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BREASTFEEDING DURATION INFLUENCES MIGRAINE HEADACHE ONSET

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The objective of this study was to determine the influence of breastfeeding duration on migraine headache. The influence of breastfeeding duration on the manifestation of migraine headache and age at onset of migraine headache symptoms was assessed by analyzing history data on headache of 30 636 children aged 3-17 residing in Vojvodina and on nutrition in 24 011 of these subjects. Data were compared between children with migraine headache (8.63%) and other primary recurrent headaches (18.83%). Negative Pearson correlation ratio (0.07, $p<0.01$) clearly showed reciprocal influence of the duration of breastfeeding on the migraine headache onset and earlier onset of migraine in children who were breastfed for a shorter time ($p<0.01$). Defining the duration of breastfeeding as an early predisposing factor for migraine offers the possibility of very early migraine headache prevention, especially in children with positive heredity for migraine.

Descriptors: CHILD, PRESCHOOL; CHILD; HEADACHE; MIGRAINE DISORDERS; BREAST FEEDING; PREVENTION AND CONTROL

INTRODUCTION

Predisposing factors of migraine headache are risk factors for migraine headache manifestation. They do not cause it directly and have no clear causal relationship with migraine attack itself (1, 2). Predisposing factors of migraine headache recognizable in the period before it appears would enable its prevention. Breastfeeding seem to be important as a potential very early migraine headache predisposing factor (3).

It is not uncommon for breastfeeding women who encounter migraine headaches to be concerned about how to treat their headaches (4-6). After all, breastfeeding mothers encounter concern about how migraine treatments can affect them as well as their breastfed babies. There are many papers discussing maternal migraine, migraine therapy and breastfeeding (7-11). Unfortunately, there are only few available researches of the impact of breastfeeding duration on recurrent pain, headache and migraine. Their findings support health policy strategies to promote breastfeeding. The "length of breastfeeding period" is an early predisposing factor contributing to the development of the migraine syndrome. Children suffering from migraine without aura have been breastfed for a significantly shorter time than children suffering from other migraine syndromes, especially those with migraine with aura. The length of breastfeeding period not only directly influences the occurrence of the migraine syndrome in general, but also the age at which it will occur (12).

Our findings open a new field for research of the breastfeeding influence on the occurrence of pain, additional metabolic studies of the influence of breastfeeding on the pathogenesis of migraine, as well as refined gene studies of migraine.

What is known about this subject? The World Health Organization has called for more research regarding the benefits of longer exclusive breastfeeding (6 months instead of 4 months). There are no evidence based studies to prove that breastfeeding is connected with migraine headache and with the age at the first migraine attack.

What this study adds is the following: breastfeeding to the age of 6 months is described as being more protective than exclusive breastfeeding until the age of 4 months and partially thereafter.

METHODS

This study was carried out from 1988 to 2008 in north Serbia, with a population of 2,031,992 according to the last 2002 census. Study subjects were 30 636 children aged 3-17, selected by a random, multistage sampling procedure at 23 preschools and 42 grade schools in 9 cities in

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Vojvodina (Novi Sad, Subotica, Kikinda, Zrenjanin, Vršac, Bela Crkva, Melenci, Futog and Temerin). Children were selected according to their month and year of birth, and the first 3 letters of their first name by a multistage, stratified, clustered sampling procedure. This ensured that children could not enter the study twice during the long study period. The subjects and/or their parents were asked to fill out a semi structured screening questionnaire developed for this study, designed according to the International Headache Society criteria (13). The subjects and/or their parents were asked to fill out a questionnaire in their places of residence. Questionnaires were distributed to children and/or their parents, selected by random sampling.

Breastfeeding was defined as a period during which the child was on breastfeeding before starting any industrial formula and/or cow milk. Breastfeeding duration was expressed in days and/or months.

