

Personality traits in headache patients with and without dyspepsia

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Abstract

Background & Objectives: Personality trait plays an important role in determining the various presentations of tension-type headache (TTH) and migraine. The primary objective of this study was to evaluate the types of personality traits present among patients with migraine and TTH. The secondary objective was to determine whether the patients with headache and coexisting dyspepsia had different personality traits from the patients with headache alone without dyspepsia. **Methods:** This was a cross-sectional study conducted in the University Malaya Medical Centre from February 2017 until March 2020. Patients who fulfilled the diagnostic criteria for migraine and TTH according to the International Headache Society (IHS) classification were recruited. The patients' personality traits were evaluated using the Minnesota Multiphasic Personality Inventory-2-restructured Form (MMPI-2-RF). The MMPI Personality Psychopathology-Five (PSY-5) Scales, comprising aggressiveness, psychoticism, disinhibition, neuroticism, and introversion were used. The presence of dyspepsia was diagnosed using the Leeds Dyspepsia Questionnaire. **Results:** There were no statistically significant differences when comparing types of personality traits between migraine and TTH patients. On univariate analysis, headache with dyspepsia was significantly associated with more neuroticism as compared to headache alone ($p=0.027$). On logistic regression, TTH with dyspepsia was significantly associated with neuroticism ($p=0.024$, OR=6.921). Psychoticism was significantly associated with chronic daily headache ($p=0.001$, OR=7.476). Aggression was significantly associated with male gender ($p=0.018$, OR= 7.580).

Conclusion: Headache with coexistent dyspepsia was associated with more neuroticism as compared to headache alone. In particular, TTH with coexistent dyspepsia was significantly associated with neuroticism compared to TTH without dyspepsia.

Keywords: Headache, migraine, tension-type headache, personality trait, disinhibition, neuroticism, psychoticism

INTRODUCTION

Headache is one of the most common diseases presenting to outpatient neurology clinics worldwide.^{1,2} Headache disorders can lead to reduction in work productivity and affect the social life of the patients.¹ The two most common primary subtypes are tension-type headache (TTH) and migraine.³

The intensity and frequency of headache has been correlated with various psychological disorders.⁴ Conversely, headache, especially migraine, is associated with neuropsychiatric morbidity.¹ Furthermore, psychological factors can influence the health-seeking behaviour of patients with migraine and TTH.⁵

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Personality traits play an important role in determining the various presentations of TTH and migraine.⁵⁻⁹ In addition, personality traits play an essential role in influencing the progression of headache, particularly TTH.⁹ When headache worsens, personality traits then influence psychological adjustment to the progression of headache as well as to persistent headache.⁹

Knowledge of an individual's personality trait is important because this will enable better management of headache.^{5,9-11} Importantly, an evaluation of personality traits enables the patients' management plan to be optimised.^{9,10,12} Problems such as headache refractory to prophylactic drugs and chronic daily headache (CDH) can be better addressed.⁹ Furthermore, certain personality traits may cause headache patients to be more likely to develop neuropsychiatric disorders such as anxiety and depression.⁹

An association between headache and gastrointestinal disorders such as functional dyspepsia (FD) has been reported.^{12,13} As with headache, psychological factors have been associated with functional dyspepsia.¹⁴ In this group of patients, anxiety and stress levels have been positively correlated with the severity of dyspepsia.¹⁴

The primary objective of this study was to evaluate the types of personality traits present in patients with migraine and TTH. The secondary objective was to determine whether patients with headache coexisting with dyspepsia had different personality traits from patients with headache alone without dyspepsia. We also aimed to compare the differences in personality traits between patients with CDH and patients with episodic headache. We also examined the independent associations of the various personality traits with gender, CDH, chronic migraine, chronic TTH, migraine with dyspepsia, TTH with dyspepsia and CDH with dyspepsia.

METHODS

Patient Selection

This was a cross sectional study conducted in the University Malaya Medical Centre between February 2017 and March 2020. This study was approved by the Institutional Ethics Committee of the University Malaya Medical Centre. The patients with headache were recruited from the neuromedical clinic and primary outpatient clinic in the University Malaya Medical Centre. The patients recruited were aged 18 years and above. Written informed consent was obtained from

all the study participants, their parents or their guardians.

Patients who fulfilled the diagnostic criteria of migraine and TTH according to the International Headache Society (IHS) classification were recruited into the study. A headache frequency of at least one episode a month for more than three months was required.

Exclusion criteria were: patients who were on non-steroidal anti-inflammatory drugs (NSAIDs), patients with known peptic ulcer disease, gastritis, and gastroesophageal reflux as well as patients with headache subtypes other than TTH and migraine. Headaches with warning signs such as focal neurological deficit, papilloedema and neck stiffness were also excluded. The presence of brain malignancy on Computed Tomography (CT) scan or Magnetic Resonance Imaging (MRI) was also an exclusion criterion.

