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Clinical Research

Duration of Breastfeeding, Bottle-Feeding, and Parafunctional Oral Habits in Relation to Anxiety Disorders Among Children

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Abstract

Objective: The aim of the present study is to investigate the duration of breastfeeding in relation to various parafunctional oral habits in children with anxiety disorders.
Materials and Methods: The study includes 195 children and adolescents with anxiety disorders and age- and gender-matched 255 healthy control subjects. Diagnoses were made with semistructured interview (K-SADS). Information about breastfeeding and parafunctional oral habits was investigated via a questionnaire prepared for the study.
Results: The mean age was 11.50 ± 2.50 years for clinical group and 11.27 ± 2.33 years for controls. Fifty-four percent of the clinical group and 56% of the control group were female subjects. Duration of exclusive (4.72 ± 2.86, 5.55 ± 2.36; $p = 0.002$) and total breastfeeding (12.38 ± 10.32, 15.89 ± 9.09; $p < 0.001$) was significantly lower and duration of bottle-feeding (22.30 ± 19.54, 16.64 ± 12.79; $p = 0.005$) was higher than controls in the clinical group. Duration of exclusive breastfeeding was significantly correlated with duration of bottle-feeding ($r = -0.263$, $p < 0.001$) and duration of pacifier use ($r = -0.249$, $p = 0.001$). Multiple regression analysis showed that duration of exclusive breastfeeding ($\beta = 0.88$, $p = 0.006$) and bottle-feeding ($\beta = 1.02$, $p = 0.005$), as well as various oral habits, was associated with diagnosis of an anxiety disorder.
Conclusion: Nutrition methods in early years of life may result in long-term consequences regarding anxiety disorders for children. Clinicians should encourage parents for a shorter duration of bottle-feeding and a longer duration of exclusive breastfeeding.

Keywords: anxiety disorders, breastfeeding, bottle-feeding, parafunctional oral habits

Introduction

Anxiety disorders are common in children and adolescents with a worldwide prevalence between 4.7% and 9.1%.[1] Children and adolescents with anxiety disorders have a worse quality of life and functioning in certain areas.[2] Anxiety disorders have high comorbidity rates with other psychiatric disorders and result in higher rates of depressive disorders[3] and adverse life course outcomes.[4] Although anxiety disorders in children are associated with significant public health burden, they commonly remain untreated.[5] Taken together, early identification for children at high risk for developing an anxiety disorder and prevention is essential.

Etiology of anxiety disorders includes both genetic and epigenetic and environmental factors. Parental rearing behavior, especially controlling and anxious rearing, is shown to be associated with anxiety disorders in children.[6] Another important factor is insecure attachment to the primary caregiver.[7] Both factors are associated with early years of life, which is an important time to develop basic trust about the world.[8] One of the most important components of mother–child interaction is breastfeeding, which is shown to have positive effects on both mother and child's mood.[9] Adequate breastfeeding is not only associated with positive mental health in adolescence[10] but also healthy craniofacial growth.[11] Children who are less breastfed are likely to engage in

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non-nutritive sucking habits,[12] which may result in malocclusion.[13] Moreover, children with parafunctional oral habits are shown to be more self-oriented and more rejected by peers.[14] These may lead to a further risk to develop clinical anxiety disorders.

While an organic etiology is not detected, children with parafunctional oral habits are often referred to the child psychiatry clinic by other clinicians. Thus, we could have the opportunity to see many of these patients. For the first treatment and follow-up periods, we observed a remarkable tendency to have a history of short breastfeeding durations. Then, we made a literature review to find a related study. To the best of our knowledge, no controlled study on breastfeeding and bottle-feeding and parafunctional oral habits with clinical cases of anxiety disorders was performed previously. At the end, we intended to perform a study concerning this issue.

The first hypothesis of the present study is that duration of breastfeeding is shorter and bottle-feeding is longer among children with anxiety disorders. The second hypothesis is that duration of bottle-feeding and pacifier use, as well as parafunctional oral habits, is correlated with duration of breastfeeding. The third hypothesis is that breastfeeding and bottle-feeding duration and existence of various parafunctional oral habits are associated with diagnosis of an anxiety disorder.

