

Infants' Non-Nutritive Sucking Habits and Childhood Obesity

Bebeklerin Besleyici Olmayan Emme Alışkanlıkları ve Çocukluk Çağı Obezitesi

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Geliş Tarihi/Received: 24.12.2015

Kabul Tarihi/Accepted: 08.02.2016

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ABSTRACT Objective: Habits formed in early childhood can affect future life. The aim of this study is to investigate whether prolonged non-nutritive sucking habits (pacifiers and finger sucking) during infancy increases the probability of childhood exogenous obesity causing a habit of high frequency of feeding. **Material and Methods:** A case-control study was conducted including children with exogenous obesity diagnosis and healthy controls. The study was performed with questionnaires completed by parents. Body mass index above the 95th percentile were evaluated as obese. Cases with endocrine, metabolic, or genetic causes of obesity, children with chronic illness other than obesity and children with obese family members were excluded. **Results:** 108 children (46 boys, 62 girls) with a mean age of 9.97 years and who met the criteria were assigned to the case group and 116 healthy children (55 boys, 61 girls) with a mean age of 10.02 years were assigned to the control group. In both case and control groups there was no statistically significant difference in mean body mass index levels on both duration of pacifier usage (Independent samples t test, $p=0.496$ and $p=0.368$, respectively) and finger sucking habit (Independent samples t test, $p=0.319$ and $p=0.377$, respectively). However, the number of the children finger sucking in the case group ($n=50$) was higher than in the control group ($n=33$) (46.3% vs. 28.4%, $p=0.006$). **Conclusion:** There was no association between pacifier usage in infancy with exogenous obesity in childhood but children who suck fingers are more likely to be obese in later life.

Key Words: Infant; fingersucking; child; obesity

ÖZET Amaç: Erken çocukluk dönemindeki alışkanlıklar hayatın ileri dönemlerini etkileyebilmektedir. Bu çalışmada bebeklik dönemindeki uzun süren besleyici olmayan emme alışkanlıklarının (emzik ve parmak emme) sık beslenme istek ve alışkanlığına yol açarak egzojen obeziteye neden olup olmayacağını araştırdık. **Gereç ve Yöntemler:** Egzojen obezite ve sağlıklı çocuklardan oluşan vaka kontrol çalışması yürütüldü. Ailelere sosyodemografik veriler ve bebeklik dönemindeki beslenme özelliklerinin ve alışkanlıklarının sorgulandığı anket dolduruldu. Beden kitle indeksi 95. persentil üzeri obez olarak değerlendirildi. Obezitenin endokrin, metabolik, genetik nedenleri ile kronik hastalığı olan çocuklar ve ailesinde obezitesi olan hastalar çalışma dışı bırakıldı. **Bulgular:** Vaka grubuna kriterleri karşılayan yaş ortalaması 9,97 yıl olan 108 (46 E/62 K) obez çocuk dahil edildi. Kontrol grubuna ise ortalama yaşı 10,02 yıl olan 116 (55 E/61 K) sağlıklı çocuk dahil edildi. Her iki grupta emzik kullanım süresi ve uzun süreli parmak emme alışkanlığının vücut kitle indeksini etkilemediği saptandı ($p=0,496$ ve $p=0,368$, sırasıyla). Buna rağmen obez grupta parmak emen hasta sayısı ($n=50$) kontrol grubundan ($n=33$) daha fazlaydı (%46,3 ve %28,4, $p=0,006$). **Sonuç:** Bebeklik döneminde uzun süreli emzik emme ilerleyen dönemlerdeki obeziteyi etkilememektedir ancak parmak emen çocuklarda obezite gelişme ihtimali daha fazladır.

Anahtar Kelimeler: Bebek; parmak emme; çocuk; obezite

Türkiye Klinikleri J Pediatr 2016;25(2):94-100

Several studies evaluated the etiological factors of non-nutritive sucking habits. Hunger, fatigue, boredom, excitement, fear, physical, emotional stress and insufficient satisfaction of sucking need in infancy are suggested to stimulate digit sucking habits.¹

The first coordinated muscular activity of the infant is sucking. There are essentially two forms of sucking: the nutritive form providing essential nutrients, and non-nutritive sucking ensuring feeling of warmth and a sense of security. The most common objects used for non-nutritive sucking are digits and pacifiers.

