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The MMPI-2 in women with headache or facial pain. A comparative study

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Abstract Our purpose was to apply the Minnesota Multiphasic Personality Inventory (MMPI-2) to groups of women with different types of headache and facial pain. 117 women with tension-type headache (TTH), migraine (M), facial pain disorder as somatoform disorder (FP), myogenous facial pain (MP), or temporomandibular joint disorder (TMJ) were given the Italian version of the MMPI-2. The level of pain was assessed with the visual analogue scale (VAS). A configural analysis of the MMPI profiles was also performed. Data were analysed with one-way ANOVA, chi-square analysis and Pearson's correlation coefficient. FP and TH patients showed the highest scale elevation and TMJ patients the lowest. The TMJ group had the highest prevalence of "coper" configuration and the FP group the lowest. A correlation was found between VAS and MMPI-2 scores for hypochondria, hysteria and paranoia. We conclude that: chronic pain may alter the patient's personality characteristics; patients with facial pain disorder show the highest tendency to neurotism and psychoticism; and in patients with migraine, TTH and MP, the psychological component may vary conspiquously. These factors should be taken into account when selecting the treatment options.

Key words MMPI-2 • Headache • Facial pain • Personality traits

Introduction

Numerous psychometric tests have been used in the assessment of personality factors contributing to the experience of chronic pain. The Minnesota Multiphasic Personality Inventory (MMPI) [1] is probably the most widely used of such instruments [2–12]. Depending on the answers (true-false) to a large number of questions, a score is given on 3 validity scales (L = lie, F = frequency, K = correction or defence) and on 10 clinical scales (Hs = hypochondria, D = depression, Hy = hysteria, Pd = psychopathological deviation, Mf = masculinity-femininity, Pa = paranoia, Pt = psychasthenia, Sc = schizophrenia, Ma = hypomania, Si = social introversion).

Four types of MMPI typologies were proposed based on some characterizing algorithms [13,14]: one type with the "conversive V" profile (with Hs and Hy scores above normal and D being at least 10 points lower); a second "depressed" type, with elevation of the neurotic triad (HS, D, Hy) and of depression in particular, with no other scale being consistently elevated; a third type of "emotionally overwhelmed" patients with scale elevation of the neurotic triad and several other scales; and lastly a fourth type (the "coper") with a normal profile.

Despite some criticisms about the adequacy and risks of misinterpretation of some scales [15,16], the MMPI has been widely used to investigate the personality of patients with headache and other types of facial pain. In migraine

patients, some authors found normal MMPI profiles or, at least, a lower scale elevation than in patients with chronic tension-type headache or with migraine and tension-type headache superimposed [17–19]. Instead, others reported an elevation of several MMPI scales and, in female migraine patients, a "conversive V" profile [20]. Mongini et al. [21] used the MMPI to assess personality profiles in patients with different types of headache or facial pain, and found that the group with facial pain disorder as somatoform disorder (FP) (previously referred to as "atypical facial pain") had the highest elevation of many MMPI scales while the group with arthrogenic facial pain due to disorders of the temporomandibular joint (TMJ) showed little or no elevation. In addition, patients with migraine (M) and, even more, those with tension-type headache (TTH) had a consistent elevation of several scales, although to lower extent than the FP patients. More recently, Mongini et al. [22] administered the MMPI to 43 women with migraine and found all four MMPI configurations. In another work in which the MMPI profiles were examined in patients with chronic daily headache (CDH), Mongini et al. [23] found in the majority of patients a depressive or emotionally overwhelmed profile and a conversive profiles in the others. In one patient only, no scale elevation was found.

In the last decade, the MMPI has been revised and adapted to the sociocultural and life style changes which made some items obsolete. This new instrument was released as the MMPI-2 [24, 25]. Butcher et al. [26], using the MMPI-2, have further elaborated 15 "content scales": anxiety (ANX), fears (FRS), obsessivity (OBS), depression (DEP), health concerns (HEA), bizarre ideas (BIZ), anger (ANG), cynicism (CYN), antisocial behavior (ASP), hypermotivation, impatience and irritability (TPA), low self esteem (LSE), social disability (SOD), family problems (FAM), working difficulties (WRK), and treatment difficulties (TRT). Recently, this instrument was adapted to the Italian population [27].

The purpose of this work was to analyze with this instrument a group of women with different types of headache and facial pain in order to determine:

1. To which extent the data of our previous works can be replicated, and,
2. To which extent the use of the MMPI-2 is helpful in acquiring new information on the relationship between psychopathology and headache or facial pain.

