The Mediating Role of Perceived Stress in the Relationship between Personality Traits and Negative Automatic Thoughts in Adolescents with Migraine

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Abstract

Background: Literature suggests that chronic headaches, particularly migraines, in adolescents are crucially affected by psychological problems. In addition, groundbreaking studies have shown that preexisting personality traits are important to accelerate the likelihood of migraine onset, maintenance, and outcome. This study aims, therefore, to investigate the mediating role of perceived stress in personality traits and negative automatic thoughts, in adolescents with migraine.

Methods: In this cross-sectional, descriptive study, the participants consisted of patients with chronic migraine referring to two neurology clinics in Ahvaz City, Iran, from 2019 to 2020. The diverse sample of patients (n =200) completed Cohen's Perceived Stress Scale, NEO Five-Factor Inventory (NEO-FFI), and Automatic Thoughts Questionnaire (ATQ-N). To analyze the obtained data, SPSS V. 21 and Amos 18 were used.

Results: Based on the standard path coefficients and the P-values, the relationship between personality traits and the negative dimension of perceived stress ($\beta = -46$, $P \geq 0.001$), personality traits and the positive dimension of perceived stress ($\beta = 0.44$, $P \geq 0.001$), the negative dimension of perceived stress and negative spontaneous thoughts ($\beta = 0.45$, $P \geq 0.008$), and the positive dimension of perceived stress and negative automatic thoughts ($\beta = -0.28$, $P \geq 0.004$) were significant.

Conclusion: According to the results, the indirect relationship between personality traits and n negative automatic thoughts was established and significant through the negative dimension of perceived stress. Moreover, the indirect relationship between personality traits and negative automatic thoughts was established and significant through the positive dimension of perceived stress.

Key Words: Adolescents, Automatic Negative Thoughts, Chronic Headaches, Migraine, Perceived Stress, Personality Traits.

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1- INTRODUCTION

Headaches are considered among the most common physical complaints and debilitating neurodegenerative disorders that affect people's social, communicative, and occupational tasks (1); and such tasks should be included in revised diagnostic criteria for chronic migraine (2). Migraine is one of the most common pain disorders with a prevalence of 5-20 % in the general population, higher in women than in men (with an average prevalence of 20.2 % versus 9.4 %) (3). previous findings evidenced that migraine is characterized by specific personality traits. Among them, neuroticism influenced the severity of depression in migraineurs, and, therefore, an early evaluation of the personality traits could allow identifying patients susceptible to develop migraine-associated psychopathological symptoms (4).

Based on Longitudinal evidence, Michl et al. (2013) concluded that trait depressive rumination is a stable tendency to focus passively and repetitively on feelings related to distress and low mood, with its causes and consequences (5). Furthermore, negative automatic thoughts have been documented to affect psychological and physiological reactivity to stress and recovery from stress (6). Based on these findings, we hypothesized that inter-individual differences in negative automatic thoughts would explain the occurrence of psychological distress in migraine (7). A study by Seng et al. (2017) confirmed that some psychological factors are associated with chronic migraine and severe migraine-related disability (8). Such studies clearly show the importance of identifying factors that contribute to psychological distress in migraine.

Personality and emotional characteristics in adolescents with migraine began to be more in-depth studied in recent years. Literature showed an increased interest in emotional aspects, such as anxiety and depression, and in their value for the clinical approaches, therapies, and comprehension of the adolescent migraine's key characteristics (9). Previous studies indicated that people with neuroticism (N) experienced more stressful incidents. On the contrary, extroverts have both more stressful and pleasant experiences (10, 11). Naturally, it can be predicted that such individuals will develop different personality types and behavioral adjustment or maladjustments to deal with stress (12). Mirhaghi and Sarabian (2016), revealed that Neuroticism (N) was significantly and positively correlated with perceived stress. However, extraversion (E), agreeableness (A), and conscientiousness (C) were negatively correlated with the perceived stress scale (10).