Information is limited on the relationship between obesity and accompanying psychopathology or specific psychiatric disorders in the childhood period, however a close relationship between obesity and psychological factors is proposed.² The oral period is the first stage of psychosexual development and includes the first year of life. Oral activities, such as eating or finger sucking, are equivalent to intimacy and love in early life, and if the need for love and security in later life is not fulfilled, gluttony may take their place. According to psychoanalytic theory, overeating results from psychosexual development remaining in the oral period. In cases where a baby's needs are not fulfilled in a timely and sufficient manner, the baby does not reach sufficient satisfaction and stalls in the oral stage and this may negatively affect future life. Pacifiers are used by many mothers to quiet a crying baby, distract a baby when busy or to reduce night waking. This may negatively affect the amount of time the baby receives one-on-one attention. At the same time, mothers who respond to every cry or discomfort with pacifier by associating oral satisfaction with the experience of hunger may cause them to search for oral satisfaction when under stress in the future.³

Negative effects of sucking habits on the social and emotional development, learning process, and impact on the speech ability of the child are studied.⁴ Most studies concentrated on prevalence, adverse effects, management and etiology of sucking habits.^{1,5} No concentration has been given to investigate influence of sucking habits on future eating habits.

The aim of this study was to investigate whether long duration of non-nutritive habits during infancy has a relationship with the probability

of childhood exogenous obesity, in the absence of existing studies into possible links.

MATERIAL AND METHODS

STUDY DESIGN AND SAMPLE

108 children with exogenous obesity diagnosis and 116 healthy controls were included in the study. Exogenous obesity was defined as no endocrine, metabolic, or genetic causes of obesity. Patients in the case group already had their etiology of obesity researched and were being monitored by our pediatric clinic with a diagnosis of exogenous obesity. Children with chronic illness (asthma, hypertension, inflammatory diseases, hyperthyroidism) and children with obese family members were excluded. The parents of children who agreed to participate in the study were asked the questions on a survey form filled out during a face-to-face interview by the same pediatrician (F.E.). People who could not recall the answers to any of the survey questions were excluded. The questions collected information about the child's name, age, gender, height, weight, gestational week at birth, type of birth, birth weight, infant feeding habits, use of pacifiers or bottles, start of supplementary feeding, end of night feeding and finger sucking habit. Actually there is no clear/precise definition for the duration of sucking behaviour to consider as a habit in the literature. The following situations were considered as a habit in the present study: a) if a baby sucked several times in a period of 5 minutes during one day causing maceration on the fingers and make mother inconvenience and b) maintained for 36 months of age or more according to previous studies.^{6,7} A total of 260 patients were surveyed. 15 children in the case group and 21 children in the control group were excluded because they did not answer the questions completely. Parents provided written informed consent for the participation of their children and the necessary legal approvals and University Ethical Committee approval were obtained.

ANTHROPOMETRIC MEASUREMENTS

Body weight and height were measured by the same two pediatricians (NK, FE). Children younger

than 5 years were weighed, naked, on a digital scale and children in the 6-18 year age group were weighed in their underwear, without external clothing. Height was measured standing and using the standard measurement.

BMI (Body Mass Index): Body mass index was calculated using the formula weight (kg)/height (m)². Taking the standard reference height and weight percentiles for Turkish children according to age and gender as a basis, body mass index (BMI) was calculated and patients above the 95th percentile were evaluated as obese.⁸

STATISTICAL ANALYSIS

Statistical analysis for the study was carried out using SPSS 19.0 statistical software package. Pearson's χ^2 test was used to compare categorical variables. Continuous variables were shown as mean \pm SD or median (min-max), where applicable. While the mean differences between groups were compared by Student's t test, otherwise, the Mann Whitney U test was applied for comparisons of the median values. Categorical data were analyzed by Pearson's Chi-square or Fisher's exact test, where appropriate.

