

# Maternal stress and childhood migraine: a new perspective on management

Maria Esposito<sup>1</sup>  
Beatrice Gallai<sup>2</sup>  
Lucia Parisi<sup>3</sup>  
Michele Roccella<sup>3</sup>  
Rosa Marotta<sup>4</sup>  
Serena Marianna Lavano<sup>4</sup>  
Antonella Gritti<sup>5</sup>  
Giovanni Mazzotta<sup>6</sup>  
Marco Carotenuto<sup>1</sup>

<sup>1</sup>Center for Childhood Headache, Clinic of Child and Adolescent Neuropsychiatry, Department of Mental Health, Physical, and Preventive Medicine, Second University of Naples, Naples, <sup>2</sup>Unit of Child and Adolescent Neuropsychiatry, University of Perugia, Perugia, <sup>3</sup>Child Neuropsychiatry, Department of Psychology, University of Palermo, Palermo, <sup>4</sup>Department of Psychiatry, "Magna Graecia" University of Catanzaro, Catanzaro, <sup>5</sup>Suor Orsola Benincasa University, Naples, <sup>6</sup>Unit of Child and Adolescent Neuropsychiatry, Azienda Sanitaria Locale 4, Terni, Italy

Correspondence: Marco Carotenuto  
Center for Childhood Headache,  
Clinic of Child and Adolescent  
Neuropsychiatry, Department  
of Mental Health, Physical, and  
Preventive Medicine, Via Sergio  
Pansini 5 PAD XI, 80131 Naples, Italy  
Tel +39 081 566 6988  
Fax +39 081 566 6694  
Email marco.carotenuto@unina2.it

**Background:** Migraine without aura is a primary headache which is frequent and disabling in the developmental age group. No reports are available concerning the prevalence and impact of migraine in children on the degree of stress experienced by parents. The aim of this study was to evaluate the prevalence of maternal stress in a large pediatric sample of individuals affected by migraine without aura.

**Methods:** The study population consisted of 218 children (112 boys, 106 girls) of mean age  $8.32 \pm 2.06$  (range 6–13) years suffering from migraine without aura and a control group of 405 typical developing children (207 boys, 198 girls) of mean age  $8.54 \pm 2.47$  years. Mothers of children in each group answered the Parent Stress Index-Short Form (PSI-SF) questionnaire to assess parental stress levels.

**Results:** The two groups were matched for age ( $P = 0.262$ ), gender ( $P = 0.983$ ), and body mass index adjusted for age ( $P = 0.106$ ). Mothers of children with migraine without aura reported higher mean PSI-SF scores related to the Parental Distress domain ( $P < 0.001$ ), Dysfunctional Parent-Child Interaction domain ( $P < 0.001$ ), Difficult Child subscale ( $P < 0.001$ ), and Total Stress domain than mothers of controls ( $P < 0.001$ ). No differences between the two groups were found for Defensive Responding subscale scores.

**Conclusion:** Our study may be the first to highlight the presence of high levels of stress in parents of children affected by migraine without aura.

**Keywords:** parental stress, childhood migraine, migraine without aura, children

## Introduction

Migraine without aura is a primary headache which is frequent in the developmental age group, with a prevalence ranging from 2% to 17%.<sup>1</sup> Migraine without aura is a painful syndrome, particularly in childhood, and is often accompanied by severe impairments, including low quality emotional functioning, absenteeism from school, and poor academic performance, as well as poor cognitive functioning,<sup>1,2</sup> motor coordination,<sup>3</sup> and sleep habits.<sup>4–8</sup> In the last 20 years, much attention has been paid to the presence of psychological difficulties and psychiatric comorbidity in children affected by primary headaches.<sup>9–16</sup> In clinical practice, many alternative therapies have been explored, and some have shown promise in the treatment of headache symptoms and/or comorbidities in affected children, such as weight loss,<sup>17</sup> nutraceuticals,<sup>18,19</sup> sleep hygiene,<sup>20,21</sup> psychotherapy, and generic psychological interventions.<sup>22–24</sup>

To date, there are no reports concerning the prevalence and impact of migraine on the degree of parental stress in the parent-child interaction, and how the presence of this painful syndrome could change and alter the daily familial relationship.<sup>25–34</sup>

Therefore, the aim of this study was to assess maternal stress in a population of school-aged children affected by migraine without aura.