Materials and methods

The study group comprised 117 consecutively referred women (mean age, 36 ± 13 years), with the following diagnoses: tension-type headache (TTH), migraine with or without aura (M), myogenous facial pain (MP), facial pain disorder as somatoform disorder (previously defined as atypical facial pain) (FP), and TMJ intra-

capsular disorder. Exclusion criteria were the presence of other pathologies, such as tumors, trauma, inflammation or systemic disease superimposed onto the headache/facial pain problem which might produce the symptoms. The diagnostic criteria of the International Headache Society (IHS) [28], and for FP patients, of the DSM-IV [29] were employed.

A patient was assigned to the TTH group when the pain was pressing and/or tightening in quality, and bilateral or variable in location. Nausea and photophobia might be present, without being a distintive feature. Objectively, signs of temporal and/or masseter hypertrophy were often present on inspection, and the careful palpation of all head muscles revealed moderate-to-severe tenderness.

To be assigned to the M group, a patient had to suffer from unilateral, pulsatory headache attacks with moderate-to-severe nausea and/or vomiting and photophobia, with no or mild signs of muscle hyperfunction.

In MP patients, most facial and masticatory muscles were painful at palpation, while palpation of the intra-auricular point and the retrocondylar aspect elicited little or no pain. Location of pain could be different according to the muscles mainly involved: pre-auricular and cheek areas for the lateral pterygoid and masseter muscles; and parietal, temporal, periorbital areas for the temporal muscle. Possible triggering or aggravating factors were: stress or situations that required intense concentration, meteorological changes or certain weather conditions (cold, humidity, wind), and sports involving prolonged isometric contractions. Mastication was not an overt aggravating factor.

In the FP patients pain was, according to the DSM-IV [29], the "predominant focus of clinical attention" in which psychological factors seem "to have an important role in its onset, severity, exacerbation, or maintenance". Pain in such patients was usually constant or persistent for most of the day, and was troublesome or poorly defined. At onset, it could be confined to a limited area of the maxilla or the mandible, but it might then spread to a wider area of the face and neck. Typically, it was not confined to the distribution of a cranial or cervical nerve root, neither could a structural source of pain be identified. Moreover, from the history and clinical examination the pain was not better accounted for by a mood, anxiety, or psychotic disorder.

To be assigned to the TMJ group a patient should show clinical or radiological signs of internal TMJ derangement, such as disc displacement with or without reduction, and arthrotic degeneration of the joint. In these patients mastication was always an aggravating factor.

The Italian MMPI-2 version was administered and T-scores were calculated. Each patient was further asked to assess the level of pain using the visual analogue scale (VAS), by placing a mark on a vertical line 10-cm long at an appropriate distance between the two endpoints (no pain and most intense pain imaginable, respectively) A configural analysis of the MMPI profiles was performed according to the aforementioned parameters. One-way ANOVA and Bonferroni test were applied to examine differences of MMPI data between the groups, while chi-square analysis was used to examine differences of distribution according to the configural analysis. Eventually the Pearson correlation coefficient was used to examine the relation between MMPI scores and age, pain chronicity and pain intensity.

Among the 117 women with headache and facial pain, 24 were assigned to the TTH group, 21 patients to the M group (1 migraine with aura, 20 without aura), 22 patients to the MP group, 29 patients to FP, and 21 patients to the TMJ group (Table 1).

Results

There was no significant difference in age between the groups. Pain chronicity, calculated from the number of months since pain onset, was highest in the M group. VAS scores were significantly higher in M patients than in TMJ patients (Table 1).

Table 2 and Fig. 1 show the mean MMPI-2 clinical scale scores, while Table 3 and Fig. 2 show the content scale scores. FP and TTH patients had the three neurotic scales

Table 1 Clinical characteristics of the 117 women, by type of facial pain or headache. Values are means (SD)

	Total 117	TTH (n = 24)	M (n = 21)	MP (n = 22)	FP (n = 29)	TMJ (n = 21)	ANOVA p	Differences after Bonferroni
Age (years)	36 (13)	36 (13)	35 (11)	41 (12)	38 (14)	31 (10)	ns	-
Pain chronicity (months)	58 (45)	54 (45)	94 (43)	49 (43)	50 (41)	48 (41)	< .01	M > all others
VAS score	62 (26)	62 (27)	72 (23)	59 (21)	68 (24)	42 (27)	< .01	TMJ < M, FP