RESULTS

The principal observations were summarized in tables. 108 children (46 boys, 62 girls) with a mean

age of 9.97 years and who met the criteria were assigned to the case group and 116 healthy children (55 boys, 61 girls) with a mean age of 10.02 years were assigned to the control group (Table 1). Other demographic characteristics were summarized in Table 1.

NON-NUTRITIVE SUCKING HABITS

The studied non-nutritive sucking habits were finger and pacifier. The rate of finger sucking was significantly higher in the obese group than in the control group (46.3% vs. 28.4%, respectively, $p=0.006$) (Table 2). Median duration of finger sucking in case and control groups were 11.54 ± 6.43 (min:2-max:24) and 11.24 ± 8.87 months (min:2-max:36) respectively ($p=0.860$).

The frequency of patients who sucked their fingers in exclusively breastfed group was 35.7%. Among exclusively breastfed children the rate of finger sucking was 51.9% ($n=28$) in the case group and 23.6% ($n=17$) in the control group and the difference was statistically significant (Yates chi-square=9.52, $p=0.002$). For all patients in the study there was no statistical difference in the rate of finger sucking in exclusively breastfed (35.7%, $n=45$) patients and in those fed with breast and formula (37.1%, $n=33$) (Chi-square=0.04, $p=0.838$).

In the case group 53 (49.1%) and in the control group 47 (40.5%) patients used pacifiers. There was

TABLE 1: Demographic characteristics of the patients.

	Exogenous obesity group (n=108)		Control group (n=116)		p
	Mean	SD	Mean	SD	
Age (yr)	9.97	3.67	10.02	3.78	0.893*
Gender					
Female	62	57.4	61	52.6	0.469**
Male	46	42.6	55	47.4	
Delivery mode					
NSVD	57	52.8	63	54.3	0.818**
C/S	51	47.2	53	45.7	
Gestational age at birth (wk)	39.00	1.08	38.85	1.40	0.349*
Birth weight (g)	3320.00	589.71	3211.29	484.17	0.135*
Weight (kg)	56.55	22.95	35.79	14.68	<0.001*
Height (cm)	141.52	20.09	138.08	20.41	0.220*
BMI (kg/m ²)	26.84	4.61	17.89	3.23	<0.001*

* Independent Samples Test, ** Pearson's χ^2 test, NSVD: Normal spontaneous vaginal delivery, C/S : Caesarean section; SD: Standard deviation.

TABLE 2: Non-nutritive sucking habits in study groups.

	Obesity group=108	Control group=116	p
Pacifier usage	N:53 (49.1%)	N:47 (40.5%)	0.198
Finger sucking habit	N:50 (46.3%)	N:33 (28.4%)	0.006
Both pacifier usage and finger sucking habit	N:24 (22.2%)	N:22 (19%)	0.519

no statistically significant difference between two groups ($p=0.198$). Mean duration of pacifier usage was 24.19 ± 16.45 and 21.36 ± 13.50 months in case and control groups, respectively ($p=0.353$). When 36 mo was taken into consideration, there was no statistically difference between obese and control groups. Pacifier usage maintained for 36 mo and more in obese group was 30.2% while it was 21.3% in control group ($p=0.365$).

Of all pacifier users 46% sucked fingers, while of those who did not use pacifiers only 29.8% sucked fingers. Finger sucking rate was significantly higher in pacifier users than non-users ($p=0.013$) (Figure 1). In the obese group pacifier users and non-users had rates of finger sucking of 45.3% and 47.3%, respectively. There was no statistically significant difference in finger sucking habits between pacifier users and non-users ($p=0.836$). In the control group pacifier use was 28.4%. The rate of finger sucking in pacifier users in the control group was significantly higher than non-users (46.8% vs. 15.9%, $p=0.001$).

No significant difference was found between obese and non-obese children in terms of only pacifier usage, only finger sucking habit or both ($p=0.190$).

