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REVIEW ARTICLE

THUMB- SUCKING AMONG CHILDREN ATTENDING IBN-ALATHEER PEDIATRIC HOSPITAL IN MOSUL

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ABSTRACT

Background: Parents are frequently concerned about their children's behavior patterns especially if they are repetitive or stereotyped. The term thumb sucking refers to placing thumb into the mouth many times every day and night, exerting definite sucking pressure. Prevalence of malocclusion is higher in children with sucking habits than in those without the habit at 3-12 years of age. However, when children stop finger sucking before the age of 6 years, they do not have a higher percentage of malocclusion than children with no history of sucking habit. **Materials and method:** The frequency of thumb sucking children was studied in a prospective study of 400 children less than 13 years of age, 200 boys and 200 girls attending Ibn-alatheer pediatric hospital in Mosul city during the period between Dec 2017 and May 2018. Data were collected from the mothers. The variables considered were age, sex, residence, type of feeding, use of a pacifier, occupation of the mother, presence of thumb sucking, family history of the habit, family actions to help the child, maximum time of the habit around the day, any associated habit and any dental malocclusion in children over 6-years of age with prolonged thumb sucking. **Results:** It was found that the percentage of thumb sucking was less with the increase in age: 28 (28%) in children less than one years of age, 15(15%) in children between 1-4 years of age, 6(6%) in children between 4-6 years of age and 4(4%) in children above 6 years of age. It was more common among females than males in all age groups, 31 (58.4%) females were found with the habit while 22 (41.6%) males with the habit. It was more in children from urban areas 44(15%) than children from rural areas 9(8%). Thumb sucking was more common in bottle fed children 16 (16%) or on combined breast and bottle feeding 3(20%) than in children on breastfeeding only 34 (12%). A reverse association was found between thumb sucking and pacifier sucking, with pacifier only 5 (6%) children had thumb sucking, while without pacifier 48 (15%) children had thumb sucking. There was a strong family history among siblings and second degree relatives 35 (66%). There was increase in the family actions against thumb sucking with the increase of age of their children, 21(68%) of these actions were found in children above 4 years of age while only 10 (32%) family actions were found in children less than 4 years old. Although most of the family actions were traditional wrong ways with unsuccessful results 23 (47%). Maximum time of the habit around the day was at day time in infants 21 (75%), at day and night in toddlers 9(60%) and at night and sleeping time in preschool and school age children 8 (80%). Various associated habits were found with thumb sucking 11(20.7%). All school age children with prolonged thumb sucking showed class II dental malocclusion. **Conclusion:** The frequency of thumb sucking appears to vary by the race and culture. The habit decreases with increase in age spontaneously. Pediatrician should be more concerned about the bad effects of thumb sucking and should offer a proper advice to the parents about this habit. If necessary a pacifier may be a substitute of choice in thumb sucking because it is more readily given up at a later age than thumb sucking, with less dental malocclusion.

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INTRODUCTION

Parents are frequently concerned about their children's behavior patterns especially if they are repetitive or stereotyped. These patterns are important, they are common in children with normal psychological status but they may also occur in children with developmental problems or emotional difficulties, or may be secondary to physical disorders (Lubitz, 1992). A habit was defined as the action or condition, which by repetition has become spontaneous (Calasti, 1960).

Habits are common and can range from benign transient habits (e.g., skin picking) to significantly problematic repetitive behavior (e.g., bruxism).

Thumb sucking: Interest in this topic been sharp by psychiatrists, psychologists, pediatricians, pediatric-dentists, orthodontists, speech therapists and plastic surgeons (Tewari, 1970). Thumb sucking is an innate reflex and one of the most common security and self-soothing mechanisms. In infants, thumb sucking and pacifier use are often classified together as nonnutritive sucking methods. Pacifier use has been linked to decreased breastfeeding duration, (Levy *et al.*, 2002; Aarts *et al.*, 1999) but the same effect of thumb sucking on

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breastfeeding has not been reported (Aarts *et al.*, 1999). In some studies, combinations of the use of pacifiers and thumb sucking have been reported to lead to decreased breastfeeding. (Levy *et al.*, 2002; Aarts *et al.*, 1999). Pacifier use has been documented to be protective against sudden infant death syndrome (SIDS) in children younger than six months and was included in the 2005 American Academy of Pediatrics SIDS guideline update; (American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome, 2005). However, there have been few studies advocating thumb sucking as an equally preventive measure against SIDS. The incidence of thumb sucking among children decreases with age, and most children spontaneously stop thumb sucking between two and four years of age. Thumb sucking is normal in infancy and toddlerhood. Like other rhythmic patterns of behavior, thumb sucking is self-soothing (Colleen *et al.*, 2011). Ultra sound observation of fetus from 15 weeks to term revealed a marked bias for sucking the thumb of the right hand (Hepper, 1991). Most of pediatricians, psychologists and orthodontist agree that thumb-sucking habit is considered as a normal phenomenon that typically starts in the early infancy (Christensen, 2005; Peterson, 1982). Most of the children stop the habit by the age of 4-6 years because of their activities turn to a more mature form of behavior (Peterson, 1982). The etiology of thumb sucking is not well known and has been related to psychoanalytic theory and the learned behavior, the later has been increasingly supported by clinical research and effective treatments (Macena, 2009).