TTH, tension-type headache; *M,* migraine; *MP,* myogenous facial pain; *FP,* facial pain as somatoform disorder; *TMJ,* temporomandibular joint disorder; *VAS,* visual analog scale of pain level
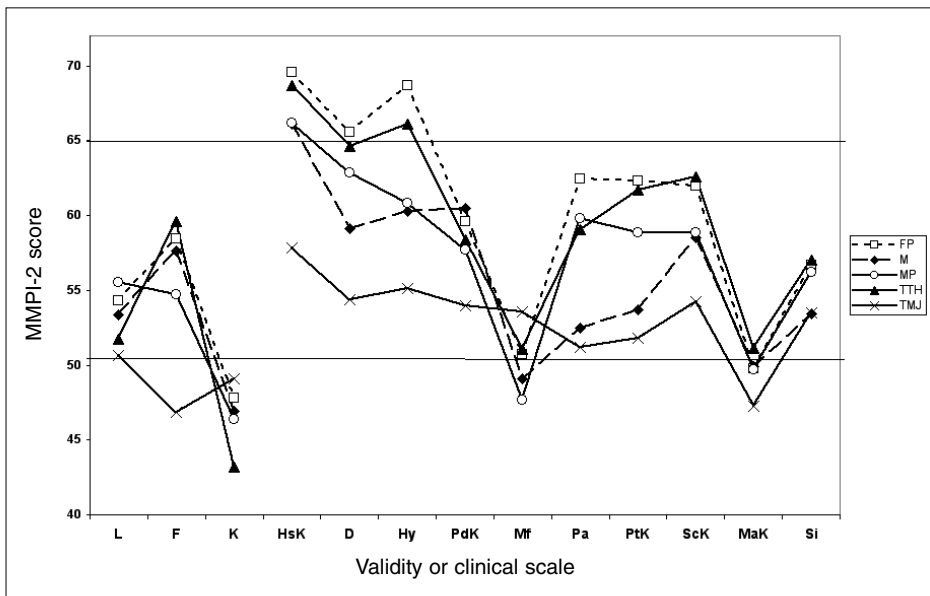

Fig. 1 MMPI-2 profiles of the clinical scales in the diagnostic groups. In general, the FP group and the TTH group the highest scores

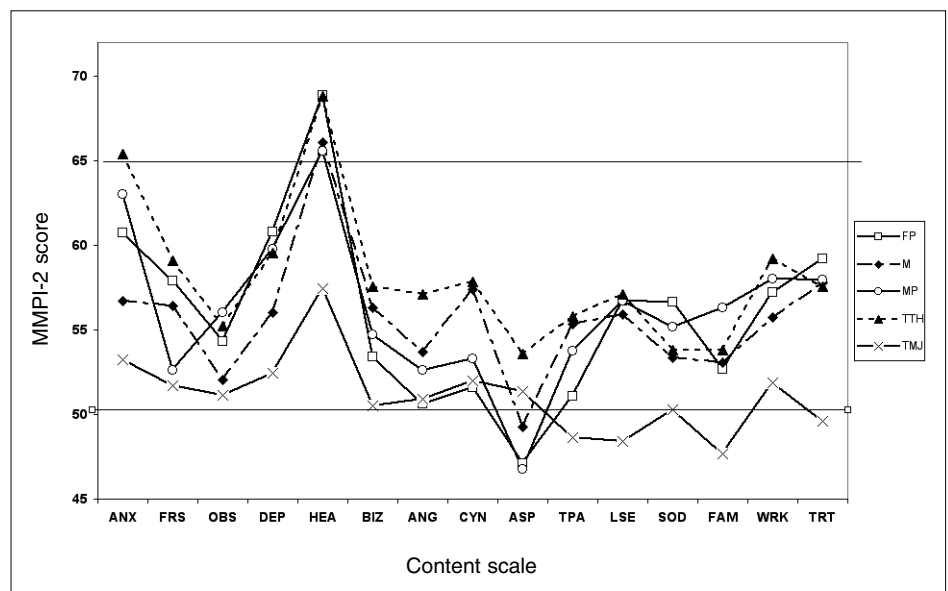**Fig. 2** MMPI-2 profiles of the content scales in the diagnostic groups

Table 2 MMPI-2 validity and clinical scores for the 5 groups of patients with facial pain or headache. Values are means (SD)