Perceived stress is closely related to neuroticism to the extent that they each constitute different facets; however, a recent study suggested that perceived stress is not representative of neuroticism (13). Neuroticism is one of the well-established predictors of perceived stress and depression (14, 15). The meta-analysis on the personality defined according to the psychobiological model revealed high harm avoidance, persistence, and low self-directedness in migraineurs. A meta-analysis on personality defined according to Three-Factor Model revealed high neuroticism and low extraversion in migraineurs. Meta-regression analysis revealed that neuroticism moderated the relationship between depression and migraine (16).

Neuroticism and depression scores are associated with headache frequency (chronic vs episodic) and are highest for migraine and tension-type headaches followed by pure tension-type headaches (17). The increased number of changes (e.g. biological, cognitive, and social) during the transition to adolescence can increase negative affect, emotional reactivity, and risk for internalizing

symptoms, with gender differences being evident. In particular, female adolescents are more likely to suffer from anxiety and depression and it has been observed that these conditions can aggravate or precede headaches (e.g. migraines) (18). Still, personality issues in migraines have been poorly studied, in particular in children and adolescents. This study aims, therefore, to investigate the mediating role of perceived stress dimensions in relation to personality traits and negative automatic thoughts, in adolescents with migraine.
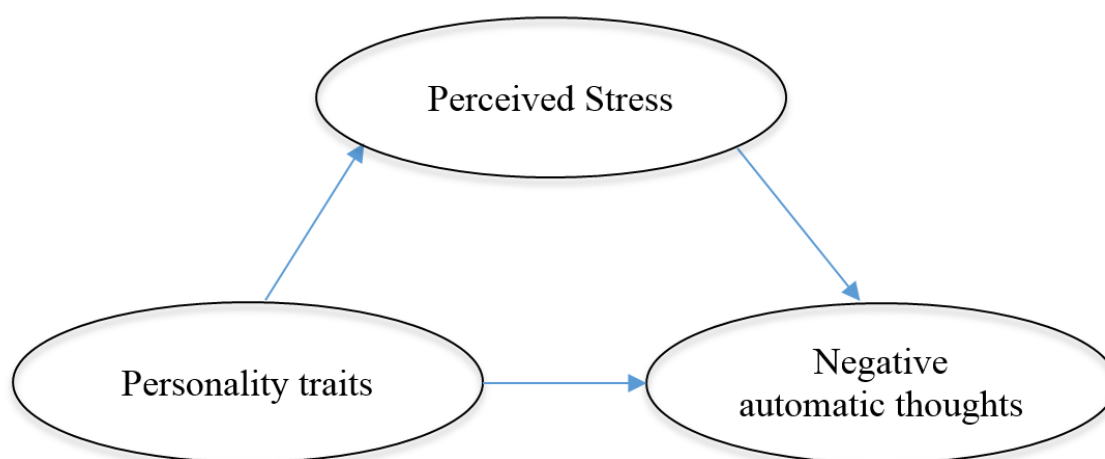

Fig. 1: The conceptual model of the study

2- METHODS

In this cross-sectional, descriptive study, the participants consisted of patients with chronic migraines referring to two neurology clinics in Ahvaz City, Iran, from 2019 to 2020. Purposeful sampling was applied in order to select the sample. Next, 200 patients with a history of migraine were selected among the clients referring to the two neurology clinics in Ahvaz to participate in this study. In order to choose the sample size, the researchers referred to the scientific resources in the field of psychological descriptive research.

To conduct the present study, researchers visited the two neurology clinics in Ahvaz from which the study samples were selected and written consents were obtained. The participants were given questionnaires to fill out. The subjects' permission to engage in the study was received in accordance with the study's ethics.

2-1. Inclusion and Exclusion criteria

The inclusion criteria involved diagnosing migraine disease by a neurologist, having no acute or chronic diseases other than migraine, having at least at the age (<14 years), signing the consent form to participate in the research. And the exclusion criteria of the study included the history of using psychiatric medicine and failure in signing the consent form.