## Materials and methods

### Study population

The study population comprised 218 children (112 boys, 106 girls) of mean age  $8.32 \pm 2.06$  (range 6–13) years with migraine without aura referred consecutively to the Clinic for Headache in Developmental Age, Clinic of Child Neuropsychiatry, Second University of Naples, to the Unit of Child and Adolescent Neuropsychiatry, Perugia University, and to the Azienda Sanitaria Locale of Terni, from January to September 2012.

The diagnosis of migraine without aura was made according to the pediatric criteria of the International Headache Society Classification 2004 (ICHD-II),<sup>35</sup> as follows: at least 5 headache attacks lasting 1–72 hours, bilateral or unilateral (frontal/temporal) location, pulsating quality, moderate to severe intensity, aggravated by routine physical activity, and accompanied by nausea, vomiting, photophobia, and/or phonophobia (inferred from behavior observed during attacks).<sup>35</sup>

Exclusion criteria were mental retardation, association of different types of headache, changes in neuroradiological (magnetic resonance imaging or computed tomography scan) and neurophysiological (wake and sleep electroencephalogram) features, concomitant neurological (ie, epilepsy, movement disorders, cerebral palsy) or psychiatric disorders (ie, schizophrenia, mood and anxiety disorders, psychosis, eating disorders, attention deficit hyperactivity disorder), metabolic disease, obesity, and signs of sleep-related breathing disorders.

Following recruitment, there was a 4-month run-in period to verify the characteristics of headache. The minimum mean duration of headache required for admission in this study was 8 (range 8–18) months, with a minimum of eight attacks per month, each lasting for a duration of at least one hour, according to ICHD-II criteria.<sup>35</sup>

The results were compared with the findings obtained in a sample of 405 typical developing controls (207 boys, 198 girls, mean age  $8.54 \pm 2.47$  years) recruited from schools in the Campania and Umbria regions. Subjects for both groups were recruited from the same urban area, and were all of Caucasian origin and of middle socioeconomic status. All parents gave their written informed consent. The clinical departmental university ethics committee at the Second University of Naples approved the study (protocol

number 16/2012), which was conducted according to the criteria of the Declaration of Helsinki as modified in 2000.

### Parenting Stress Index-Short Form

To assess the perceived stress in mothers of children with PCD, the Italian version of the Parenting Stress Index-Short Form (PSI-SF) was used.<sup>36</sup> The PSI-SF is a standardized tool which yields scores for parental stress across four areas, ie, Parental Distress and Parent-Child Dysfunctional Interaction domains, and Difficult Child and Total Stress subscales. It has 36 items and provides both raw and percentile scores. Each item is graded on a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree).

In particular, the Parental Distress domain measures the distress that parents feel about their parenting role in light of other personal stresses and has a cutoff score of 36; the Parent-Child Dysfunctional Interaction domain focuses on the perception of the child as not responsive to parental expectations, and has a cutoff score of 27; and the Difficult Child subscale represents behaviors that children often engage in that may make parenting easier or more difficult, and has a cutoff score of 36.

The PSI-SF also produces a Defensive Responding subscale score, which indicates likely response bias. The subscale scores range from 12 to 60, and the total stress score ranges from 36 to 180, with higher scores indicating greater levels of parental stress. Thus, responses higher than the 85th percentile (one standard deviation above the mean) are interpreted as “clinically significant” for high levels of family stress.<sup>36</sup> The PSI-SF has been used widely, and psychometric evidence supports its reliability and validity.<sup>37,38</sup> The PSI-SF shows high internal consistency (Cronbach’s alpha 0.92) and its validity has been established in parents of children with chronic medical conditions, including diabetes and asthma.<sup>39–41</sup> In this study, the PSI-SF was administered only to the mother, being the parent who usually spends more time with the children.