Materials and Methods

Participants

We recruited 195 children and adolescents with anxiety disorders from 3 clinics in Istanbul (139 patients from Bezmialem Vakif University, 10 patients from Cerrahpasa Medical Faculty, and 46 patients from Kanuni Sultan Suleyman Research Hospital). Psychiatric diagnoses were based on a semistructured interview; the schedule for affective disorders and schizophrenia for school-age children, present version (K-SADS-P). Having neurologic disorders, psychosis, autism spectrum disorders, and mental retardation were exclusion criteria. The age- and gender-matched control group consisted of 298 children and adolescents from three different public schools (3–10th graders), who are attending regular school curriculum. Children and adolescents who scored higher than the clinical cutoff point in The Revised Child Anxiety and Depression Scale (RCADS) total anxiety subscale were excluded from the study. After exclusion of 43 cases, the remaining 255 subjects were included in the study as control group.

Diagnoses of the clinical group were as follows: social anxiety disorder ($n=45$ [23.1%]), anxiety disorder not otherwise specified ($n=42$ [21.5%]), generalized anxiety disorder ($n=37$ [19.0%]), specific phobia ($n=30$ [15.4%]), separation anxiety disorder ($n=23$ [11.8%]), and panic disorder ($n=18$ [9.2%]) (Table 1). Total comorbidity rate was 55.4%. Age and gender of the clinical and control group were not significantly different; mean age of the clinical group was 11.5 ± 2.5 and control group was 11.27 ± 2.33 ($t=0.97$, $p=0.33$), 56% of the clinical group and 54% of the control group were female ($\chi^2=0.24$, $p=0.63$). Maternal and paternal age and education and family income did not differ between two groups. Family history of a psychiatric disorder was differing between groups (39.3% in clinical, 5.3% in control group; $\chi^2=72.27$, $p<0.001$).

Table 1. Anxiety Disorders and Comorbidities in Clinical Group

	N *(%)*	*Comorbidity (%)*
Generalized anxiety disorder	37 (19.0%)	64.9
Separation anxiety disorder	23 (11.8%)	78.3
Social anxiety disorder	45 (23.1%)	53.3
Panic disorder	18 (9.2)	72.2
Specific phobia	30 (15.4)	56.7
Anxiety disorder NOS	42 (21.5)	28.6
Total	195	55.4

NOS, not otherwise specified.

The study protocol was approved by the Bezmialem University Ethics Committee for noninterventional studies. A written consent was taken from parents of children who agreed to participate in the study.

Measures

A sociodemographic data form prepared for the current study, including exclusive (breastfeeding without any other food intake) and total (total breastfeeding duration) breastfeeding period, bottle-feeding duration, duration of pacifier use and lifetime parafunctional oral habits (finger sucking, nail-biting, toenail-biting, pencil-biting, lip-biting, biting objects, bruxism, pica), snoring, mouth breathing, and malocclusion problems, was used to obtain information. Bruxism is defined as involuntary mandibular movement with tooth grinding. pica is defined as recurring ingestion of nonnutritive substances. The data form was adapted from a similar questionnaire used in previous research on Turkish children and adolescents.[15]

Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (K-SADS)

It is a semistructured interview to diagnose various psychiatric disorders (schizophrenia, mood disorders, anxiety disorders, obsessive compulsive disorders, disruptive disorders, elimination disorders, etc.) in children and adolescents.[16] The interview was translated into Turkish, and the Turkish form was found valid and reliable.[17] The interview was conducted by experienced child and adolescent psychiatrists.

The Revised Child Anxiety and Depression Scale

It is a 47-item, 4-point Likert questionnaire developed to detect anxiety disorders, obsessive compulsive disorder, and depression in children and adolescents.[18] The scale yields a total anxiety score (sum of the five anxiety subscales) and a total internalizing score (sum of all six subscales). The Turkish translation of child and parent forms was found to be valid and reliable.[19] Cronbach's alpha values for total scale were 0.95 for both child and parent forms. The cutoff value of total anxiety subscale score was used to detect and exclude possible cases from control group.