2-2. Instruments

a) Cohen's Perceived Stress Scale: Cohen's perceived stress scale was first presented by Cohen et al. (19). This tool was codified to determine how much individuals could identify stress in unpredictable and uncontrollable situations of life. It has three 4-item, 10-item and 14-item versions. In this study, the 14-version item was used. The responses were scored with the five-point Likert scale, ranging from Never to Always; a score from 0 to 4 was allocated to each item (although some

items were inversely scored). The score domain ranges from 0 to 56, and higher scores indicate that an individual perceives stress more. This scale does not have ranking scores and a cut-off point. It is appropriate for the comparison of perceived stress levels in different populations. The reliability and validity of this scale was confirmed by Cohen et al. (19). Safaei and Shokri (2014) indicated that this tool was acceptably valid (11). In the present study, the Cronbach's alpha coefficient of the original scale was 0.74.

b) NEO Five-Factor Inventory (NEO-FFI): The abridged form of NEO-FFI includes 60 items. Like the full form, this abridged one evaluates five personality factors (Neuroticism, Extraversion, Openness to experience, Agreeableness and Conscientiousness). The Big Five personality traits inventory was developed by Costa and McCrae in 1989 (20). It is an intelligent summary of the 180-item form. In the abridged form, each factor includes 12 items. Likert scale was used to rank the choices from 0 (totally disagree) to 4 (totally agree), although some items were scored inversely. Based on the mean and standard deviation, the scores were turned into z $(Z=(X-\ddot{X})/SD)$, then the result was changed to T with a mean which was 50 ± 10. The scores above 55, from 45 to 55 and below 45 were considered high, medium and low, respectively. The next studies did not make a significant change in the validation results of the questionnaire (20). In Iran, Roshan Chesli et al. (21) and Khormaee and Farmani (2014) showed that the reliability of this questionnaire was acceptable in general (22).

c) Negative Automatic Thoughts Questionnaire (ATQ-N): The ATQ is a 30-item 5-point self-report scale that assesses the frequency of Negative Automatic Thoughts (NATs). For each item, the respondents are asked to indicate how frequently each thought occurred during the past week (1 = not at all, 5 = all the time). The ATQ predominantly concentrates on negative cognitions which are characteristics of depression, e.g., loss, failure, self-depreciation (23) and consists of statements that reflect different aspects of depression, e.g., demoralization, self-criticism, brooding, motivation, and interpersonal disappointment (23). ATQ-Persian had excellent internal consistency (Cronbach's alpha = 0.96), test–retest reliability (r = 0.84) and correlation with the Beck Depression Inventory (r = 0.77) (24).

2-3. Statistical methods

In this study, Mean± Standard Deviation (SD) was used to describe continuous data and frequency (%) for categorical data. In the inferential statistics section, the path analysis test and the study of direct and indirect relationships were performed. To analyze the obtained data SPSS V. 21 and Amos 18 were used.

3- RESULTS

In this report, the majority of adolescent migraine sufferers (62.5 percent) were female, with the lowest age of adolescent migraine sufferers (9 percent) being 14 years old (**Table 1**).

The mean±SD of the subscales of Personality traits, Negative Automatic Thoughts, and Perceived Stress are shown in **Table 2**, below.

Table 3 shows that all study variables have a significance rating greater than 0.05, indicating that their Z score is not meaningful, according to the normality criterion. As a result, there is no apparent breach of the data's normality.

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Table-1: Frequency distribution of the studied sample by demographic variables

Variable Levels	Frequency	Percent
Male	75	37.5
Female	125	62.5
12 years	22	11
13 years	29	14.5
14years	18	9
15 years	34	17
16 years	25	12.5
17 years	29	14.5
18 years	43	21.5

Table-2: Descriptive statistics of the subscales used in the study

Variable	Sub scale	Mean± SD	Min	Max
Personality traits	Neuroticism	22.64±7.90	42	1
	Extraversion	16.08±5.48	27	4
	Openness to experience	18.18±5.08	28	7
	Agreeableness	17.12±4.28	26	8
	Conscientiousness	19.77±6.17	32	8
Negative Automatic Thoughts	Individual incompatibility and tendency to change	17.98±5.78	31	7
	Negative self-perceptions and negative expectations	19.86±6.28	31	8
	Low self-esteem	16.67±5.83	29	7
	Helplessness	22.81±7.34	9	36
Perceived Stress	The negative dimension of perceived stress	3.12±1.66	0	6
	The positive dimension of perceived stress	4.17±1.61	1	8