### Statistical analysis

The *t*-test and Chi-square test were applied as appropriate to compare the characteristics (age, gender, body mass index adjusted for age) and the PSI-SF results between the two populations.  $P < 0.05$  was considered to be statistically significant. All data were coded and analyzed using the commercially available Statistica version 6.0 package for Windows (StatSoft Inc, Tulsa, OK, USA).

## Results

The mean frequency of migraine attacks per month in the migraine without aura group was  $6.21 \pm 2.58$ . The two study

groups were matched for age ( $P = 0.262$ ), gender ( $P = 0.983$ ), and body mass index adjusted for age ( $P = 0.106$ , Table 1). Mothers of children with migraine without aura reported higher mean PSI-SF scores on the Parental Distress domain ( $P < 0.001$ ), Parent-Children Dysfunctional Interaction domain ( $P < 0.001$ ), Difficult Child subscale ( $P < 0.001$ ), and Total Stress subscale than the mothers of the controls ( $P < 0.001$ , Table 2). No differences between the two groups were found for the Defensive Responding subscale score (Table 2).

## Discussion

The association between stressors and migraine has been found in all age groups, including adolescents who may particularly benefit from behavioral therapies aimed at improving coping strategies for stress.<sup>42</sup>

Among the modifiable risk factors for headache, stress and/or the psychiatric comorbidity are thought to be the greatest contributors to chronification,<sup>43</sup> and emotional stress is frequently reported by patients affected by migraine as an important trigger for attacks.<sup>44</sup> Indeed, how stressful events may promote the development of chronic migraine is still debated, even if neurochemical changes seem to be involved.<sup>45,46</sup> The role of psychological and behavioral components as negative prognostic indicators is also well known, and they play a key role in the pathophysiological process leading to chronification.<sup>47</sup>

On the other hand, the clinical management of pediatric migraine could be considered to be complex and meaningful, just as much as living in a family with a child affected. The main finding of the present study is the significantly higher rate of stress in mothers of children with migraine without aura ( $P < 0.001$ ), highlighting the importance of coping strategies.

In general, the use of health care, medication, and alternative therapies constitutes only a limited part of a successful

**Table 1** Characteristics of the sample study: differences in age, gender, and body mass index adjusted for age between the group of children affected by migraine without aura and controls

|                    | MoA<br>(n = 218) | Controls<br>(n = 405) | P     |
|--------------------|------------------|-----------------------|-------|
| Age                | 8.32 ± 2.06      | 8.54 ± 2.47           | 0.262 |
| Gender ratio (M/F) | 112/106          | 207/198               | 0.983 |
| z-BMI              | 0.49 ± 0.21      | 0.52 ± 0.23           | 0.106 |

**Notes:** The *t*-test and Chi-square test were applied as appropriate;  $P < 0.05$  were considered to be statistically significant.

**Abbreviations:** MoA, migraine without aura; z-BMI, body mass index adjusted for age.

**Table 2** Mean differences in Parenting Stress Index-Short Form scores between children affected by migraine without aura and controls

|              | MoA<br>(n = 218) | Controls<br>(n = 405) | P      |
|--------------|------------------|-----------------------|--------|
| PD           | 41.93 ± 7.12     | 26.94 ± 5.44          | <0.001 |
| PCDI         | 33.97 ± 4.79     | 22.18 ± 3.05          | <0.001 |
| DC           | 24.58 ± 2.93     | 22.96 ± 3.19          | <0.001 |
| DEF          | 14.01 ± 3.27     | 13.96 ± 4.19          | NS     |
| Total stress | 101.38 ± 7.81    | 65.27 ± 4.39          | <0.001 |

**Notes:** The *t*-test and Chi-square test were applied as appropriate;  $P < 0.05$  were considered statistically significant.