Methods of study

All the study participants were interviewed with a structured headache questionnaire. Data on demographic characteristics and clinical data were recorded. The details of headache characteristics recorded included site, laterality (unilateral, bilateral), character (throbbing, tightness, pressing), and frequency of episodes in one month. Data on trigger factors were collected. The medications taken were recorded. The Visual Analogue Scale (VAS) was used to determine the intensity of the headache.

Headache classification

The diagnosis of the headache subtypes was based on the International Headache Society (IHS) Criteria (ICHD III).³ Chronic daily headache (CDH) was defined as headache ≥ 15 days/month.^{3,15-17}

According to the IHS criteria (ICHD-III), headaches are divided into primary and secondary headaches.³ The commonest primary headaches are migraine (with and without aura) and TTH.³

Duration of headache

Migraine episodes are characterised by headache episodes lasting from four hours to 72 hours.³ TTH episodes are characterised by headache episodes lasting from 30 minutes to seven days.³

Infrequent vs frequent TTH

We defined infrequent TTH as at least 10 episodes of headache a year occurring on less than 1 day/

month on average (<12 days/year).³ Patients with frequent TTH were defined as those having at least 10 episodes of headache occurring on 1-14 days/month on average for >3 months (≥ 12 and <180 days/year).³

Specific instruments

The VAS is recommended for use in headache studies.¹⁸ The amount of pain that a patient feels ranges across a continuum from none to an extreme amount of pain. It is usually pictured as a horizontal line 100 mm in length. There is a word description at each end of the line. The patient places a mark on the line at the point that he/she feels represents his/her current level of perceived pain.

The presence of dyspepsia was diagnosed using the original English and locally translated Malay validated versions of the Leeds Dyspepsia Questionnaire. The questionnaire is based on eight symptom-based questions. It encompasses the frequency and severity of various upper gastrointestinal symptoms, consisting of upper abdominal pain, belching, nausea, dysphagia, heartburn, regurgitation, vomiting and early satiety. A score ranging from 0 to 40 can be calculated in the Leeds Dyspepsia Questionnaire based on the item frequency. A score of $\geq 11/40$ has been shown to be diagnostic of dyspepsia.

The Minnesota Multiphasic Personality Inventory (MMPI) is the most popular validated assessment instrument used to investigate personality traits.^{19,20} The MMPI is a standardized psychometric test of adult personality and psychopathology. The MMPI-2-restructured Form (MMPI-2-RF) is composed of 338 questions. The patients' personality traits were evaluated using the MMPI-2-RF.

The MMPI Personality Psychopathology-Five (PSY-5) Scales were used to characterise the clinical symptoms, behavioural tendencies, and personality characteristics of the patients.²¹ This test gives a model of individual differences in adaptive functioning.²² Physical symptoms are related to high scores on these scales which correlate with the presence of a particular trait.

The PSY-5 consists of five scales as follows: Aggressiveness, psychoticism, disconstraint, neuroticism (or negative emotionality), and introversion or (low positive emotionality). These five major personality traits comprise the Five Factor Model (FFM).²¹ The manual scoring of the MMPI was performed by a psychiatrist who was blinded to the identity of the patients.

The Aggressiveness-Revised (AGGR-r) scale consists of 18 items describing aggressively assertive behaviour. Elevated scores are associated with instrumental aggressiveness (behaviour designed to accomplish a desired goal as opposed to being reactive).²³

The Psychoticism- Revised (PSYC-r) scale consists of 26 items describing a variety of experiences associated with thought disturbance. Elevated scores are associated with unusual perceptual experiences and thoughts, as well as a sense of alienation from others.²³

The Disconstraint- Revised (DISC-r) scale consists of 20 items describing a variety of manifestations of disconstrained behaviour. Low DISC-r scores indicate a relatively high overall level of behavioural constraint.²³

The Negative Emotionality/ Neuroticism-Revised (NEGE-r) scale consists of 20 items describing a wide range of negative emotional experiences. Elevated scores are associated with negative emotions such as anxiety, insecurity, fear and worry as well as general tendency to catastrophize and to expect the worst to happen.²³

The Introversion/ Low Positive Emotionality-Revised (INTR-r) scale consists of 20 items describing the lack of positive emotional experiences and avoidance of social situations and interactions. Elevated scores are associated with social introversion, anhedonia, restricted interests and pessimistic outlook.²³

Statistical analysis

All descriptive statistics were done using the Statistical Package for Social Sciences (SPSS) (Version 21.0, SPSS Inc., Chicago) software. For categorical data, the chi square test or Fisher's test was performed. Continuous variables were expressed as means and analysed with an independent sample t-test. Logistic regression was used to analyse the MMPI t-score in the patients with CDH and episodic headache. A p value of <0.05 was taken as statistically significant.

