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Attachment styles in children affected by migraine without aura

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Background: In recent years, great attention has been given to the presence of psychological problems and psychiatric comorbidity that are also present in children affected by primary headaches. The relationship between pain and attachment has been identified, and it may be that pain perception may change in relation with specific attachment styles. The aim of the present study was to assess the prevalent attachment style and verify its putative relationship and correlation with the main characteristics of migraine attacks, in school-aged children affected by migraine without aura (MoA).

Materials and methods: The study population consisted of 219 children (103 males, 116 females) aged between 6 and 11 years (mean 8.96 ± 2.14 years), consecutively referred for MoA compared with 381 healthy controls (174 males, 207 females; mean age 9.01 ± 1.75 years) randomly selected from schools. All the children were classified according to the attachment typologies of the Italian modified version of the Separation Anxiety Test; monthly headache frequency and mean headache duration were assessed from daily headache diaries kept by all the children. Headache intensity was assessed on a visual analog scale. The chi-square test and *t*-test, where appropriate, were applied, and the Spearman rank correlation test was applied to explore the relationship between the types of attachment style and clinical aspects of MoA.

Results: The MoA group showed a significantly higher prevalence of type A (avoidant) attachment ($P<0.001$) and a significantly lower prevalence of type B (secure) attachment ($P<0.001$) compared with the control group. Moreover, the Spearman rank correlation analysis showed a significant relationship between MoA characteristics and the attachment style of MoA children.

Conclusion: The main findings of the present study were the higher prevalence among MoA children of the avoidant attachment style (type A) and the significantly lower prevalence of the secure style attachment (type B) compared with the normal controls, suggesting that the study of psychiatric comorbidity in pediatric headache may be enriched by this new aspect of analysis.

Keywords: migraine without aura, children, attachment style, Separation Anxiety Test

Introduction

Currently, the World Health Organization recognizes migraine as a high priority public health problem.[1,2]

In fact, the disability associated with migraine appears to be closely related to its severity, affecting areas of functioning such as communication, mobility, self-care, emotional functioning, academic performance and cognitive functioning,[3,4] motor coordination,[5] sleep habits,[6–11] socialization, and relationships with peers[12] and with family members.[13,14] In clinical pediatric practice, many alternative therapies, different from the classical pharmacological treatment,[15] have been explored, such as weight

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loss,[16] nutraceuticals,[17–19] sleep hygiene,[20,21] psychotherapy, and generic psychological interventions, and some have shown promise in the treatment of headache symptoms and/or comorbidities in affected children.[22–24]

Moreover, in the last 20 years great attention has been given to the presence of psychological problems and psychiatric comorbidity that are also present in children affected by primary headaches.[25–32]

The relationship between pain and attachment has been identified,[33,34] including whether the pain perception might change in relation with specific attachment styles.[35,36]

Bowlby's attachment theory was formulated to account for human infants' attraction to and dependence on others and to specify how early experiences with significant others, particularly adult caregivers, are carried forward in development.[37–40] According to this theory, the early mother–child relationship lays the groundwork for the child's understanding of and participation in subsequent familial and extrafamilial relationships. The quality of infants' attachments with their mothers can be different, as can the child's later social outlook and success with peers.[41,42]

Conversely, when parental insensitivity contributes to the development of an insecure primary attachment, children are thought to develop an internal working model of relationships that stresses their unpredictable nature and to develop images of themselves as unworthy and ineffectual. In fact, an attachment relationship that provides neither comfort nor support is likely to arouse anxiety and anger, leading the insecure child to behave in the peer group – "by shrinking from it or doing battle with it."[39]

Other important contributions have also been derived from developmental psychopathology, in particular, the analysis of the relationship between attachment and clinical disturbances.