Table-3: Kolmogorov test results regarding the normality of research variables

Variable	Sub scale	Z	P
Personality traits	Neuroticism	53 .0	16 .0
	Extraversion	0. 45	0. 36
	Openness to experience	0. 64	0. 14
	Agreeableness	0. 42	0. 38
	Conscientiousness	0. 37	0. 54
Negative Automatic Thoughts	Individual incompatibility and tendency to change	0. 46	0.34
	Negative self-perceptions and negative expectations	0 57	0 17
	Low self-esteem	0. 53	0. 24
	Helplessness	0. 62	0. 16
Perceived Stress	The negative dimension of perceived stress	0. 54	0. 21
	The positive dimension of perceived stress	0. 47	0. 33

According to the indices obtained in the **Table 4**, the chi index of the two sections was obtained with a degree of freedom of 2.95, and the values of the GFI, AGFI, NFI, CFI, and NNFI fit indices were in the range of ninety to one, indicating that the required standards have been achieved by those indices. It can, therefore, be said that the model has a good fit and is confirmed.

Table-4: Fit Indices reported SEM

Indicator	Value
χ^2	124.26
RMSEA	0.05
p	0.063
df	42
X^2/df	2.95
GFI	0.98
AGFI	0.96
NFI	0.97
CFI	0.96
IFI	0.99
NNFI	0.98

Based on the standard path in **Table 5**, as well as the coefficients and the significance level presented, it is observed that all straight paths are significant. Among the standard direct relationships between the variables of the proposed research model, the relationship between personality traits and the negative dimension of perceived stress was (β = -46, P≥ 0.001), the relationship between personality traits and the positive dimension of perceived stress was (β = 0.44, P≥ 0.001), the negative dimension of perceived stress to negative spontaneous thoughts was (β = 0.45, P≥ 0.008) and the positive dimension of perceived stress to negative spontaneous thoughts was (β = -0.28, P≥ 0.004).

Table-5: Measurements of the direct relationships between parameters in the proposed model

Path	Direct Effect	P-value
Personality traits to negative dimension of perceived stress	-0.46	0.001 ≥
Personality traits to the positive dimension of perceived stress	0.44	0.001 ≥
The negative dimension of perceived stress to Automatic negative thoughts	0.45	0.008
The positive dimension of perceived stress to Automatic negative thoughts	-0.28	0.004

As shown in **Table 6**, there is a significant correlation between the components of personality traits with the components of negative spontaneous thoughts and perceived stress as well as between the components of spontaneous negative thoughts and perceived stress, at the significance level of at least 0.05.

Table-6: Descriptive statistics of mean, SD and correlation matrix of research variables

| Variables	1	2	3	4	5	6	7	8	9	10	11
Neuroticism	1										
Extraversion	0.27 *	1									
Openness to experience	-0.24 *	0.26 *	1								
Agreeableness	-0.23 *	0.22 *	0.19 *	1							
Conscientiousness	-0.20 *	0.18 *	0.22 *	0.20 *	1						
Individual incompatibility and tendency to change	0.35 **	-0.23 *	-0.25 *	-0.26 *	-0.33 **	1					
Negative self-perceptions and negative expectations	0.32 **	-0.26 *	-0.23 *	-0.24 *	-0.35 **	-0.37 **	1				
Low self-esteem	0.36 **	-0.29 *	-0.26 *	-0.30 *	-0.26 *	-0.34 **	-0.39 **	1			
Helplessness	0.34 **	-0.27 *	0.27 *	-0.23 *	-0.21 *	-0.28 *	0.30 **	0.40 **	1		
The negative dimension of perceived stress	0.24 *	-0.23 *	-0.29 *	-0.26 *	-0.24 *	0.26 *	0.34 **	0.37 **	-0.33 **	1	
The positive dimension of perceived stress	0.25 *	0.34 **	0.26 *	0.33 *	0.29 *	-0.34 **	-0.27 *	-0.35 **	0.28 *	-0.26 *	1