The associations of the various personality traits that were examined in this study were gender, CDH, chronic migraine, chronic TTH, migraine with dyspepsia, TTH with dyspepsia, CDH with dyspepsia, chronic TTH with dyspepsia, and chronic migraine with dyspepsia. When any of these associations were statistically significant on chi square test or Fisher's test, they were then analysed on logistic regression. The determinants were defined as independent determinants if logistic regression analysis showed statistically significant results.

RESULTS

The demographic characteristics of the study patients are illustrated in Table 1. Thirty four (28.6%) of the study patients had dyspepsia. Headache characteristics are shown in Table 2. Table 3 shows the diagnosis of headache according to the IHS classification.

There were no statistically significant differences in types of personality trait between patients with migraine and patients with TTH, or in MMPI t-scores between patients with migraine and TTH (Tables 4a and 4b).

On the t-test for independent samples, the MMPI t-scores for neuroticism, psychoticism, and aggression were significantly higher in CDH patients compared to patients with episodic headache. These results are illustrated in Table 5.

On logistic regression, there was no statistically significant relationship between neuroticism, psychoticism, and aggression with CDH vs. episodic headache.

Types of personality traits in headache patients with and without dyspepsia

On univariate analysis, headache coexisting with dyspepsia was significantly associated with neuroticism as compared to headache alone without dyspepsia ($p=0.027$) (Table 6).

On univariate analysis, TTH coexisting with dyspepsia was significantly associated with neuroticism compared to TTH without dyspepsia (Table 7a). Psychoticism was significantly associated with CDH, chronic migraine, as well as CDH with dyspepsia (Table 7b). Introversion was significantly associated with chronic migraine (Table 7c). Aggression was significantly associated with male gender and chronic migraine (Table 7d).

On logistic regression, TTH with dyspepsia was significantly associated with neuroticism ($p=0.024$, $OR=6.921$). Psychoticism was significantly associated with CDH ($p=0.001$, $OR=7.476$). Aggression was significantly associated with male gender ($p=0.018$, $OR=7.580$). The results of logistic regression are in Tables 8a, 8b and 8c.

DISCUSSION

To our knowledge, there has been no study to date on personality traits of headache patients with either migraine or TTH with coexisting dyspepsia. There is also not much published data on the application of the Personality Psychopathology Five or Five Factor Model (neuroticism,

psychoticism, introversion, disconstraint, and aggression) in patients with migraine and TTH.

In this study, MMPI t-scores for neuroticism, psychoticism, and aggression were higher among the patients with CDH than in the patients with episodic headache. In a previous study, psychopathological factors were more common in patients with CDH in comparison to patients with episodic headache.¹¹ Particular personality traits can lead to an increased risk of the onset and persistence of headache, resulting in CDH.²⁴ On the whole, the frequency of personality disorders is higher in patients with chronic pain compared to subjects without pain.⁹

In our study, CDH was associated with neuroticism, similar to findings of previous studies.^{11,25,26} Various studies have shown an association between neuroticism and pain.⁹ Neuroticism may be a result of adjustment to CDH.⁹ In several previous studies assessing personality traits in headache patients with MMPI-2, patients with CDH were also reported to have neuroticism.^{11,25,27} In another previous study, 52% of patients with CDH had neuroticism.²⁸

High harm avoidance is a tendency to be fearful, and this is related to neuroticism.⁹ Patients with low self-directedness tend to be poorly motivated and to have difficulty with coping with CDH.⁹ Moreover, lower self-directedness causes the patients with headache to enter a cycle of fear and pain, thus contributing to neuroticism.⁹ Anxiety is a component of neuroticism. Various studies conducted in the community as well as outpatient clinics have shown that patients with CDH have an increased risk of anxiety.^{8,10,25,29-34} In a previous study involving study participants from several ethnic groups, headache patients with anxiety had the highest number of headache days per month.³⁰

Neuroticism is a personality trait with much emotional instability.³⁵ Besides anxiety, patients with neuroticism also have raised levels of insecurity and worry.³⁵ Headache patients with neuroticism usually have poor pain management.³⁵ Neuroticism may therefore affect the effectiveness of prescribed medications and hence influence the outcome of headache management.^{24,35}

In our study, there was a greater tendency for headache with coexisting dyspepsia compared to headache alone to be associated with neuroticism. In particular, TTH with coexisting dyspepsia was more likely to be significantly associated with neuroticism compared to TTH without dyspepsia. This study showed that dyspepsia tends to be associated with neuroticism.