Table 2. Revised Child Anxiety and Depression Scale Scores and Existence of Various Feeding Practices and Different Parafunctional Oral Habits in Clinical and Control Groups

	Clinical (n = 195)	*Control (n = 298)*	*Control vs. clinical*
RCADS child total anxiety	48.21 ± 22.07	24.71 ± 12.83	$t = 13.25$, $p < 0.001$
RCADS parent total anxiety	39.17 ± 19.67	15.67 ± 8.86	$t = 15.52$, $p < 0.001$
Breastfeeding, *n* (%)	182 (93.3)	250 (98.0)	$\chi^2 = 6.37$, $p = 0.012$
Bottle-feeding, *n* (%)	149 (76.4)	150 (59.3)	$\chi^2 = 14.54$, $p < 0.001$
Pacifier use, *n* (%)	109 (55.9)	104 (40.9)	$\chi^2 = 9.89$, $p = 0.002$
Finger sucking, *n* (%)	21 (10.8)	25 (9.8)	$\chi^2 = 0.11$, $p = 0,738$
Nail-biting, *n* (%)	98 (50.3)	77 (30.2)	$\chi^2 = 18.71$, $p < 0.001$
Toenail-biting, *n* (%)	16 (8.3)	2 (0.8	$\chi^2 = 15.97$, $p < 0.001$
Pencil-biting, *n* (%)	65 (33.7)	58 (22.9	$\chi^2 = 6.34$, $p = 0.012$
Lip-biting, *n* (%)	58 (30.2)	27 (10.8)	$\chi^2 = 26.54$, $p < 0.001$
Biting objects, *n* (%)	31 (16.1)	14 (5.6)	$\chi^2 = 13.31$, $p < 0.001$
Bruxism, *n* (%)	76 (39.8)	37 (14.9)	$\chi^2 = 36.33$, $p < 0.001$
Snoring, *n* (%)	51 (26.6)	35 (13.9)	$\chi^2 = 11.21$, $p = 0.001$
Mouth breathing, *n* (%)	109 (56.2)	136 (54.0)	$\chi^2 = 0.22$, $p = 0.641$
Pica, *n* (%)	12 (6.2)	5 (2.0)	$\chi^2 = 5.30$, $p = 0.021$
Treatment suggested for malocclusion, *n* (%)	43 (22.1)	54 (21.3)	$\chi^2 = 0.41$, $p = 0.840$

RCADS, Revised Child Anxiety and Depression Scale.

Statistical analysis

Statistical Package for the Social Sciences software (version 19.0; SPSS, Inc., Chicago, IL) was used for statistical analysis. Chi-square tests were used to compare categorical variables. Student's *t*-test or Mann–Whitney *U* test was used to compare continuous variables. Pearson's or Spearman's correlation coefficients were used to detect a relationship between continuous variables. A backward multiple stepwise regression analysis was used to calculate the independent relationship between various variables and anxiety disorders. A *p*-value of <0.05 was taken as the significance level.

Results

RCADS total scores of parents ($t = 15.52$, $p < 0.001$) and children ($t = 13.25$, $p < 0.001$) were significantly differing between the clinical and control groups. As in line with the first hypothesis, the clinical group was less breastfed than control subjects (93.8% vs. 97.4%; $\chi^2 = 3.99$, $p = 0.046$). Bottle-feeding and pacifier use were more common in clinical group. Different parafunctional oral habits were more prevalent in clinical group (Table 2).

As expected, in the first hypothesis, total and exclusive breastfeeding duration was shorter in the clinical group ($t = 3.76$, $p < 0.001$, $t = 3.17$, $p = 0.002$, respectively). Duration of bottle-feeding ($t = 2.86$, $p = 0.005$), pacifier use ($t = 2.07$, $p = 0.040$), and nail-biting ($t = 4.57$, $p < 0.001$) was significantly longer in the clinical group (Table 3).