**Abbreviations:** PD, Parental Distress domain; PCDI, Parent-Child Dysfunctional Interaction domain; DC, Difficult Child subscale; DEF, defensive responding subscale; MoA, migraine without aura; NS, not significant.

coping strategy, so more specific approaches for social support, lifestyle, and self-management demonstrated how headache patients play a central role within their own care. Moreover, patients with medically unexplained disorders complain that they are not taken seriously by physicians,<sup>48</sup> and doctors become frustrated seeing patients with disorders they are not able to understand or cure.<sup>49</sup> This approach could be hazardous in the developmental age group, particularly in prepubertal subjects, and could represent a starting point for the difficulty in management and interaction with children suffering from migraine without aura, as highlighted by our results showing higher scores on the Difficult Child subscale ( $P < 0.001$ ) and on the Parent-Child Dysfunctional Interaction domain ( $P < 0.001$ ).

On the other hand, primary headache would impact on everyday functioning of children in significant ways. Affected children report that pain significantly decreases the amount of leisure time spent with peers and has negative effects on their usual daily activities.<sup>50,51</sup> This might explain the higher prevalence in our children with migraine without aura of difficult interaction with their mothers ( $P < 0.001$ ).

Conversely, patients who are more likely to benefit from behavioral therapy include those with chronic or refractory migraine, psychiatric comorbidities such as anxiety and mood disorders, and poor coping strategies,<sup>52</sup> highlighting the relevance of coping in the management of headache in the developmental age group. Informing parents about the clinical characteristics of pediatric migraine without aura, eg, the high frequency of attacks and accompanying symptoms, may help to reduce the perception of the child as difficult. For example, use of familiar coping strategies could help parents not to be afraid before and/or during the attacks and consequently reduce their stress levels.

In conclusion, our study is the first report to the authors' knowledge concerning a relationship between migraine

without aura in childhood and parental stress, highlighting its importance and the need for expanded intervention in the clinical management of pediatric headache, that may also include the family members and further research are needed.

## Disclosure

The authors report no conflicts of interest in this work.