OTHER INFANCY PERIOD CHARACTERISTICS

In the case group 80.6% ($n=87$) were appropriate for gestational age (AGA), 4.6% ($n=5$) were small for gestational age (SGA) and 14.8% ($n=16$) were large for gestational age (LGA). In the control group 88.8% ($n=103$) were AGA, 6.9% ($n=8$) were SGA and 4.3% ($n=5$) were LGA. The number of LGA patients in the case group was higher and the difference was statistically significant ($p=0.023$).

In the case group 95.6% and in the control group 96.6% of patients were breastfed. The mean duration of breastfeeding for all patients who used pacifiers ($n=94$) was 13.69 ± 9.42 months (min:1, max:42). The duration of breastfeeding was significantly longer in those who did not use pacifiers ($p<0.001$). Pacifier usage was more common among those who were breastfed less than 6 months compared to infants that were breastfed more than 6 months ($p<0.001$). In the obese group, duration of breastfeeding for pacifier users was 16.06 ± 11.05 months (min: 1, max: 42), and in the control group it was 11.10 ± 6.41 months (min:1, max:24); the difference was statistically significant ($p<0.05$) (Figure 2).

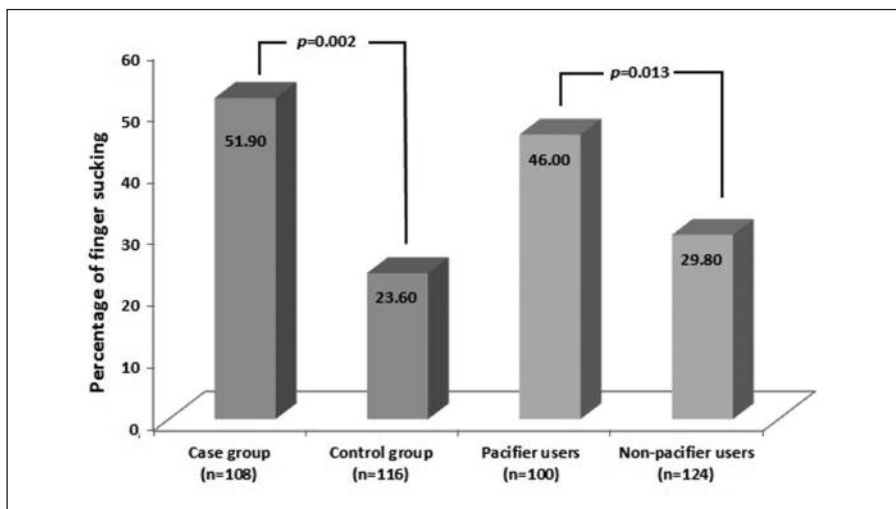


FIGURE 1: Percentage of finger sucking in our study groups and pacifier users.

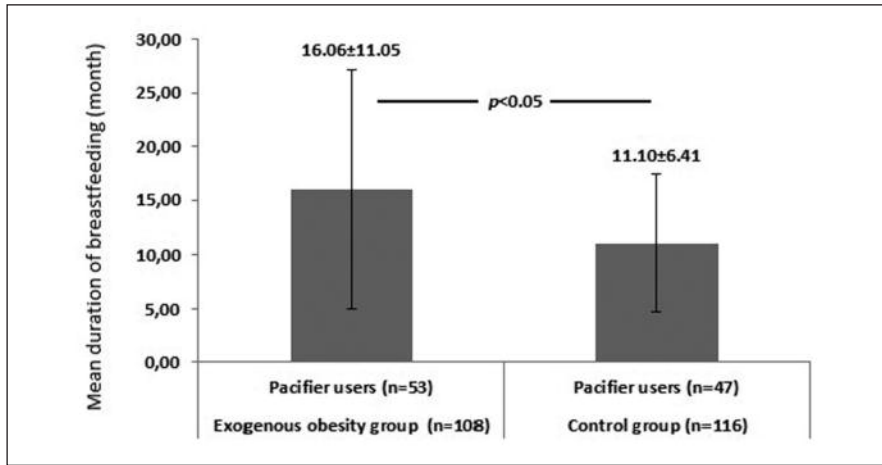


FIGURE 2: Mean duration of breastfeeding related to the pacifier usage status in case and control groups.