*P<0.05, **P<0.01
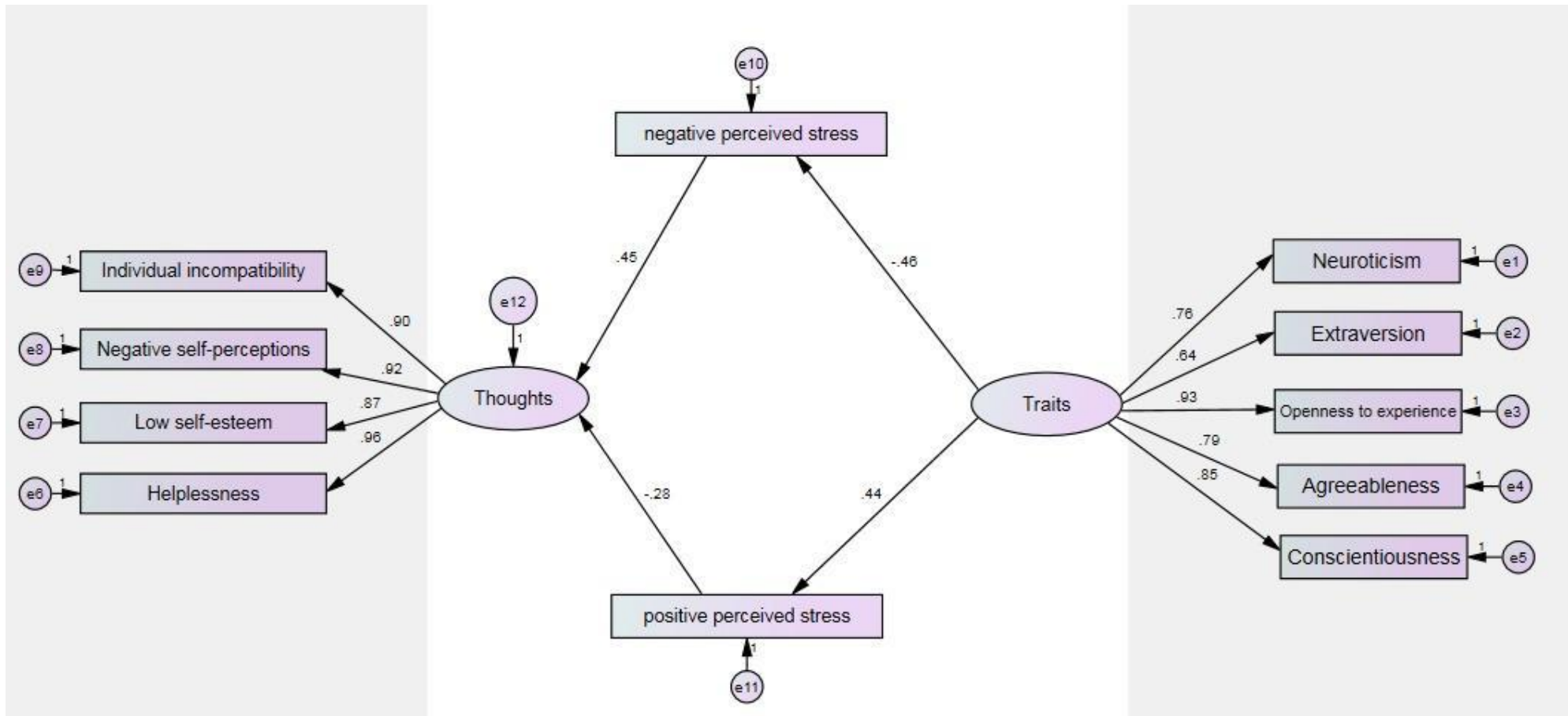
Fig. 2: The proposed research model

According to the results presented in **Table 7**, it is clear that the indirect relationship between personality traits and negative spontaneous thoughts is significant through the negative dimension of perceived stress with β = -0.36 at the significance level of P≥ 0.01. Therefore, it can be said that the indirect relationship between personality traits and negative spontaneous thoughts is established and significant through the negative dimension of perceived stress.

According to **Table 7**, it is clear that the indirect relationship between personality traits and negative spontaneous thoughts is significant through the positive dimension of perceived stress with β = 0.34 at the significance level of P≥ 0.01. Therefore, it can be said that the indirect relationship between personality traits and negative spontaneous thoughts is established and significant through the positive dimension of perceived stress.