## References

- Kernick D, Campbell J. Measuring the impact of headache in children: a critical review of the literature. *Cephalalgia*. 2009;29:3–16.
- Esposito M, Pascotto A, Gallai B, et al. Can headache impair intellectual abilities in children? An observational study. *Neuropsychiatr Dis Treat*. 2012;8:509–513.
- Esposito M, Verrotti A, Gimigliano F, et al. Motor coordination impairment and migraine in children: a new comorbidity? *Eur J Pediatr*. 2012; 171:1599–1604.
- Carotenuto M, Guidetti V, Ruju F, et al. Headache disorders as risk factors for sleep disturbances in school aged children. *J Headache Pain*. 2005;6: 268–270.
- Vendrame M, Kaleyias J, Valencia I, Legido A, Kothare SV. Polysomnographic findings in children with headaches. *Pediatr Neurol*. 2008;39:6–11.
- Carotenuto M, Esposito M, Precenzano F, Castaldo L, Roccella M. Cosleeping in childhood migraine. *Minerva Pediatr*. 2011;63:105–109.
- Carotenuto M, Esposito M, Pascotto A. Migraine and enuresis in children: an unusual correlation? *Med Hypotheses*. 2010;75:120–122.
- Esposito M, Roccella M, Parisi L, Gallai B, Carotenuto M. Hypersomnia in children affected by migraine without aura: a questionnaire-based case-control study. *Neuropsychiatr Dis Treat* 2013;9 289–294.
- Arruda MA, Guidetti V, Galli F, Albuquerque RC, Bigal ME. Migraine, tension-type headache, and attention-deficit/hyperactivity disorder in childhood: a population-based study. *Postgrad Med*. 2010;122:18–26.
- Guidetti V, Galli F, Sheftell F. Headache attributed to psychiatric disorders. *Handb Clin Neurol*. 2010;97:657–662.
- Galli F, Canzano L, Scalisi TG, Guidetti V. Psychiatric disorders and headache familial recurrence: a study on 200 children and their parents. *J Headache Pain*. 2009;10:187–197.
- Bruni O, Russo PM, Ferri R, et al. Relationships between headache and sleep in a non-clinical population of children and adolescents. *Sleep Med*. 2008;9:542–548.
- Galli F, D'Antuono G, Tarantino S, et al. Headache and recurrent abdominal pain: a controlled study by the means of the Child Behaviour Checklist (CBCL). *Cephalalgia*. 2007;27:211–219.
- Guidetti V, Galli F. Psychiatric comorbidity in chronic daily headache: pathophysiology, etiology, and diagnosis. *Curr Pain Headache Rep*. 2002;6:492–497.
- Guidetti V, Galli F, Cerutti R, Fortugno S. "From 0 to 18": what happens to the child and his headache? *Funct Neurol*. 2000;15 Suppl 3:122–129.
- Guidetti V, Galli F, Fabrizi P, et al. Headache and psychiatric comorbidity: clinical aspects and outcome in an 8-year follow-up study. *Cephalalgia*. 1998;18:455–462.
- Verrotti A, Agostinelli S, D'Egidio C, et al. Impact of a weight loss program on migraine in obese adolescents. *Eur J Neurol*. 2013;20: 394–397.
- Esposito M, Ruberto M, Pascotto A, Carotenuto M. Nutraceutical preparations in childhood migraine prophylaxis: effects on headache outcomes including disability and behaviour. *Neurol Sci*. 2012;33:1365–1368.
- Esposito M, Carotenuto M. Ginkgolide B complex efficacy for brief prophylaxis of migraine in school-aged children: an open-label study. *Neurol Sci*. 2011;32:79–81.
- Bruni O, Galli F, Guidetti V. Sleep hygiene and migraine in children and adolescents. *Cephalalgia*. 1999;19 Suppl 25:57–59.
- Carotenuto M, Gallai B, Parisi L, Roccella M, Esposito M. Acupressure therapy for the insomnia in adolescents: a polysomnographic study. *Neuropsychiatr Dis*. 2013;9:157–162.
- Chopra R, Robert T, Watson DB. Non-pharmacological and pharmacological prevention of episodic migraine and chronic daily headache. *WV Med J*. 2012;108:88–91.
- Kröner-Herwig B, Gassmann J. Headache disorders in children and adolescents: their association with psychological, behavioral, and socio-environmental factors. *Headache*. 2012;52:1387–1401.
- Sieberg CB, Huguet A, von Baeyer CL, Seshia S. Psychological interventions for headache in children and adolescents. *Can J Neurol Sci*. 2012;39:26–34.
- Mazzone L, Vitiello B, Incorpora G, Mazzone D. Behavioural and temperamental characteristics of children and adolescents suffering from primary headache. *Cephalalgia*. 2006;26:194–201.
- Guite JW, Logan DE, McCue R, Sherry DD, Rose JB. Parental beliefs and worries regarding adolescent chronic pain. *Clin J Pain*. 2009;25:223–232.
- Janssens KA, Oldehinkel AJ, Rosmalen JG. Parental overprotection predicts the development of functional somatic symptoms in young adolescents. *J Pediatr*. 2009;154:918–923. e1.
- Anthony KK, Schanberg LE. Assessment and management of pain syndromes and arthritis pain in children and adolescents. *Rheum Dis Clin North Am*. 2007;33:625–660.
- Rhee H, Holditch-Davis D, Miles MS. Patterns of physical symptoms and relationships with psychosocial factors in adolescents. *Psychosom Med*. 2005;67:1006–1012.
- Logan DE, Scharff L. Relationships between family and parent characteristics and functional abilities in children with recurrent pain syndromes: an investigation of moderating effects on the pathway from pain to disability. *J Pediatr Psychol*. 2005;30:698–707.
- Smith MS, Martin-Herz SP, Womack WM, Marsigan JL. Comparative study of anxiety, depression, somatization, functional disability, and illness attribution in adolescents with chronic fatigue or migraine. *Pediatrics*. 2003;111(4 Pt 1):e376–e381.
- Thomsen AH, Compas BE, Colletti RB, et al. Parent reports of coping and stress responses in children with recurrent abdominal pain. *J Pediatr Psychol*. 2002;27:215–226.
- Aromaa M, Sillanpää M, Rautava P, Helenius H. Pain experience of children with headache and their families: a controlled study. *Pediatrics*. 2000;106(2 Pt 1):270–275.
- Hurrelmann K, Engel U, Holler B, Nordlohne E. Failure in school, family conflicts, and psychosomatic disorders in adolescence. *J Adolesc*. 1988;11:237–249.
- Headache Classification Subcommittee of the International Headache Society. *The International Classification of Headache Disorders*, 2nd ed. *Cephalalgia*. 2004;24 Suppl 1:1–15.
- Abidin RR. *Parenting Stress Index*, 3rd ed. Professional Manual. Lutz, FL: Psychological Assessment Resources Inc; 1995.
- Abidin RR. Parenting Stress Index: a measure of the parent-child system. In: Zalaquett CP, Wood R, editors. *Evaluating Stress: A Book of Resources*. Lanham, MD: Scarecrow Press; 1997.
- Lessenberry B, Rehfeldt R. Evaluating stress levels of parents of children with disabilities: a review of assessment instruments. *Exceptional Children*. 2004;70:231–244.
- Abidin RR. *Parenting Stress Index-Short Form Manual*. Los Angeles, CA: Western Psychological Services; 1990.
- Carson DK, Schauer RW. Mothers of children with asthma: perceptions of parenting stress and the mother-child relationship. *Psychol Rep*. 1992;71:1139–1148.
- Wysocki T, Huxtable K, Linscheid TR, Wayne W. Adjustment to diabetes mellitus in preschoolers and their mothers. *Diabetes Care*. 1989;12:524–529.
- Milde-Busch A, Blaschek A, Heinen F, et al. Associations between stress and migraine and tension-type headache: results from a school-based study in adolescents from grammar schools in Germany. *Cephalalgia*. 2011;31:774–785.