	L	F	K	HsK	D	Hy	HsK+D+Hy	PdK	Mf	Pa	PtK	ScK	MaK	Si
TTH	52 (9)	60 (14)	43 (10)	69 (11)	65 (11)	66 (11)	200 (29)	58 (7)	51 (11)	59 (12)	62 (11)	63 (10)	51 (11)	57 (11)
M	53 (9)	58 (17)	47 (8)	66 (13)	59 (14)	60 (11)	185 (36)	60 (13)	49 (7)	52 (11)	54 (13)	59 (11)	50 (13)	53 (13)
MP	56 (10)	55 (10)	46 (8)	66 (10)	63 (12)	61 (12)	190 (32)	58 (8)	48 (10)	60 (9)	59 (11)	59 (8)	50 (10)	56 (10)
FP	54 (7)	58 (10)	48 (11)	70 (11)	66 (11)	69 (14)	205 (32)	60 (7)	51 (10)	62 (11)	62 (9)	62 (8)	50 (11)	57 (10)
TMJ	51 (8)	47 (6)	49 (9)	58 (12)	54 (9)	55 (12)	167 (30)	54 (6)	54 (9)	51 (11)	52 (8)	54 (6)	47 (6)	54 (6)
ANOVA														
F	ns	4.057	ns	3.893	4.240	4.849	5.059	ns	ns	4.850	4.473	3.650	ns	ns
p	ns	0.0041	ns	0.0053	0.0031	0.0012	0.0009	ns	ns	0.0012	0.0022	0.0078	ns	ns
Differences after Bonferroni	–	TMJ < TTH, M, FP	–	TMJ < TTH, FP	TMJ < TTH, FP	TMJ < TTH, FP	TMJ < TTH, FP	–	–	FP > M, TMJ	TMJ < TTH, FP	TMJ < TTH, FP	–	–

TTH, tension-type headache; *M*, migraine; *MP*, myogenous facial pain; *FP*, facial pain of somatoform disorder; *TMJ*, temporomandibular joint disorder; *ns*, not significant

Table 3 MMPI-2 Content scale scores for the 5 groups of patients with facial pain or headache. Values are means (SD)

	ANX	FRS	OBS	DEP	HEA	BIZ	ANG	CYN	ASP	TPA	LSE	SOD	FAM	WRK	TRT
TTH	65 (11)	65 (12)	59 (15)	55 (12)	60 (11)	69 (11)	58 (12)	57 (12)	58 (12)	54 (10)	56 (13)	57 (9)	54 (13)	54 (8)	59 (13)
M	61 (13)	57 (13)	56 (10)	52 (11)	56 (12)	66 (14)	56 (12)	54 (12)	57 (16)	49 (8)	55 (12)	56 (13)	53 (12)	53 (10)	56 (14)
MP	58 (10)	63 (10)	53 (10)	56 (9)	60 (9)	66 (10)	55 (9)	53 (10)	53 (12)	47 (8)	54 (9)	57 (11)	55 (9)	56 (10)	58 (8)
FP	60 (11)	61 (10)	58 (13)	54 (10)	61 (9)	69 (14)	53 (13)	51 (11)	52 (12)	47 (8)	51 (12)	57 (11)	57 (13)	53 (11)	57 (10)
TMJ	53 (9)	53 (9)	52 (9)	51 (11)	52 (8)	57 (9)	51 (9)	51 (8)	52 (12)	51 (8)	49 (11)	48 (9)	50 (7)	48 (8)	50 (10)
ANOVA															
F	ns	4.333	ns	ns	3.295	3.819	ns	ns	ns	3.002	ns	2.944	ns	ns	ns
p	ns	0.0027	ns	ns	0.0136	0.0060	ns	ns	ns	0.0214	ns	0.0234	ns	ns	ns
Differences after Bonferroni	–	TMJ < TTH, MP	–	–	TMJ < FP	TMJ < TTH, FP	–	–	–	TTH > FP	–	TMJ < TTH, FP	–	–	–

TTH, tension-type headache; *M*, migraine; *MP*, myogenous facial pain; *FP*, facial pain of somatoform disorder; *TMJ*, temporomandibular joint disorder; *ns*, not significant

Table 4 Patient distribution according to diagnosis and MMPI-2 configuration. In 10 patients the profile could not be classified

Diagnosis	Patients, n				Chi-square
	Copers	Depressed	Conversive V profile	Emotionally overwhelmed	
FP (n=29)	2	2	12	13	$p < .001$
M (n=21)	4	1	6	6	ns
MP (n=22)	5	3	4	10	ns
TTH (n=24)	4	4	5	9	ns
TMJ (n=21)	12	1	5	1	$p < .001$
Total (n=117)	27	11	30	39	
	$p < .01$	ns	ns	$p < .05$	