Table-7: Bootstrap results related to indirect relationships in the first model of the research

Path	β	Min	Max	P-value
Personality traits to Automatic negative thoughts through The negative dimension of perceived stress	0.36 -	0.36	0.25	0.01≥p
Personality traits to Automatic negative thoughts through The positive dimension of perceived stress	0.34	0.39	027	

4- DISCUSSION

The current study assessed the relationship between personality traits and negative automatic thoughts considering the mediating role of perceived stress. This study covered migraine patients referring to neurology clinics in Ahvaz City, Iran. According to the statistical results, the indirect relationship between personality traits and negative automatic thoughts was established and significant through both negative and positive dimensions of perceived stress.

The results of this study are in line with numerous previous studies (12-16), which all of them emphasized on the comorbidity between migraine and psychiatric disorders that are highly relevant in the clinical practice, influencing both the response to treatment and likelihood to achieve remission. The results of some studies also confirmed that there was a significant difference between the perception of stress and negative automatics thought among patients suffering from migraine (9, 18). The results of a recent study add proof of the substantial difference in the internalizing issues between migraine-positive children and those without migraine. In fact, migraine has historically been associated with injury, loss of performance, higher rates of mental conditions of anxiety, depression (16). Although study findings revealed that chronic post-traumatic headaches had elevated levels of post-traumatic stress disorder, in individuals with stress headache-like symptoms, they had a positive association with pain severity (25). It has been found that neuroticism is correlated with perseverance, with rumination serving as a mediator between neuroticism and depression/anxiety. Strong ratings on neuroticism among migraine sufferers have also been recorded (26). In current literature on cognitive impairment, associations are also reported between migraine and psychiatric conditions correlated with a mild occurrence in the general public, including mental disorders, alcohol use disorders, stress disorder, and eating disorders (27). Ashina et al. (2017), showed that Headache frequency (chronic vs. episodic) is correlated with neuroticism

and depression scores and is higher for migraine and TTH, then for pure TTH, and pure migraine, respectively (28).

Explaining the results of this study, it can be said that due to the sensitive age of adolescents and the signs of puberty, the amount of stress in this period becomes more than before, and if the stress continues and has a genetic background, persistent and stressful headaches end in migraine. These can be named among the mediating variables that aggravate this disease. As noted in the research background, the personal type of neurosis is prone to rumination and negative thoughts, which alone can be a strong cause of migraine.

4-1. Study Strengths and limitations

As for the strengths of the study, we can menthe interview participants were randomly chosen and it means that and that

This study provided the first systemic model to elucidate the mediating function of perceived stress dimensions in the relation between personality characteristics and negative automatic thinking among adolescents with migraine; and attempts were made in the sampling procedure that the research cohort reflects the study population equally well. Despite this, the major restriction of this study is related to the exclusive use of self-reports. The next limitation was its restricted generalizability; as the study was carried out in a single center, it is unclear as to whether the patients in the study were representative of all patients. Furthermore, the study's statistical population is limited to migraine patients. The same variables will be extended to other samples in future experiments. Due to the possibility of bias in the response of the participants to the questionnaires, caution should be exercised in generalizing the results. Targeted sampling is used due to expense, time consumption, and lack of access to an up-to-date list, so the sampling error is more than random sampling.

5- CONCLUSION

In conclusion, this study highlights the importance of personality characteristics and negative automatic thinking in migraine, and also it has revealed the mediating role of perceived stress. We believe that an interdisciplinary approach to migraine research may be useful for the better therapeutic management of patients. The results, further, recommend the development of prevention and intervention programs focusing on strategies to promote adaptive skills and reduction in repetitive negative thinking may reduce migraine. Thus, the design of training courses or seminars to alleviate stress and negative thoughts is suggested to be studied in future research. Specialized therapies for individuals with physical and mental illnesses are also needed. Together with the third wave treatment method, research into the relationship between these variables provides realistic solutions to reinforce constructive ideas.

6- Ethical Considerations

The study was approved by the Ethics Committee of the Islamic Azad University, Shiraz Branch (IR.IAU. REC.1399.235). All study procedures were in compliance with the ethical guidelines of the Declaration of Helsinki, 2013.

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