3	15.0±7.7***###	13.1±8.6***##	14.2±9.8***###	9.88	<0.001
STAI-X1 State anxiety	36.9±9.0	36.9±9.0	38.6±11.5	48.6±12.3***###$	43.3±11.4*#	47.6±12.8***###$$	8.91	<0.001
STAI X-2 Trait anxiety	37.8±9.5	41.1±10.5	44.5±11.9*	50.9±10.7***##	50.1±10.1***###	51.4±12.7***###	11.94	<0.001
QD Depression	3.8±3.8	4.3±4.2	5.3±4.2	9.9±4.3***###$$	6.8±4.7**	7.5±5.1***#	9.12	<0.001
EPQ/R-E Intra/extratensive	8.3±3.3	8.6±3.4	7.0±3.8	6.9±3.5	7.5±3.0	6.8±3.7	2.18	ns
EPQ/R-N Emotional liability	4.0±3.0	5.1±3.6	6.5±3.5*	7.8±3.1***	8.3±6.1***##	7.7±3.5***#	7.84	<0.001
EPQ/R-P Antisociality and maladjustment	2.9±1.8	2.6±1.5	2.2±1.2	2.9±2.0	2.6±1.4	2.6±1.5	0.87	ns
EPQ/R-L Simulation	7.5±2.5	8.1±2.4	8.1±3.2	8.3±2.4	9.3±6.3	8.6±2.5	1.27	ns
QPF/R Psychophysiological disorders	42.4±2.4	47.6±12.9	48.7±11.0	61.2±12.7***###$$	53.8±13.6***	57.5±12.7***##$	11.87	<0.001
IP-R Phobias/total score	53.4±30.5	64.3±31.6	65.5±28.7	75.7±40.5*	81.0±36***	89.9±40.8***##$	6.23	<0.001
IP-1 Calamities	13.7±8.8	16.1±7.9	16.4±8.8	18.1±10.5	20.0±7.8**	21.0±8.7***	4.37	<0.001
IP-2 Social phobia	16.8±9.4	18.6±10.6	21.8±11.8	23.8±13.2*	26.5±10.2***##	26.4±10.5***##	6.36	<0.001
IP-3 Repellent animals	7.7±6.7	10.5±8.1	8.7±6.8	10.7±7.5	10.8±8.5	12.8±8.9	2.13	ns
IP-4 Departure	3.5±3.9	4.5±4.3	4.6±3.6	9.5±8.5***##$	7.0±6.5*	8.8±7.4***#	6.68	<0.001
IP-5 Physicians and blood	6.3±3.9	7.5±5.0	7.3±4.5	8.5±4.8	8.8±5.1*	9.8±4.2**	3.15	0.009
MOCQ/R Obsessive-compulsive/total score	4.3±3.2	5.0±3.0	7.3±4.4**	9.1±4.7***###	6.8±4.5**	7.4±4.1**	7.02	<0.001
MOCQ/R-1 Checking	2.3±2.0	2.4±2.0	4.3±2.7**##	4.5±2.6***##	3.6±2.6*	3.8±2.3*	6.20	<0.001
MOCQ/R-2 Cleaning	1.8±1.6	2.2±1.5	2.4±1.9	3.1±2.1	2.2±1.8	2.5±1.7	2.18	ns
MOCQ/R-3 Doubting/ruminating	0.5±0.8	0.7±1.1	1.5±2.6*	2.0±1.3**#	1.7±2.2**#	1.9±1.5***#	6.27	<0.001
STAI-X3 State anxiety	17.0±4.1	16.9±5.0	18.0±6.0	24.0±6.1***###$$	19.4±6.3	21.7±7.2***##	8.13	<0.001

#$p \leq 0.05$, ##$p \leq 0.01$ and ###$p \leq 0.001$ in comparison with migraine (Bonferroni's post hoc)
$$p \leq 0.05$, $$$p \leq 0.01$ in comparison with episodic tension-type headache (Bonferroni's post hoc)
*$p \leq 0.05$, **$p \leq 0.01$ and ***$p \leq 0.001$ in comparison with controls (Dunnett's post hoc)

showed that patients with migraine had significantly lower scores than patients with migraine associated with chronic tension-type headache in Trait Anger. No other significant differences were found in the STAXI scales.