The semi structured questionnaire, which was specially developed for this study by the author, was designed according to the International Headache Society criteria. It was a screening questionnaire, which was completed by the children and/or their parents. It included 3 sections: 1) items about the child's sociodemographic characteristics and his/her family and school; 2) items about the child's development (prenatal, perinatal, psychomotor and breastfeeding); and 3) items about headaches including all characteristics, signs and symptoms. Questions about breastfeeding were about breastfeeding duration before the child was given any industrial formula and/or cow milk. Breastfeeding duration was expressed in months.

The questionnaire was developed in 3 phases. In the first, semi structured interviews with pediatricians and researchers were organized to select relevant domains. The domains for the section about headaches were selected based on the International Classification of Headache Disorders II criteria (13). More than 150 possible items were identified. Precise, comprehensive and appropriate items were included in the first form. The possible responses were open-end options or categorical judgments.

In the second phase, the questionnaire was pretested by semi structured interviews in a small group of children who did or did not suffer from headaches (16 families were included). This phase aimed to evaluate the face and content validity of the questionnaire. Additionally, the sensitivity was evaluated by correlating data from the questionnaire and medical records of the children who had headaches. This phase resulted in a revised version, which was evaluated only in healthy children. Fifty children and adolescents completed the questionnaire twice in 3 weeks. The nonresponsive rate, response distributions, graphical response presentation (response inconsistency) and questionnaire burdens (time to complete, formatting, etc.) were analyzed. A number of items were modified or eliminated and the final form included 93 items that required 20 min to complete.

The inclusion criteria were: age 3-17 years, informed consent form signed by parents of children aged 3-15 years, and by parents and children aged 15-17 years. The exclusion criterion was a previous diagnosis of a disease that has headache as a symptom.

Based on the data gathered by the questionnaire, children who had recurrent headache underwent an extended interview and neurological examination. Recurrent headache was accepted as all headache types that appeared 3 or more times *per* month, without separating them according to specific characteristics. Using the International Classification of Headache Disorders, migraine was accepted as 1.1-1.7, migraine with aura as 1.2.2-1.2.6, migraine without aura as 1.1 and other migraine syndromes as 1.3-1.7. Only 24 011 questionnaires had complete written data on breastfeeding.

Clear data on breastfeeding duration were obtained for 20 411children; 6068 of them had headache, 4023 suffered from recurrent headache of a non-migraine type, and 2038 had migraine headache. Distribution of migraine types disclosed 530 children with migraine with aura, 1379 with migraine without aura and 129 with other migraine types. In 7 children we could not define the type of recurrent headache, so they were not included in the calculation of recurrent headache type.

The χ^2-test, Levin test and ANOVA were used as statistical methods. A 5% level of significance was used ($p<0.05$). Duration of breastfeeding was tested by analysis of variance, multiple level test and Scheffe test. All statistical analyses were performed with SPSS 15.0 (SPSS Inc., Chicago, IL, USA).

Table 1. *Duration of breastfeeding and age at headache onset (by type of headache)*

Type of headache	Breastfeeding (months)/ Age at headache onset (age)	f	Mean	Standard deviation	Pearson correlation ratio	Statistical significance of correlation ratio
Whole	Breastfeeding (months)	6068	4.90	3.04	0.15	0.01
	Headache onset (age)		5.88	1.69		
Other	Breastfeeding (months)	4023	5.16	3.02	0.18	0.01
	Headache onset (age)		6.23	1.68		
Migraine	Breastfeeding (months)	2038	4.36	2.45	-0.07	0.01
	Headache onset (age)		5.20	1.47		
With aura	Breastfeeding (months)	530	5.63	2.28	-0.01	0.01
	Headache onset (age)		4.83	1.05		
No aura	Breastfeeding (months)	1379	3.90	2.28	-0.01	0.01
	Headache onset (age)		5.59	1.37		
Other migraine	Breastfeeding (months)	129	4.17	2.92	0.11	0.01
	Headache onset (age)		2.56	0.58		

RESULTS

Primary recurrent (non-migraine) headache was defined in 18.83% and mi-

graine in 8.63% (migraine with aura 25.32%, migraine without aura 67.50% and other migraine syndromes in 7.17%).