Table 1: Basic demography of study patients

	Patients (n=119)
Age (mean \pm SD), range	45.01 \pm 15.30 (18-80)
Gender (n, %)	
Male	22 (18.5%)
Female	97 (81.5%)
Ethnic group (n, %)	
Malay	53 (44.5%)
Chinese	31 (26.1%)
Indian	31 (26.1%)
Others	4 (3.4%)
Body mass index (BMI) (kg/m ²) (mean \pm SD)	25.68 \pm 5.30
Body mass index (BMI) (kg/m ²) (n, %)	
<18.5	4 (3.4%)
18.5-25	56 (47.1%)
25.1-30	38 (31.9%)
>30	17 (14.3%)
Not available	4 (3.4%)
Education level (n, %)	
Primary and secondary school	62 (51.3%)
Pre-university and diploma	26 (21.8%)
Degree, Masters and PhD	32 (26.9%)
Salary (n, %)	
RM500-RM1000	5 (4.2%)
RM1001-RM2000	22 (18.5%)
RM2001-RM5000	36 (30.3%)
>RM5000	17 (14.3%)
Dependent on family	39 (32.8%)
Marital status (n, %)	
Single	30 (25.2%)
Married	83 (69.7%)
Widow/widower	6 (5.0%)
Smoking (n, %)	
Yes	8 (6.7%)
No	111 (93.3%)
Alcohol (n, %)	
Yes	9 (7.6%)
No	110 (92.4%)
Comcomitant medical illnesses (n, %)	
Cardiovascular	22 (18.5%)
Endocrine	16 (13.4%)
Gastrointestinal	14 (11.8%)
Metabolic	12 (10.1%)
Respiratory	10 (8.4%)
Rheumatology	6 (5.0%)
Neurology	4 (3.4%)
Dermatology	2 (1.7%)
Renal	2 (1.7%)
Dyspepsia (n, %)	
Yes	34 (28.6%)
No	85 (71.4%)

Table 2: Headache characteristics

	Patients (n=119)
Frequency (n, %)	
Every day	36 (30.3%)
Every other day	13 (10.9%)
>1-3x/week	25 (21.0%)
1x/week-1x/2week	20 (16.8%)
<1x/2week-1x/month	10 (8.4%)
<1x/month-1x/6months	14 (11.8%)
<1x/6months-<1x/12months	1 (0.8%)
Frequency of headache in 15 days/month (n, %)	
Headache < 15days/month	69 (58%)
Headache ≥15days/month	50 (42%)
Site of pain (n, %)	
Frontal	27 (22.7%)
Temporal	66 (55.5%)
Parietal	22 (18.5%)
Occipital	45 (37.8%)
Whole Head	14 (11.8%)
Back of neck	13 (10.9%)
Orbital/supraorbital	12 (10.1%)
Vertex	4 (3.4%)
Laterality of pain (n, %)	
Unilateral	61 (51.3%)
Bilateral	41 (34.5%)
Unilateral alternating	17 (14.3%)
Character of headache (n, %)	
Throbbing/pulsating	70 (58.8%)
Sharp/stabbing	14 (11.8%)
Tightness/pressing	31 (26.1%)
Others	4 (3.4%)
Intensity of headache (n, %)	
Mild	7 (5.9%)
Moderate	59 (49.6%)
Severe	53 (44.5%)
Visual analogue scale, mm (mean±SD)	68.97 ±18.47
Triggering factor (n, %)	
Stress	85 (71.4%)
Sleep deprivation	75 (63.0%)
Sun exposure	61 (51.3%)
Tired	61 (51.3%)
Weather	35 (29.4%)
Missing meal	31 (26.1%)
Fever	29 (24.4%)
Menstruation	26 (21.8%)
Oversleep	19 (16.0%)
Excitement	6 (5.0%)
Medications (n, %)	
Symptomatic	
Paracetamol	80 (67.2%)
Tramadol	15 (12.6%)
Ergotamine	12 (10.1%)
Sumatriptan	10 (8.4%)
NSAIDs	43 (36.1%)
Prophylactic	
Amitriptyline	20 (16.8%)
Propranolol	5 (4.2%)
Gabapentin	2 (1.7%)
Pregabalin	1 (0.8%)
Flunarizine	4 (3.4%)
Topiramate	2 (1.7%)
Erenumab	2 (1.7%)

Table 3: Headache diagnosis

Headache subtype	Patients (n=119)
Migraine without aura (n, %)	45 (37.8%)
Migraine with aura (n, %)	32 (26.9%)
Infrequent (n, %)	6 (5.0%)
Frequent (n, %)	19 (16.0%)
Chronic tension-type headache (n, %)	17 (14.3%)

Table 4a: MMPI t-score in patients with migraine and TTH

	Patients with migraine (n=77)	Patients with TTH (n=42)	All headache patients (n=119)	p-value
Neuroticism (mean ± SD, range)	59.19 ± 12.51	57.88 ± 11.65	58.73 ± 12.18 (32-88)	0.58
Psychoticism (mean ± SD, range)	63.92 ± 14.81	65.43 ± 11.99	64.46 ± 13.84 (38-100)	0.57
Introversion (mean ± SD, range)	56.04 ± 10.44	55.76 ± 11.03	55.94 ± 10.61 (36-83)	0.89
Aggression (mean ± SD, range)	50.27 ± 9.08	50.50 ± 9.24	50.35 ± 9.10 (35-78)	0.90
Disconstraint (mean ± SD, range)	43.58 ± 8.41	43.57 ± 7.68	43.58 ± 8.13 (31-69)	1.00