FP, facial pain as somatoform disorder; *M*, migraine; *MP*, myogenous facial pain; *TTH*, tension-type headache; *TMJ*, temporomandibular joint; *ns,* not significant

Table 5 Pearson correlation analysis between MMPI scales and age, VAS and pain chronicity

MMPI-2 validity on clinical scale	Age	VAS	Chronicity
L	–0.0486	0.0994	–0.1097
F	0.0979	0.2258 *	–0.0424
K	–0.2371 *	–0.0472	–0.1582
HsK	0.0553	0.2195 *	0.1136
D	–0.0044	0.0133	0.0393
Hy	–0.0372	0.2397 **	0.0565
PdK	–0.0847	0.1962	0.0091
Mf	0.0286	0.0515	–0.0035
Pa	0.1623	0.2145 *	–0.0805
PtK	–0.0370	–0.0080	0.0010
ScK	–0.0067	0.1136	–0.1076
MaK	0.0518	0.1651	–0.1199
Si	0.0122	–0.1376	–0.0159

*r > 0.1816, $p < 0.05$; **r > 0.2373, $p < 0.01$

(Hs, D, Hy) above the normality level, while MP and M patients had only Hs elevated. Of the content scales, all groups except TMJ had elevated health concerns (HEA). Interestingly, several other scales were significantly lower in the TMJ group than in other groups (Tables 2, 3).

Data from the configural analysis are shown in Table 4. The TMJ group had the highest prevalence of copers and the FP group had the lowest. These patients were roughly equally distributed between the "conversive" and "emotionally overwhelmed" profiles. Patients of the other groups were more broadly distributed between the different profiles.

After Pearson's correlation analysis (Table 5), a correlation was found between VAS scores and hypochondria, hysteria and paranoia. No correlation was found between MMPI-2 scores and age or pain chronicity.

Discussion

Our investigation was limited to female patients for 2 reasons. The first was that female patients were overwhelmingly more frequent. This was due to a higher prevalence in women of the pathologies at hand, but may also be partially related to a higher tendency of women to seek treatment in a speciality center. The second reason was related to the different significance that the MMPI-2 data may have between males and females.

A question to consider when studying chronic pain syndromes is whether personality disturbances predispose to such syndromes in general (and to headache and facial pain in particular), or whether the pain itself causes such disturbances. In our previuos study [21] we compared our data to those from two control groups – healthy, pain-free subjects and patients suffering from chronic pain outside the craniofacial and neck areas – and found that in the chronic pain patients, several MMPI scores were higher than those of the pain-free subjects, but they were still within normal levels and substantially lower than those of all headache/facial pain groups except the TMJ group.

In general the data at hand confirm, in agreement with those of the previous work [21], that chronic headache and facial pain are frequently accompanied by some personality changes. This may in part be a consequence of the presence and level of chronic pain. Indeed, these changes were minimal in the TMJ group that also had the lowest VAS scores. However, we did not find a strict relationship between pain parameters and personality characteristics. In fact, the FP patients had the majority of the clinical scales higher than the other groups although neither pain chronicity nor pain level was higher. After Pearson's correlation analysis, a correlation was found between VAS scores and three MMPI-2 scales. However, the correlation between these variables

could be bidirectional in nature. Scores of the neurotic scales (Hs, D, Hy) were higher in the TTH patients than in the M patients, although not significantly so. This confirms our previous results [21].

The configural analysis confirmed that FP patients are those most likely to show some alterations at the MMPI: indeed, in this group only 2 of 29 patients had a normal profile while 27 of 29 had either a "conversive" or an "emotionally overwhelmed" profile. On the other hand the majority of TMJ patients had a normal profile. TH, MP and M patients were in an intermediate position.

In conclusion, the data at hand confirm that in women:

1. Chronic pain may alter the patient's personality characteristics but does not fully account for the differences in data found between the diagnostic groups.
2. Patients with facial pain disorders are those who show the highest tendency to neurotism and to psychoticism; this confirms that in these patients psychological factors may play a significant role in the onset and maintenance of pain.
3. In patients with migraine, TTH and MP, the psychological component may vary conspiquously. This factor should be taken into account when selecting the treatment options.
4. Long-term studies are needed on patients with personality changes, or on those with headache and facial pain, to further verify the relationships between these two variables.

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