Children with migraine had the shortest period of breastfeeding ($p<0.001$), 130.8 days (ratio 0-13 months). Children without headaches were breastfed for 147 days (ratio 0-16 months), and children with non-migraine headaches for 153.9 days (ratio 0-15 months). Scheffe test confirmed that children with migraine without aura were breastfed for a significantly shorter period ($p<0.001$) than children with other migraine syndromes, and particularly shorter than children with migraine with aura. Children with migraine with aura were breastfed for 168.9 days, children with migraine without aura for 117 days, and children with other migraine syndromes for 125.1 days.

Migraine headaches occurred at the mean age of 5 years and 2.4 months. Negative Pearson correlation ratio -0.07 ($p<0.01$) clearly showed the reciprocal influence of the duration of breastfeeding on the migraine syndrome onset and on the earlier onset of migraine syndrome in children who were breastfed for a shorter time ($p<0,01$). Migraine with aura occurred at the mean age of 4 years and 9.9 months. Negative Pearson correlation ratio for the duration of breastfeeding and onset of migraine with aura -0.01 ($p<0.01$) clearly showed the statistically significant effect of the duration of breastfeeding on the age at onset of migraine with aura. Migraine without aura had its onset at the mean age of 5 years and 6.5 months. Negative Pearson correlation ratio -0.01 ($p<0.01$) confirmed clearly the influence of the duration of breastfeeding on the age at onset of migraine without aura. In other migraine syndromes there was a positive Pearson correlation ratio, so there was no direct effect of the duration of breastfeeding on the onset of other migraine syndromes and migraine equivalents (Table 1).

Breastfeeding duration had no statistically significant effect on the prevalence and severity of migraine in children.

DISCUSSION

There are only few available studies on the impact of breastfeeding duration on recurrent pain, headache and migraine. Our results are very similar to those reported by Kaspris et al., opening a new field for research of breastfeeding influence on pain occurrence. Using a semi constructed questionnaire, they investigated breastfeeding influence on the pain associated with the growth of lower extremities (according to Petersen's criteria). Their study that included mothers of 532 children showed a statistically significant dependence between pain presentation and breastfeeding, as well as the duration of breastfeeding. In children presenting growth pains, breastfeeding did not seem to affect the type or frequency of pain (14).

Children suffering from migraine without aura were breastfed for a significantly shorter time than children suffering from other migraine syndromes, especially those with migraine with aura. The results obtained suggested the "length of breastfeeding period" as an early predisposing factor contributing to the development of the migraine syndrome. This issue requires additional metabolic investigation of the influence of breastfeeding on the pathogenesis of migraine. The length of breastfeeding period does not only directly influence the occurrence of the migraine syndrome in general, but also the age at its onset (15, 16).

The impact of the length of breastfeeding on the onset of migraine syndromes has not yet been described. There are studies discussing food allergy as a potential etiology of migraine syndrome. Migraine has been extensively discussed from this point of view. Breastfeeding has only been discussed from the aspect of food allergy prevention (17, 18).

Positive Pearson correlation ratio (0.18, $p=0.001$) excluded direct influence of the duration of breastfeeding on the age at onset of non-migraine headaches. Negative Pearson correlation ratio (-0.07, $p<0.01$) clearly showed the reciprocal influence of the duration of breastfeeding on the migraine syndrome onset and on the earlier onset of the migraine syndrome in children who were breastfed for a shorter time ($p<0.01$). Negative Pearson correlation ratio for the duration of breastfeeding and onset of migraine with aura clearly showed the statistically significant effect of the duration of breastfeeding on the age at onset of migraine with aura. The same relation with negative Pearson correlation ratio (-0.01 $p<0.0001$) was also observed for migraine without aura. In other migraine syndromes and migraine equivalents, there was positive Pearson correlation ratio, so there was no direct effect of the duration of breastfeeding of their onset. Our results pointed to the duration of breastfeeding as a completely new potential predisposing factor of migraine syndrome, requiring additional in-depth investigation of the effect of breastfeeding on the migraine syndrome.

To our knowledge, there are no previous researches of breastfeeding duration in such a large cohort of children.