Table 4b: Types of personality traits in the patients with migraine and TTH

	Patients with migraine (n=77)	Patients with TTH (n=42)	All headache patients (n=119)	p-value
Neuroticism				0.69
Various negative emotional responses (t ≥ 65) (n, %)	23 (29.9%)	10 (23.8%)	33 (27.7%)	
Below average level of negative emotional responses (t < 39) (n, %)	1 (1.3%)	0 (0%)	1 (0.8%)	
Psychoticism				0.06
Experiences associated with of thought dysfunction (t ≥ 65) (n, %)	26 (33.8%)	24 (57.1%)	50 (42.0%)	
No experience of thought disturbance (t < 39) (n, %)	4 (5.2%)	2 (4.8%)	6 (5.0%)	
Introversion				
Lack of positive emotional experiences (t ≥ 65) (n, %)	14 (18.2%)	8 (19.0%)	22 (18.5%)	
Feeling energetic (t < 39) (n, %)	1 (1.3%)	2 (4.8%)	3 (2.5%)	
Aggression				0.71
Interpersonally aggressive (t ≥ 65) (n, %)	8 (10.4%)	4 (9.5%)	12 (10.1%)	
Interpersonally passive (t < 39) (n, %)	1 (1.3%)	2 (4.8%)	3 (2.5%)	
Disconstraint				0.53
Disconstrained behaviour (t ≥ 65) (n, %)	2 (2.6%)	1 (2.4%)	3 (2.5%)	
Overly constrained behaviour (t < 39) (n, %)	28 (36.4%)	11 (26.2%)	39 (32.8%)	

Table 5a: MMPI t-scores in patients with CDH vs. episodic headache

	Patients with CDH (n=50)	Patients with episodic headache (n=69)	p-value
Neuroticism (mean ± SD)	61.70 ± 12.97	56.58 ± 11.17	0.023
Psychoticism (mean ± SD)	68.57 ± 13.35	61.54 ± 13.52	0.006
Introversion (mean ± SD)	53.54 ± 9.64	57.54 ± 11.04	0.054
Aggression (mean ± SD)	53.02 ± 9.16	48.42 ± 8.61	0.007
Disconstraint (mean ± SD)	44.38 ± 8.03	43.00 ± 8.21	0.36

Table 5b: Logistic regression of the MMPI t-scores in the patients with CDH and episodic headache

	Odds ratio	β	p-value	95% confidence interval
Neuroticism	1.022	0.022	0.26	0.98-1.06
Psychoticism	1.02	0.018	0.33	0.98-1.06
Aggression (mean ± SD)	1.04	0.043	0.094	0.99-1.10

Table 6: Types of personality traits in headache patients with and without dyspepsia

	Headache with dyspepsia (n=34)	Headache without dyspepsia (n=85)	p-value
Neuroticism			0.027
Various negative emotional responses (t ≥ 65) (n, %)	15 (44.1%)	18 (21.2%)	
Below average level of negative emotional responses (t < 39) (n, %)	0 (0%)	1 (1.2%)	
Average (normal) (n, %)	19 (55.9%)	66 (77.6%)	
Psychoticism			0.43
Experiences associated with of thought dysfunction (t ≥ 65) (n, %)	13 (38.2%)	37 (43.5%)	
No experience of thought disturbance (t < 39) (n, %)	1 (2.9%)	5 (5.9%)	
Average (normal) (n, %)	19 (55.9%)	43 (50.6%)	
Not analysable/data not adequate (n, %)	1 (2.9%)	0 (0%)	
Introversion			0.55
Lack of positive emotional experiences (t ≥ 65) (n, %)	5 (14.7%)	17 (20.0%)	
Feeling energetic (t < 39) (n, %)	0 (0%)	3 (3.5%)	
Average (normal) (n, %)	29 (85.3%)	65 (76.5%)	
Aggression			0.56
Interpersonally aggressive (t ≥ 65) (n, %)	5 (14.7%)	7 (8.2%)	
Interpersonally passive (t < 39) (n, %)	1 (2.9%)	2 (2.4%)	
Average (normal) (n, %)	28 (82.4%)	74 (87.1%)	
Not analysable/data not adequate (n, %)	0 (0%)	2 (2.4%)	
Disconstraint			0.51
Disconstrained behaviour (t ≥ 65) (n, %)	0 (0%)	3 (3.5%)	
Overly constrained behaviour (t < 39) (n, %)	13 (38.2%)	26 (30.6%)	
Average (normal) (n, %)	21 (61.8%)	56 (65.9%)	