In fact, investigations have clearly and repeatedly shown that infants' relationships with their parents can be characterized as secure as opposed to insecure, using the Strange Situation paradigm.[43] The Strange Situation procedure proposed by Ainsworth[43] highlights the individual differences observed when the child is forced to separate from the "secure base" (identified as the mother figure). Three patterns of attachment were initially identified through the Strange Situation procedure, "secure," "insecure–avoidant," and "insecure–anxiety/ambivalence," and a fourth pattern, "insecure–disorganized/disoriented," has been subsequently identified and developed by Main et al.[44,45]

In fact, the different styles of attachment can be considered to be the result of the different interaction modalities between the mother figure and the child, and they do not reflect the temperament or instinct of the child. The behavioral models at the reunion phase in the Strange Situation are considered to represent the differences in the internal representation of the attachment relationship of the child with a particular caregiver. From this perspective, in the attachment paradigm, the internal representations are classified, instead of different children.[43]

In 1976, Klagsbrun and Bowlby proposed a promising tool for measuring the internal representations of attachment security in middle childhood, named the Separation Anxiety Test (SAT), now used worldwide in school-aged populations.[46]

In children and adults, attachment styles may be related to many comorbidities, such as sleep disorders,[47] pain threshold alteration,[48] and academic difficulties.[49] To the best of our knowledge, there are no reports about attachment style evaluation in subjects affected by primary headache. Thus, the aim of the present study was to assess the prevalent attachment style and to verify its putative relationship and correlation with the main characteristics of migraine attacks, in school-aged children affected by migraine without aura (MoA).

Materials and methods

Study population

The study population consisted of 219 children (103 males, 116 females) aged between 6 and 11 years (mean 8.96 ± 2.14 years) consecutively referred for MoA to various facilities: the Clinic for Headache, Clinic of Child and Adolescent Neuropsychiatry, Second University of Naples; to the Unit of Child and Adolescent Neuropsychiatry, Perugia University; to the local health unit (Azienda Sanitaria Locale), Terni; to the Department of Psychiatry, University of Catanzaro; and to the Child Neuropsychiatry, University of Palermo, Italy. The diagnosis of MoA was made according to the pediatric criteria of the International Headache Society Classification 2013.[50]

The exclusion criteria were: allergies, endocrinological problems (ie, diabetes), preterm birth,[51,52] neurological (ie, epilepsy and all types of headache other than MoA) or psychiatric (attention deficit hyperactivity disorder [ADHD], depression, or behavioral problems) symptoms, mental retardation (intelligence quotient [IQ] ≤70), borderline intellectual functioning (IQ ranging from 71 to 84),[53,54] overweight (body mass index [BMI] ≥85th percentile) or obesity (BMI ≥95th percentile),[55,56] sleep disorders,[6,21,57–60] primary nocturnal enuresis,[10,61,62] and anticonvulsant[63,64] or psychoactive drug administration.

Following recruitment, there was a 4-month run-in period to verify the migraine characteristics.

At the end of the run-in, the monthly headache frequency and mean headache duration were assessed from daily headache diaries kept by all the children. Headache intensity was assessed on a visual analog (VAS) scale, as previously reported.[17–19]

For admission in this study subjects had to have experienced headaches for 8 months, with a minimum of four attacks monthly, each lasting for a duration of one hour, according to the *International Classification of Headache Disorders* (ICHD)-3 criteria.[50]

The results were compared with the findings obtained in a sample of 381 healthy controls (174 males, 207 female; mean age 9.01 ± 1.75 years) randomly selected from schools in the Campania, Umbria, Sicilia, and Calabria regions.

The subjects in both groups were recruited from the same urban area; the participants were all Caucasian and of middle-class socioeconomic status (between class 2 or class 3, corresponding to 28,000–55,000 Euros/year to 55,000–75,000 Euros/year, respectively, according to current Italian economic parameters), as previously reported.[5] All parents gave their written, informed consent. The Departmental Ethics Committee of the Second University of Naples approved the study. The study was conducted according to the criteria of the Declaration of Helsinki.[65]

Main outcome measures

Modified Italian version of the Separation Anxiety Test (SAT)

The children were classified according the attachment typologies of the Italian modified version of the SAT.[66] The SAT is a semiprojective test, used to measure the personality characteristics and the possible psychopathological aspects associated with the separation from the attachment figure or other figure responsible for the child's protection and care.

In the SAT, two types of scenes are presented alternately, in order to not overload the subject with negative and anxiety-inducing emotions.

The answers provided by each subject were transcribed to response card tables, of which there were two versions: one for a hypothetical subject and one for the actual subject. Once the responses were collected and recorded on the appropriate response cards, the next step was to classify the emotional reactions in one of seventeen categories.