Correlation analyses showed a relationship between exclusive and combined breastfeeding and pacifier use and bottle-feeding as we predicted in the second hypothesis, although there was not a correlation between parafunctional oral habits (Table 4).

In accordance with the third hypothesis, backward stepwise multiple logistic regression analysis revealed that

Table 3. Duration of Exclusive and Total Breastfeeding and Different Parafunctional Oral Habits

	Clinical	*Control*	*Control vs. clinical*
Breastfeeding			
Breastfeeding duration (months)	12.38 ± 10.32	15.89 ± 9.09	$t = 3.76$, $p < 0.001$
Exclusive breastfeeding duration (months)	4.72 ± 2.86	5.55 ± 2.36	$t = 3.17$, $p = 0.002$
Bottle-feeding			
Duration of bottle-feeding (months)	22.30 ± 19.54	16.64 ± 12.79	$t = 2.86$, $p = 0.005$
Age bottle-feeding started (months)	7.16 ± 10.04	6.48 ± 5.40	$t = 0.72$, $p = 0.470$
Pacifier use			
Duration of pacifier use (months)	20.19 ± 12.40	16.55 ± 12.39	$t = 2.07$, $p = 0.040$
Age pacifier use started (months)	2.16 ± 3.25	3.37 ± 4.36	$t = 2.23$, $p = 0.027$
Finger sucking			
Duration of finger sucking (months)	15.00 ± 21.90	7.18 ± 8.99	$t = 1.37$, $p = 0.179$
Age finger sucking started (months)	9.06 ± 17.11	6.12 ± 11.16	$t = 0.59$, $p = 0.557$
Nail-biting			
Duration of nail-biting (months)	77.93 ± 58.61	40.95 ± 40.82	$t = 4.57$, $p < 0.001$
Age nail-biting started (months)	62.04 ± 37.84	77.70 ± 42.88	$t = 2.39$, $p = 0.018$

Table 4. Correlations Between Breastfeeding and Duration of Different Oral Habits in Children with Anxiety Disorders

	Pacifier use	*Bottle-feeding*	*Finger sucking*	*Nail-biting*
Exclusive breastfeeding	$r=-0.249$, $p=0.001$	$r=-0.263$, $p<0.001$	$r=0.156$, $p=0.034$	$r=-0.048$, $p=0.528$
Combined breastfeeding	$r=-0.383$, $p<0.001$	$r=-0.338$, $p<0.001$	$r=0.033$, $p=0.656$	$r=-0.043$, $p=0.562$
Bottle-feeding	$r=0.277$, $p<0.001$	—	$r=0.031$, $p=0.678$	$r=-0.043$, $p=0.562$

duration of exclusive breastfeeding, bottle-feeding, nail-biting, toenail-biting, bruxism, snoring, and lip-biting is associated with diagnosis of an anxiety disorder ($R^2=0.31$, $F(2,8)=105.78$, $p<0.001$) (Table 5).

Discussion

The results of the present study showed that a shorter duration of exclusive breastfeeding and a longer duration of bottle-feeding are independently associated with anxiety disorders in children. Various parafunctional oral habits such as lip-biting and bruxism are demonstrated to be related to anxiety disorders. However, contrary to our expectation, they were not correlated with durations of breastfeeding and bottle-feeding. The findings of the study may show that nutritional practices in early life and parafunctional oral habits, although not acting in the same way, are related to the development of anxiety disorders.

Shorter duration of exclusive breastfeeding was shown to be associated with anxiety disorders in our study. Breastfeeding is an important parameter in the healthy development of a child because of its effects on mother–child interaction.[20] In addition, breastfeeding practices may be an expression of maternal psychological health.[21] Moreover, breastfeeding duration is associated with better mental health in adolescence[22] and adulthood.[23] Studies on exclusive breastfeeding are more limited. In a randomized controlled trial, researchers directed the mothers for increasing breastfeeding durations. They succeeded to enhance breastfeeding durations, however, the related outcome did not have any positive effects on children's mental health, based on a strengths and difficulties questionnaire.[24] A study about the effects of feeding practices and mood of mothers revealed that breastfeeding is associated with a decrease in negative mood and bottle-feeding with a decrease of positive mood.[9] Regression analysis in our study showed that shorter duration of exclusive breastfeeding, but not total breastfeeding, is related to a diagnosis of anxiety disorder in children. Longitudinal studies are needed to clarify this relationship.