Table 7a: Factors determining neuroticism

	Neuroticism present	No neuroticism	p-value
Gender (n, %)			0.61
Female gender	28(28.9%)	69(71.1%)	
Male gender	5(22.7%)	17(77.3%)	
Chronic daily headache (CDH) (n, %)			0.04
Yes	19(38.0%)	31(62.0%)	
No	14(20.3%)	55(79.7%)	
Chronic migraine (n, %)			0.20
Yes	11(37.9%)	18(62.1%)	
No	11(23.4%)	36(76.6%)	
Chronic TTH (n, %)			0.067
Yes	8(38.1%)	13(61.9%)	
No	2(9.5%)	19(90.5%)	
Migraine patients with dyspepsia (n, %)			0.27
Migraine with dyspepsia	9(40.9%)	13(59.1%)	
Migraine without dyspepsia	14(25.5%)	41(74.5%)	
TTH patients with dyspepsia (n, %)			0.02
TTH with dyspepsia	6(50.0%)	6(50.0%)	
TTH without dyspepsia	4(13.3%)	26(86.7%)	
CDH or episodic headache with dyspepsia			0.17
CDH with dyspepsia	10(58.8%)	7(41.2%)	
Episodic headache with dyspepsia	5(29.4%)	12(70.6%)	
Chronic migraine or episodic migraine with dyspepsia			0.24
Chronic migraine with dyspepsia	5(50.0%)	5(50.0%)	
Episodic migraine with dyspepsia	5(26.3%)	14(73.7%)	
Chronic TTH or episodic TTH with dyspepsia			0.24
Chronic TTH with dyspepsia	5(71.4%)	2(28.2%)	
Episodic TTH with dyspepsia	1(20.0%)	4(80.0%)	

Table 7b: Factors determining psychoticism

	Psychoticism present	No psychoticism	p-value
Gender (n, %)			0.15
Female gender	38(39.2%)	59(60.8%)	
Male gender	12(57.1%)	9(42.9%)	
Chronic daily headache (CDH) (n, %)			0.002
Yes	29(59.2%)	20(40.8%)	
No	21(30.4%)	48(69.6%)	
Chronic migraine (n, %)			<0.0001
Yes	17(60.7%)	11(39.3%)	
No	9(19.1%)	38(80.9%)	
Chronic TTH (n, %)			1.00
Yes	12(57.1%)	9(42.9%)	
No	12(57.1%)	9(42.9%)	
Migraine patients with dyspepsia (n, %)			1.00
Migraine with dyspepsia	7(33.3%)	14(66.7%)	
Migraine without dyspepsia	19(34.5%)	36(65.5%)	
TTH patients with dyspepsia (n, %)			0.73
TTH with dyspepsia	6(50.0%)	6(50.0%)	
TTH without dyspepsia	18(60%)	12(40%)	
CDH or episodic headache with dyspepsia			0.013
CDH with dyspepsia	10(62.5%)	6(37.5%)	
Episodic headache with dyspepsia	3(17.6%)	18(82.4%)	
Chronic migraine or episodic migraine with dyspepsia			0.21
Chronic migraine with dyspepsia	5(55.6%)	4(44.4%)	
Episodic migraine with dyspepsia	5(26.3%)	14(73.7%)	
Chronic TTH or episodic TTH with dyspepsia			0.24
Chronic TTH with dyspepsia	5(71.4%)	2(28.6%)	
Episodic TTH with dyspepsia	1(20.0%)	4(80.0%)	

Table 7c: Factors determining introversion

	Introversion present	No introversion	p-value
Gender (n, %)			0.76
Female gender	17(17.5%)	80(82.5%)	
Male gender	5(22.7%)	17(77.3%)	
Chronic daily headache (CDH) (n, %)			0.056
Yes	5(10.0%)	45(90.0%)	
No	17(24.6%)	52(75.4%)	
Chronic migraine (n, %)			0.013
Yes	1(3.4%)	28(96.6%)	
No	13(27.7%)	34(72.3%)	
Chronic TTH (n, %)			1.00
Yes	4(19.0%)	17(81.0%)	
No	4(19.0%)	17(81.0%)	
Migraine patients with dyspepsia (n, %)			1.00
Migraine with dyspepsia	4(18.2%)	18(81.8%)	
Migraine without dyspepsia	10(18.2%)	45(81.8%)	
TTH patients with dyspepsia (n, %)			0.40
TTH with dyspepsia	1(8.3%)	11(91.7%)	
TTH without dyspepsia	7(23.3%)	23(76.7%)	
CDH or episodic headache with dyspepsia			1.00
CDH with dyspepsia	2(11.8%)	15(88.2%)	
Episodic headache with dyspepsia	3(17.6%)	14(82.4%)	
Chronic migraine or episodic migraine with dyspepsia			1.00
Chronic migraine with dyspepsia	1(10.0%)	9(90.0%)	
Episodic migraine with dyspepsia	3(15.8%)	16(84.2%)	
Chronic TTH or episodic TTH with dyspepsia			1.00
Chronic TTH with dyspepsia	1(14.3%)	6(85.7%)	
Episodic TTH with dyspepsia	0	5(100.0%)	