The SAT scoring process is based on the attachment categories identified by the Strange Situation observation procedure proposed by Ainsworth and takes into account all the attachment categories of response: that is related to emotions reported by the subject and their justification, both to indicate the mode of coping (coping strategies) in the indicated situation. Thus, a score of −2 is assigned to all those responses that refer to attachments of the disorganized or avoidant type; a score of −1 is assigned to all the answers that may be due to an ambivalent attachment type; and a score of +1 is assigned to all the emotions that are normally expected to be raised by a separation. However, when a child responds to more than two tables with anxiety responses, the response may be indicative of potentially pathological anxiety; in this case, the score +1 will be replaced with the score −1 for the third and fourth anxious response, score −2 for the fifth and sixth. Finally, a score of +2 is awarded to responses that can be traced to a secure attachment type.

Summarizing, according to the total score, the attachment style is determined as follows:

Score: +4 and above shows secure attachment (type B);

Score: +1 to +3 shows insecure attachment/anxious ambivalent attachment (type C);

Score: −2 to 0 shows insecure attachment/anxious avoidant attachment (type A); and

Score: −3 and below shows disorganized "at risk" attachment/confused attachment (type D).

Statistical analysis

In order to compare the characteristics (age and sex) and the SAT results between the MoA children and controls, the chi-square test and *t*-test, where appropriate, were applied.

Then, to explore the relationship between the types of attachment style and the clinical aspects of MoA, such as frequency, duration, and severity of attacks, the Spearman rank correlation test was applied.

For all statistical analysis, P-values<0.05 were considered significant.

All data were coded and analyzed using the STATISTICA 6.0 package for Windows (StatSoft®, Inc., Tulsa, OK, USA).

Results

The two study groups were not significantly different for age, (8.96 ± 2.14 in the MoA group vs 9.01 ± 1.75 in the control group [P=0.751]) or sex (ratio male/female was 103/116 in the MoA group vs 174/207 in the control group [P=0.812]).

Among the MoA clinical characteristics in the MoA group, the attacks occurred with a mean frequency of 7.14 ± 1.50 per month, with a mean duration of 6.02 ± 1.34 hours and a mean intensity of 8.39 ± 0.69, according to the VAS parameters.

The MoA group showed a significantly higher prevalence of type A (avoidant) attachment ($P<0.001$) and a significantly lower prevalence of type B (secure) attachment ($P<0.001$) with respect to the control group (Table 1).

Moreover, the Spearman rank correlation analysis showed a significant relationship between MoA characteristics and the attachment style of MoA children; in particular, type A attachment was related positively with the frequency ($r=0.392$, $P<0.001$), intensity ($r=0.375$, $P<0.001$), and duration ($r=0.184$, $P=0.006$) of migraine attacks, while type C attachment was negatively related with the frequency ($r=-0.348$, $P<0.001$) and intensity ($r=-0.305$, $P<0.001$) of migraine attacks. Moreover, the secure style of attachment (type B) was negatively related with the duration ($r=-0.229$, $P<0.001$) of MoA attacks.

Discussion

The main findings of the present study were the higher prevalence among MoA children of the avoidant attachment style (type A) and the significantly lower prevalence of the secure style attachment (type B) with respect to normal controls. Moreover, our findings identified an intriguing positive correlation for the type A with the frequency, intensity, and duration of migraine attacks.

In general, attachment can be defined as the child's need to seek proximity to a favorite protective caregiver in times of stress (eg, illness or danger) and to derive comfort from the attachment figure in stressful settings.[67]

On the other hand, the formation of an attachment relationship, essential for offspring survival[38] has been found to be influenced by the history of interactions between an infant and its caregiver, by sensitive parenting, and, to a lesser extent, by sociodemographic factors and parental psychosocial characteristics.[68] In this light, we could speculate that our findings about the higher prevalence of the insecure attachment in the study group could be related to the already identified and well known psychological features in parents of migraine children.[13,14,27]

Table 1 The attachment styles of the study subjects

	MoA (N=219) (%)	Controls (N=381) (%)	Chi-square	*P*-value
Type A	36.07	14.96	34.168	<0.001
Type B	22.37	48.82	39.714	<0.001
Type C	25.11	23.09	0.210	0.646
Type D	16.44	13.12	0.989	0.320

Notes: The table shows the differences in the prevalence of each attachment style between the MoA children and typical developing children (Controls); specifically, according to Bowlby's attachment theory,[38–40] four attachment style (types) are possible: insecure/avoidant (type A); secure (type B); insecure/ambivalent (type C); and disorganized/confused (type D). The chi-square test was applied; *P*–values<0.05 were considered statistically significant.
Abbreviation: MoA, migraine without aura.