The same tendency emerged for depression (BDI and QD), anxiety (STAI-X1 and-X2), phobias (IP-R, IP-2, IP-4), emotion liability (EPQ/R-N), psychophysiological disturbances (QPF-R) and obsessive-compulsive symptoms (MOCQ/R-3): also in this case patients with migraine showed significantly lower scores compared to patients with migraine associated with chronic tension-type headache. Comparisons between migraine and migraine associated with episodic tension-type headache revealed significantly increased scores for the latter group on BDI, STAI-X1 and-X2, EPQ/R-N, IP-2 and MOCQ/R-3 scales. Migraine revealed lower scores compared to chronic tension-type headache on BDI, STAI-X1 and -X2, QPF-R, IP-4, QD, MOCQ/R, MOCQ/R-1 and MOCQ/R-3 scales. Finally, migraine showed lower scores compared to episodic tension-type headache on the MOCQ/R-1 scale. Migraine with chronic tension-type headache showed higher scores compared to episodic tension-type headache on STAI-X1, QPF/R and IP-R, while episodic tension-type headache showed lower scores compared to chronic tension-type headache on STAI-X1, QPF/R, IP-4 and QD scales. Patients with chronic tension-type headache, with or without migraine, revealed a higher level of anxiety at the end of the battery (STAI-X3) compared to controls and migraine patients. Moreover, patients with chronic tension-type headache were significantly more anxious (STAI-X3) than episodic tension-type headache patients.

Finally, we transformed the STAXI raw scores in percentile and T scores. Only the subscales (mean±SD) that showed significant differences among subgroups in the previous comparisons were reported. For T-anger, patients that were out of the normative range were 65% of the migraine with chronic tension-type headache (percentile scores: males 78.1±22.8, females 79.7±17.6; T scores: males 65.2±6.3, females 71.5±4.3). For T-anger/T, patients that were out of the normative range were 58.2% of the migraine with episodic tension-type headache (percentile scores: males 81±12.1, females 75.5±14.2; T-scores: males 71.4±10.5, females 68.3±8.6) and 53.4% of the migraine with chronic tension-type headache (percentile scores: males 77.7±10.1, females 71.3±12.4; T-scores: males 69.8±6.1, females 62±4.1). For T-anger/R, patients that were out of the normative range were 63.4% of the migraine with episodic tension-type headache (percentile scores: males 83±10, females 79±10.6; T-scores: males 72.8±7.6, females 70.3±10.5) and 63% of the migraine with chronic tension-type headache (percentile scores: males 79.5±4.2, females 75.6±8.1; T-scores: males 70.1±6.1, females 68.2±4.8). For Anger-control, patients that were out of the normative range were 97% of the episodic tension-type headache (percentile scores: males 9.7±5.5, females 11.5±6.2; T-scores: males 35.4±9, females 37.2±9.5), 92.3% of the chronic tension-type headache (percentile scores: males 4.3±1.9, females 4.6±2.1; T-scores: males 32.3±8.7, females 33.2±8.9), 96.1% of the migraine with episodic tension-type headache (percentile scores: males 3.8±1.1, females 14.8±5.7; T-scores: males 32.3±9, females 39.7±9.5) and 90% of the migraine with chronic tension-type headache (percentile scores: males 22±6.3, females 27.1±6.7; T-scores: males 43.3±9.8, females 43.2±9.7).

Discussion

Our study was performed in a population of patients with migraine and/or tension-type headache referring to a headache centre. It is well known that headache patients seeking medical assistance report more frequent headaches, greater functional disability and present psychological characteristics different from headache patients who do not consult physicians [23]. Taking into account the characteristics of the population we have studied, we found interesting findings on anger control and emotional distress in our headache patients.