The mean age of initiation of complementary feeding was 5.83 ± 1.20 months for all patients in the study. It was significantly later in the obese group (6.01 ± 1.12 months; min:3.50-max:9.00) than the case group (5.63 ± 1.25 months; min:3.50-max:8.00) ($p=0.015$).

In all patients ($n=224$) the mean age of end of night time feeding was 18.60 ± 5.94 (min:9-max:36) months. It was 20.40 ± 6.60 months (min:10-max:36) in the obese group and 16.93 ± 4.69 (min:9-max:30) months in the control group ($p=0.001$).

DISCUSSION

Children who sucked their fingers during infancy are found to be more likely to be obese later in life. Though obesity results from imbalance between calorie intake and use, in addition to a variety of factors which are effective in the etiology of exogenous obesity, it is well-documented that the beginning of obesity in the majority of overweight adults began in childhood.⁹ Feeding type in the infancy period determines feeding habits in later childhood.¹⁰ Researches increasingly found that factors in early life are important for the risk of developing obesity later in childhood.¹¹

Prolonged finger-sucking habits may have negative impact on dental, speech, physical and emotional development.⁴ Although bottle-fed chil-

dren are found to be more prone to developing a non-nutritive sucking habit than breastfed children,¹² finger-sucking was found to be more common among exclusively breastfed children.¹³ In the present study there was no statistical difference in the rate of finger sucking in exclusively breastfed patients. However, the rate of finger sucking was significantly higher in the exclusively breastfed obese children.

Complications of pacifier use include a negative effect on breastfeeding particularly with prolonged use, as calming an infant with a pacifier may lead to less frequent episodes of breastfeeding.¹⁴ However, there are some proposed favorable effects of pacifier use such that there is an inverse relationship between use of pacifiers and risk of sudden infant death syndrome (SIDS). Therefore, use of pacifiers is recommended to reduce the risk of SIDS.¹⁵ In our study; it was found that duration of breastfeeding was longer in those who did not use pacifier and pacifier usage was found more common among those who were breastfed less than 6 months.

Breastfeeding more than 6 months is a protective factor against the bad habit of late pacifier sucking.¹⁶ In our study in the case group the duration of breastfeeding for pacifier users was significantly longer than the pacifier users in the control group and also pacifier usage was found be more

common among those who were breastfed for less than 6 months. In the case group the rate of finger sucking was significantly higher than in the control group and pacifier usage was found as a risk factor for finger sucking.

Although the effect is not substantial, breastfeeding has been shown to reduce the risk of later obesity.¹⁷ Some small studies do not show a relationship between breastfeeding and later obesity,¹⁸ while some large cohort studies have shown that breastfed babies are less likely to be obese in the future.¹⁹ In our study the duration of breastfeeding was similar in both groups.

Complementary feeding also seems to play a role.²⁰ High protein intake may be associated with a higher risk of obesity in childhood, whereas high fat intake does not seem to be a risk factor for later obesity during the complementary feeding period. In our study the obese group began complementary feeding significantly earlier than the control group. Early introduction of complementary foods (before age 4 months) may be associated with an increased risk of later obesity.²¹ According to a re-

cent systematic review; there is no clear association between the timing of the introduction of complementary foods and childhood overweight or obesity, but some research suggests that very early introduction (at or before 4 months), rather than at 4-6 months or >6 months, may increase the risk of childhood obesity.²²

In conclusion, obesity in the childhood period increases morbidity and mortality in adulthood and an important amount of those obese in adolescence continue obesity in adulthood leading to important health problems. Childhood exogenous obesity may develop from wrong feeding and non-nutritive sucking behavior habits and approaches in the infancy period. To our knowledge; this is the first paper which investigates the association between non-nutritive infant habits and childhood obesity. Based on the results of our study finger sucking habit is associated with obesity. There is a need for a better understanding of how the oral stage affects later periods of life in relation to eating and longitudinal studies are necessary to verify the nature of these associations.

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