In general, according to the Bowlby/Ainsworth theories of attachment,[38–40] during the early years of life, the child's internal representation may be considered to occur at the sensorimotor level.

In fact, adult patients affected by MoA have demonstrated an abnormal sensorimotor plasticity, probably due to altered thalamic control,[69] while in affected children, many reports about the cortical brain alterations have suggested a putative correlation between the neurophysiological abnormality and emotional symptomatology in migraine.[70]

Moreover, recent contributions from neuroscience have been offered to support Bowlby's assertions and consider attachment to be an instinctive behavior with a biological function, consider that emotional processes lie at the foundation of a model of instinctive behavior, and consider that a biological control system in the brain regulates affectively driven instinctive behavior – this control system may reside in the orbitofrontal system, in its cortical and subcortical connections.[71]

Moreover, the lateral tegmental limbic forebrain–midbrain circuit has been found to be involved in the negative regulation of affect and to be associated with avoidance behavior and with the passive coping style.[72,73]

In this light, attachment behaviors cannot be considered as a behavioral phenomenon exclusively because of the relationship with specific neurotransmitter pattern, such as the serotoninergic system,[74] in fact a significant association have been found between attachment disorganization and the short polymorphism of the serotonin transporter gene.[75]

Serotonin is known to play an important role in the pathogenesis of migraine, although individual genetic association studies that have examined the relationship between polymorphisms of the serotonin transporter (5-HTT) gene and migraine have yielded inconsistent results;[76] other neurotransmitters[77] and the dopaminergic system disequilibrium may also be involved.[57]

In fact, it has been suggested that an individual's unique narrow or broad optimal orbitofrontal ventral tegmental dopaminergic profile is set up, during its critical period of development, through positively valenced attachment transactions.[78–80] Recently, the dopamine D4 receptor (DRD4) gene and the serotonin transporter (5-HTT) gene were found to be candidate genes for infant attachment disorganization.[77]

The attachment theory is one of the most influential models proposed to explain the relationship between early experience and adult personality. According to attachment theory, infants develop expectations about their caregivers' availability and responsiveness, based on the quality of parental care they receive. These expectations then serve as the basis for the development of mental representations of the self and of the other (the so-called "internal working models"), which can influence later psychosocial functioning. In fact, infants with emotionally available caregivers develop a model of the self as loved and valued, and a model of the other as loving. When instead, infants have experiences that lead them to expect caregivers to be rejecting or undependable, they develop a model of the self as unloved or rejected, and a model of the other as unloving or rejecting.[81,82]

In this light, we could hypothesize that the prevalent insecure attachment style in MoA children could be derived from a high level of parental distress, dysfunctional parent–child interaction, and the perception of these subjects as difficult children by their mothers, as shown in a previous study.[14] Moreover, we could suggest that the fact that MoA children tend to show low levels of self-esteem[83] could be considered reasonably to be the long-term effect of the insecure attachment style.

As adults, the children with insecure attachment style do not expect that significant others will be available when needed, and they develop insecure strategies for coping with their distress; in fact even if the attachment style of a person is a trait characteristic, it is most evident during stressful circumstances. Specifically, attachment style has been associated with a range of health-related variables, including health complaints, health care utilization, and responses to pain.[84,85] For this reason, we could speculate that the relationship between the presence of an avoidant attachment style (type A) and the intensity and duration of MoA attacks could be considered as a consequence of an alteration in the coping strategies of children with MoA symptomatology.

This hypothesis may be supported by Ciechanowski et al[86] who found, in a group of adults affected by migraine, a significant association between attachment style and somatic symptom reporting and in particular, a significantly greater number of physical symptoms reported by insecure subjects compared with secure ones.

Finally, we must distinguish nature from nurture, and we have to limit the strength of our preliminary findings because we have to take into account that the nature of style attachment could evolve under the effect of a familiar environment and also under the effect of being affected by migraine, and we cannot exclude the role of the temperamental characteristics of children with MoA[87] and of maternal personality traits.[88]

In conclusion, our results may open a new perspective in the management of childhood MoA; further, studies of psychiatric comorbidity in pediatric headache may also be enriched by these new aspects of analysis, although further longitudinal research is also needed on the other headache types.

Disclosure

The authors report no conflicts of interest in this work.

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