First, anger control was significantly lower in all the headache patients we examined except in migraine, in accordance with some studies [12] but not with others [13, 14]. Tension-type headache patients, regardless of the clinical subtype, the frequency of attacks or the duration of the disease, presented a reduced ability to monitor and to prevent the experience of anger. In patients with episodic tension-type headache, Hatch et al. [12] found a reduced ability to control angry feelings but no data on migraine patients is available. The authors also found higher scores in anger suppression (anger-in), in general index of anger expression (AX/EX) and trait anger (T-anger), but no significant differences were found between the headache patients and the controls for the expressed anger (anger-out) scores. In accordance with Hatch et al. [12], we thought that the lack of anger control of our patients was related to an increase in the experience of anger as feelings of resentment, mistrust or frustration rather than representing a direct expression of anger toward other people or objects.

Second, in our study, anger-in and anger-out scores were not significantly different among the headache patients even when compared with controls. These finding do not match with several studies dealing with the way headache patients express angry feelings: as previously reported [11, 12], headache patients are often inhibited in expressing anger compared to healthy controls.

Third, patients with migraine associated with both episodic and chronic tension-type headache showed a significant increase in the trait-anger score and/or its subscales (T-anger/T, T-anger/R). So, the migraine and tension-type headache patients seem to present a disposition experiencing anger even without specific provocation. Trait anger is considered to have a stable pattern of personality attributes, quite similar to hostility [1]. Some studies reported that migraine patients are overcontrolled in their behaviour and present personality traits that lead others to regard them as nice and agreeable people [16]. Other studies [24–26] suggested that migraine patients do not have a great deal of anger and/or suppressed anger, and if it is present, it is probably an unconscious defence mechanism; tension-type headache patients are more openly hostile and consciously troubled. Anger is a feeling that may be prone to denial because of social and moral norms, and in some cases, pain sufferers could have the tendency to deny angry feelings and aggressiveness [1].

The neurobiology of anger is still under investigation. Studies using positron emission tomography (PET), single photon emission computed tomography (SPECT) and functional magnetic resonance imaging (fMRI) have explored the neuroanatomic substrates of anger and aggressive behaviour [27, 28]. Both cortical regions, like inferior frontal cortex and left temporal pole, and subcortical structures like basal ganglia and amygdala are involved in the control and expression of anger. Neurochemical studies have shown that several neurotransmitters, like norepinephrine, serotonin, dopamine and acetylcholine, are involved in the modulation of anger and aggressive behaviour. Some studies demonstrated that patients with depression and anger attacks have a greater central serotonergic dysregulation than depressed patients without such attacks [29, 30]. Recently, a polymorphism of the gene coding for tryptophan hydroxylase, the rate-limiting enzyme in serotonin biosynthesis, was shown to be associated with anger-related traits of personality [31]. Finally, recent studies suggested that patients with chronic daily headache have a significant impairment of serotonin metabolism [32, 33]. So the dysfunction of cerebral serotonergic system seems to be one of the key features in the mechanism of transformation of an episodic to a chronic form of headache and it may play a role in the abnormalities in anger experience and control observed in our patients. The results obtained by the administration of the CBA 2.0 and the BDI evidence a lack of psychopathological impairment in the migraine group compared to controls. On the contrary, the chronic tension-type headache and migraine associated with tension-type headache patients experienced higher levels of depressive symptoms, state and trait anxiety, phobias (especially social refusal and departures), emotion liability, psychophysiological disorders and obsessive-compulsive symptoms in comparison with controls. Episodic headaches differed from controls only on trait anxiety, emotion liability and obsessive-compulsive symptoms. Our results provided evidence that patients with chronic tension-type headache and migraine associated with tension-type headache experience more emotional distress in comparison to both migraine and tension-type headache with an episodic occurrence. However, it is important to highlight the self-report nature of the tests used and the consequent methodological limitations of the interpretation of the data.

In conclusion, we have found that chronic headache sufferers show a significant impairment in their ability to control angry feelings and a significant increase of trait anger, anxiety, depression, obsessive-compulsive symptoms, phobias and psychophysiological disorders. We suggest that an interdisciplinary approach to the study of headache may be useful to better characterise the therapeutic management of the different types of patients.

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