Table 7d: Univariate analysis of factors determining aggression

	Interpersonally aggressive	Not aggressive	p-value
Gender (n, %)			0.008
Female gender	6(6.2%)	90(93.8%)	
Male gender	6(28.6%)	15(71.4%)	
Chronic daily headache (CDH) (n, %)			0.12
Yes	8(16.3%)	41(83.7%)	
No	4(5.9%)	64(94.1%)	
Chronic migraine (n, %)			0.049
Yes	6(20.7%)	19(90.0%)	
No	2(4.3%)	44(95.7%)	
Chronic TTH (n, %)			1.00
Yes	2(10.0%)	19(90.0%)	
No	2(9.5 %)	19(90.5 %)	
Migraine patients with dyspepsia (n, %)			1.00
Migraine with dyspepsia	2(9.1 %)	20(90.1%)	
Migraine without dyspepsia	6(11.1%)	48(88.9%)	
TTH patients with dyspepsia (n, %)			0.068
TTH with dyspepsia	3(25.0%)	9(75.0%)	
TTH without dyspepsia	1(3.4%)	28(96.6%)	
CDH or episodic headache with dyspepsia			0.34
CDH with dyspepsia	4(23.5%)	13(76.5%)	
Episodic headache with dyspepsia	1(5.9%)	16(94.1%)	
Chronic migraine or episodic migraine with dyspepsia			0.59
Chronic migraine with dyspepsia	2(20.0%)	8(80.0%)	
Episodic migraine with dyspepsia	2(10.5%)	17(89.5%)	
Chronic TTH or episodic TTH with dyspepsia			1.00
Chronic TTH with dyspepsia	2(28.6%)	5(71.4%)	
Episodic TTH with dyspepsia	1(20.0%)	4(80.0%)	

Table 7e: Factors determining disconstraint

	Disconstrained behaviour	Overly constrained behaviour	Average (normal)	p-value
Gender (n, %)				0.24
Female gender	2(2.1%)	35(36.1%)	60(61.9%)	
Male gender	1(4.5%)	4(18.2%)	17(77.3%)	
Chronic daily headache (CDH) (n, %)				0.37
Yes	1(2.0%)	13(26.0%)	36(72.0%)	
No	2(2.9%)	26(37.7%)	41(59.4%)	
Chronic migraine (n, %)				0.42
Yes	1(3.4%)	8(27.6%)	20(69.0%)	
No	1(2.1%)	20(42.6%)	26(55.3%)	
Chronic TTH (n, %)				0.54
Yes	0	5(23.8%)	16(76.2%)	
No	1(4.8%)	6(28.6%)	14(66.7%)	
Female migraine patients (n, %)				0.30
Yes	1(1.5%)	25(37.9%)	40(60.6%)	
No	1(9.1%)	3(27.3%)	7(63.6%)	
Female TTH patients (n, %)				0.25
Yes	1(3.2%)	10(32.3%)	20(64.5%)	
No	0	1(9.1%)	10(90.9%)	
Migraine patients with dyspepsia (n, %)				0.61
Migraine with dyspepsia	0	9(40.9%)	13(59.1%)	
Migraine without dyspepsia	2(3.6%)	19(34.5%)	34(61.8%)	
TTH patients with dyspepsia (n, %)				0.68
TTH with dyspepsia	0	4(33.3%)	8(66.7%)	
TTH without dyspepsia	1(3.3%)	7(23.3%)	22(73.3%)	
CDH or episodic headache with dyspepsia				0.16
CDH with dyspepsia	0	4(23.5%)	13(76.5%)	
Episodic headache with dyspepsia	0	9(52.9%)	8(47.1%)	
Chronic migraine or episodic migraine with dyspepsia				0.41
Chronic migraine with dyspepsia	0	2(20.0%)	8(80.0%)	
Episodic migraine with dyspepsia	0	8(42.1%)	11(57.9%)	
Chronic TTH or episodic TTH with dyspepsia				1.00
Chronic migraine with dyspepsia	0	2(28.6%)	5(71.4%)	
Episodic migraine with dyspepsia	0	2(40.0%)	3(60.0%)	

Table 8a: Logistic regression of factors determining neuroticism

	β	p-value	Odds ratio	95% CI
CDH	1.831	0.051	6.242	0.991-31.319
TTH with dyspepsia	1.935	0.024	6.921	1.283-37.322