Problems in attachment patterns are seen as important factors in the development of anxiety disorders.[25] Attachment is shown to be related to maternal sensitivity and breastfeeding duration.[26] Breastfeeding is not only an indicator of secure attachment and maternal health[27] but also promotes secure attachment through providing an intimate interaction between mother and child. Besides, breastfeeding is shown to have relaxing and calming effects on both child and mother.[28] Insecure attachment may be a pathway between inadequate breastfeeding and anxiety disorders. Nevertheless, we did not investigate attachment patterns in the current study. Further research is needed to clarify the relationships between breastfeeding, attachment, parafunctional oral habits, and anxiety disorders.

Another interesting finding of the current study is that shorter duration of bottle-feeding is independently associated with a diagnosis of anxiety disorder. In accordance with existing literature, the present study showed that duration of bottle-feeding is negatively correlated with the duration of breastfeeding.[12,15] Current literature suggests that bottle-feeding and pacifier use may have deleterious effects on duration of breastfeeding.[29] It is shown that children who are less breastfed are not only more likely to engage in non-nutritive sucking habits[12] but also prone to develop malocclusion problems.[11] The present study failed to find an association between bottle-feeding and parafunctional oral habits. Further research is needed to clarify this issue.

There might be a relationship between parafunctional oral habits and anxiety disorders. However, contrary to the current literature,[12,13] there were no relationships between parafunctional oral habits and breastfeeding and/or bottle-feeding. One of the possible explanations may be the small sample size, which includes children with clinically

Table 5. Backward Stepwise Multiple Logistic Regression of Various Parafunctional Oral Habits and Feeding Practices

	β	*SE* B	*β (CI)*	t	p
Exclusive breastfeeding	–0.124	0.045	0.883 (0.809–0.965)	7.593	0.006
Combined breastfeeding	–0.027	0.014	0.974 (0.947–1.001)	3.632	0.057
Bottle-feeding	0.022	0.008	1.022 (1.007–1.038)	7.859	0.005
Nail-biting	0.658	0.242	1.931 (1.201–3.104)	7.387	0.007
Toenail-biting	1.074	0.411	2.926 (1.307–6.555)	6.812	0.009
Lip-biting	0.580	0.156	1.786 (1.317–2.423)	13.914	0.000
Bruxism	0.596	0.134	1.815 (1.396–2.359)	19.804	0.000
Snoring	0.489	0.149	1.630 (1.217–2.184)	10.720	0.001

CI, confidence interval; SE, standard error.

diagnosed anxiety disorders and controls. Another explanation may be the cultural differences between the aforementioned studies and Turkish population. Cross-cultural studies are needed to clarify this relationship in different cultures.

Our study has several limitations. First is the cross-sectional design, which limits the search for a cause/effect relationship. Second, although we asked for psychiatric treatment history of the parents, we did search for pre- and postpartum anxiety and depression, which may indirectly affect breastfeeding duration. Third, we did not investigate the parenting style, which weakened our opportunity for a broader understanding of parents' role on anxiety levels of children. Finally, some of the parameters were collected retrospectively, which may be affected from recall bias. However, the present study was performed with a relatively large sample, including children clinically diagnosed with anxiety disorders and age- and gender-matched controls. Findings are significant, however, longitudinal research is needed for further understanding of the relationships.

In conclusion, breastfeeding and bottle-feeding practices were significantly differing between children with anxiety disorders and control group. Clinicians should encourage parents for a shorter duration of bottle-feeding and a longer duration of exclusive breastfeeding. Besides, various parafunctional oral habits were more common and with longer duration in children with anxiety disorders than the control group.

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