43. Gentili C, Panicucci P, Guazzelli M. Psychiatric comorbidity and chronicisation in primary headache. *J Headache Pain*. 2005;6:338–340.
44. Andress-Rothrock D, King W, Rothrock J. An analysis of migraine triggers in a clinic-based population. *Headache*. 2010;50:1366–1370.
45. Brighina F, Fierro B. Cortical hypoactivity or reduced efficiency of cortical inhibition in migraine? *Cephalalgia*. 2007;27:187–188.
46. Cahana A, Jones D. Neurobiology of the chronicisation of pain in children: the memory of pain and its painful memory. *Ann Fr Anesth Reanim*. 2007;26:540–545. French.
47. Pistoia F, Sacco S, Carolei A. Behavioral therapy for chronic migraine. *Curr Pain Headache Rep*. 2013;17:304.
48. Werner A, Malterud K. It is hard work behaving as a credible patient: encounters between women with chronic pain and their doctors. *Soc Sci Med*. 2003;57:1409–1419.
49. Wileman L, May C, Chew-Graham CA. Medically unexplained symptoms and the problem of power in the primary care consultation: a qualitative study. *Fam Pract*. 2002;19:178–182.
50. Langeveld JH, Koot HM, Passchier J. Headache intensity and quality of life in adolescents. How are changes in headache intensity in adolescents related to changes in experienced quality of life? *Headache*. 1997;37:37–42.
51. Frare M, Axia G, Battistella PA. Quality of life, coping strategies, and family routines in children with headache. *Headache*. 2002;42:953–962.
52. Nicholson RA, Buse DC, Andrasik F, Lipton RB. Nonpharmacologic treatments for migraine and tension-type headache: how to choose and when to use. *Curr Treat Options Neurol*. 2011;13:28–40.

### Neuropsychiatric Disease and Treatment

#### Publish your work in this journal

Neuropsychiatric Disease and Treatment is an international, peer-reviewed journal of clinical therapeutics and pharmacology focusing on concise rapid reporting of clinical or pre-clinical studies on a range of neuropsychiatric and neurological disorders. This journal is indexed on PubMed Central, the 'PsycINFO' database and CAS.

Submit your manuscript here: <http://www.dovepress.com/neuropsychiatric-disease-and-treatment-journal>

Dovepress

The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.