Table 8b: Logistic regression of factors determining psychoticism

	β	p-value	Odds ratio	95% CI
CDH	2.012	0.001	7.476	2.199-25.413
CDH with dyspepsia	-0.476	0.670	0.621	0.070-5.540

Table 8c: Logistic regression of factors determining aggression

	β	p-value	Odds ratio	95% CI
Male gender	2.026	0.018	7.580	1.424-40.342
Chronic migraine	1.627	0.069	5.087	0.881-29.379

A previous study has shown a tendency for postprandial distress (a type of FD) to be associated with neuroticism.³⁶ Another type of FD called epigastric pain syndrome has also been reported to be associated with neuroticism.³⁷ Anxiety has been associated with postprandial distress and uninvestigated dyspepsia.³⁸ FD has been strongly linked to anxiety.^{38,40} Personality traits play a large role in FD.⁴⁰ The psychological 'state' which refers to psychological state of a person's cognitive processes (thoughts or feelings) at a particular time, also plays a large role in FD.⁴⁰ A large proportion of patients with FD have psychiatric disorders, therefore these patients need to be seen by both gastroenterologists and psychiatrists.⁴⁰

CDH was significantly associated with psychoticism as well as neuroticism.⁹ In a previous study, 36% of the patients with CDH presented with psychoticism.²⁷ In our study, there was a tendency for chronic migraine to be associated with psychoticism, introversion, and aggression. Patients with CM have a high score on various personality traits.⁴¹ In a previous study, the patients with chronic migraine (CM) had multiphasic personality abnormalities.²⁶ In other studies, personality traits and psychological factors have been reported to influence the clinical course of CM.^{11,41-42} Patients with chronic migraine¹¹ as well as frequent migraines²⁵ have more introversion compared to healthy control subjects.

In our study, the male patients with headache were significantly more likely to have an aggressive personality trait. We hypothesize that

the reason is that men have poorer tolerance to pain compared to women. It has been reported that aggression can be due to physical pain.⁴³

Our study demonstrates that there was a tendency for aggression to be associated with chronic migraine. Aggression may be a common feature in CM.⁴³ It is believed that physical pain influences cognition and decision-making.^{43,44} As a result, the patients with severe pain from migraine may develop an aggressive personality trait.^{43,44} In a previous study, the frequency of aggressive personality trait was higher in the patients with CM than in healthy control subjects.^{43,45}

Assessment of personality traits with MMPI-2 can provide helpful insights on patients with CDH so they can be managed properly.^{11,42} Personality traits can determine the prognosis of headache and adjustment to ongoing headache.^{9,35} Coexisting high scores on personality traits worsen prognosis with respect to headache onset, maintenance, and outcome.^{35,42}

Personality traits can also determine whether the patients with headache are compliant to treatment or not.^{34,35} Personality traits and psychological factors are important in nonpharmacological management, which includes improving treatment compliance and locus of control.⁴⁶ Various personality traits determine response to therapy.^{34,41} Cognitive-behavioural therapy is the management of choice in headache patients whose daily life or function has been affected by their personality traits.⁴⁷

Evaluation of personality traits can assist understanding of complex patients presenting with

chronic pain.⁹ This can help explain why certain headache patients are more resistant to treatment and more likely to have comorbidity, in particular, psychiatric comorbidity.⁹ Psychiatric comorbidity is a risk factor predisposing to chronification of episodic headache.^{29,32,48-52} Moreover, personality trait assessment helps to identify the reason why headache patients are more likely to be in a vicious cycle of chronic pain and suffering.⁹

Migraine patients with psychiatric comorbidity utilize healthcare facilities more than those without psychiatric comorbidity.⁵³ When the latter is not managed properly, this can lead to worsening disability due to migraine.⁵³ Furthermore, psychiatric comorbidity results in decreased quality of life and poorer prognosis despite migraine therapy.^{10,32,53} Therefore, it is important to recognize the personality traits of the patients presenting with headache at an early age.¹⁰ The management of psychiatric comorbidity is therefore essential to help improve the outcome of headache therapy.^{10,12,54}

In a previous study, headache patients with anxiety had the worst quality of life.⁵⁰ On the other hand, successful treatment of migraine decreases anxiety.⁵⁵ However, a neuroticism personality trait can still persist despite treatment.⁵⁵ Therefore, psychological intervention is recommended as a component of management of migraine.⁵⁵

In conclusion, evaluation of personality traits is important in the management of the patients with headache, especially CDH. There were no significant differences in aggressiveness, psychoticism, disconstraint, neuroticism, and introversion between patients with migraine and TTH. There was a tendency for headache with coexisting dyspepsia to be associated with neuroticism in comparison to headache alone. In particular, TTH with dyspepsia was significantly associated with neuroticism compared to TTH without dyspepsia.

DISCLOSURE

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