Some fine microelements and/or Mg and IgA from breast milk as well as the act of breastfeeding can be related to our findings, but it is another issue for further investigations.

A shorter duration of breastfeeding may be a predictor of adverse mental health outcomes throughout the developmental trajectory of childhood and early adolescence as well as in academic achievement (19, 20). Wendy Oddy, Telethon Institute for Child Health Research, was senior director of an investigation that began in 1989, inviting participation from 2 900 women who were 16-20 weeks of gestation. All data (family, social, economic, demographic and medical) were taken into account as well as examination of the newborn two days of delivery. After scoring the form of infant feeding (breast milk or formula) and the duration of breastfeeding (less than six months or more than half a year), the scientists conducted specific questionnaires on the behavior and psychopathology of study participants when they were aged 1, 2, 3, 5, 8, 10 and 14 years. Their data showed that "short lactations (less than six months) were associated with increased mental health morbidity that extended from infancy through adolescence (20).

Breastfeeding has a positive psychological influence on children. Children breastfed for a longer time enjoy better mental health: contact with the mother during breastfeeding has a positive effect on the development of neuroendocrine aspects necessary for the response to stress, which may affect the child later and be one of the triggers for migraine, especially migraine without aura.

The possible route of earlier occurrence of migraine in non-breastfed children probably involves fatty acids and bioactive components of human milk that are essential for further development and also influence the response to stress (e.g., leptin reduces stress through its activity in the hippocampus, hypothalamus, pituitary and adrenal gland).

Migraine headache can be provoked by different food chemicals. It is clear that the child on breastfeeding, avoiding cow milk and industrial formulas, will have a delay in the age at first migraine attack. There are no previous studies on breastfeeding duration in such a large cohort of children. We think that: 1) some fine microelements and/or Mg and IgA from breast milk, as well as the act of breastfeeding are related to our findings; 2) food chemical intolerance reactions can be specific for the central nervous system and provoke migraine headache; and 3) migraine with aura is gene defined, so the impact of breastfeeding and all other external factors is lower. Future fine genetic studies are expected to prove it.

The symptoms of food chemical intolerance can come and go and change throughout life.

There is positive association of the duration of exclusive breastfeeding with infections of the upper and lower respiratory tract and gastrointestinal tract in infancy; however, it was not proved for partial breastfeeding, as it was for migraine in our study (21).

CONCLUSION

Duration of breastfeeding has a direct impact on the age at migraine headache onset. Migraine headache occurs at a younger age in shorter breastfeed children. The duration of breastfeeding had most significant influence on the onset of migraine without aura.

Autori izjavljuju da nisu bili u sukobu interesa.
Authors declare no conflict of interest.

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S a ž e t a k

TRAJANJE DOJENJA UTJEČE NA POJAVU MIGRENSKE GLAVOBOLJE

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Cilj istraživanja bio je utvrditi utjecaj trajanja dojenja na migrensku glavobolju. Utjecaj trajanja dojenja na očitovanje migrenske glavobolje i na dob kod pojave simptoma migrenske glavobolje procjenjivao se analizom anamnestičkih podataka o glavobolji kod 30 636 djece u dobi od 3 do 17 godina nastanjene u Vojvodini, te o prehrani kod njih 24 011. Uspoređeni su podaci djece s migrenskom glavoboljom (8,63%) i one s drugim ponavljajućim vrstama glavobolje (18,83%). Negativan Pearsonov korelacijski omjer (0,07; p<0,01) jasno je ukazao na recipročni utjecaj trajanja dojenja na nastup migrenske glavobolje i raniji nastup migrene u djece dojene kroz kraće vrijeme (p<0,01). Prepoznavanje trajanja dojenja kao ranog predisponirajućeg čimbenika za migrenu otvara mogućnost vrlo rane prevencije migrenske glavobolje, naročito kod djece s pozitivnim naslijeđem migrene.

Deskriptori: DIJETE, PREDŠKOLSKO; DIJETE; GLAVOBOLJA; POREMEĆAJI MIGRENE; DOJENJE; PREVENCIJA I KONTROLA

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