Thumb sucking and its effect on dentition: Normally about two-third of such habits are self-limiting by the age of 4-5 years with no long-term consequence (Popovich, 1973) Prolonged thumb sucking alters the functional equilibrium between tongue and orofacial musculature (Dentistry, 2005) and lead to narrowing of the maxillary arch, resultant posterior crossbite and sometimes can also lead to simple anterior open bite (Farsi, 1997). Prevalence of malocclusion is higher in children with sucking habits than in those without the habit at 3-12 years of age. However, when children stop finger sucking before the age of 6 years, they do not have a higher percentage of malocclusion than children with no history of sucking habit (Macena *et al.*, 2009).

Influence of thumb sucking on peer social acceptance: The risk of reduced social acceptance should be added to the list of potentially harmful effects of chronic thumb sucking in school age children, these children were rated as significantly less intelligent, happy, attractive, likeable, and fun and less desirable as a friend, playmate, seatmate, classmate, and neighbor than when they were in the non-thumb sucking pose (Friman, 1993).

Prolong thumb sucking and speech: Speech defects are common occurrence of school age children with thumb sucking habit. Related to the inability to effect an oral seal for swallowing is the difficulty of adequately pronouncing the constants, T and D, where the tip of the tongue is placed behind the incisor teeth. These children talk with a marked lisp, which disappears when the dental malocclusion is corrected (Curzon, 1974).

Treatment of thumb sucking

Pediatric treatment: Unfortunately, the pediatrician has little time to address behavior problem in the average well-child

visit (Reisinger, 1980). Treatment that require extensive explanation limit the time the pediatrician has to evaluate the child and family's emotional status (Friman, 1986). For the pediatrician presented with concerned parents, the advice he can give will depend upon the age of the child. In the every small infant, it must be determined that the baby is getting enough nursing to satisfy the need for oral gratification. If necessary, a pacifier may be prescribed and in particular the Nuk-sauger teat, which is designed to reproduce the nipple of the human breast, in contrast to the round symmetrical feeding teat usually used. A pacifier is far more readily given up at a later age than thumb sucking. Should a child present with a finger-sucking habit under the age of 3 years, the parent should be advised to ignore the habit entirely and not focus attention on it. It should be pointed out that finger-sucking is normal in a large percentage of infants and that in all probability the habit will be voluntarily given up by the age of 4 years. It is imperative that the parents cease to be overanxious.

By the age of 4 years some concern should be expressed if the habit persists and in particular if it is continuous throughout the day (Al-Hussyeen, 2009). The parents role in the correction of an oral habit is important . parents are often overanxious about the habit and its possible effects. This anxiety may result in nagging or punishment that often creates a greater tension and intensification of the habit (Al-Hussyeen, 2009). According to Friman P.C. *et al.* the use of aversive taste treatment by application of a commercially available, bitter tasting material resulted in complete elimination of thumb and finger sucking who suggest that the children younger than 4 years of age should not be treated (Friman, 1986). If thumb sucking associated with other habits e.g. trichotillomania or object attachment. The treatment of a covering habit "Thumb sucking" can be an effective treatment of these associated benign habit disorders (Reisinger, 1980; Friman,1986).

Dental treatment: Children of school age and still sucking are in definite need of corrective treatment and should be referred as soon as possible to a pedodontist or orthodontist. Dental treatment will largely consist of correction of any existing displacement of the incisors by appliances that at the same time will be designed to break the habit (Curzon, 1974). Corrective appliances for oral habits are indicated only when the child wants to discontinue the habit and needs only a reminder to accomplish the task (McDonald, 1994).

The aim of the study: To assess the frequency of thumb sucking in children less than 13 years of age attending Ibn-alatheer pediatric hospital in Mosul city.

MATERIALS AND METHOD

Materials

A prospective study of 400 children less than 13 years old attending Ibnalatheer pediatric hospital in Mosul city during the period between 15th of December-2017 to 15th of May - 2018. The collection of the sample done randomly from children attending Ibnalatheer pediatric hospital either as in patients, out patients, or occasionally as a relatives of other in patients. Those in patients with chronic illnesses were excluded from the study, e.g. those with thalassemia, leukemia, diabetics mellitus, chronic malnutrition ... etc.

The sample taken were divided into 4-age groups each age group contain 100 child, 50 male and 50 female. These age groups were:

- A-less than one year old.
- B-Between one year and 4year old.
- C-between 4year and 6years old.
- D-between 6years and 12 years old. Table (1)

Questionnaires were directed to the mother. The data collected from each child was recorded on a special data sheet to be analyzed later (Appendix: Data sheet). One child who develop thumb sucking at hospital was excluded, so only children with thumb sucking before admission to hospital was included in this study. Only predominant thumb sucking was included in the study as positive, while nonspecific digit or other fingers sucking were excluded and considered as negative. All children in the age group-D i.e. 6-12years old with positive thumb sucking after proper examination for any dental malocclusion, open bite, protrusion of the maxillary incisor and insertion of the lower lip behind the maxillary incisors, were referred to Orthodont unit at Annor center for dentistry for proper dental management.

RESULTS

Out of the 400 children involved in the study: Thumb sucking was seen in 53 children which represent 13.25%, (table-2). Thumb sucking decreased with increase in age: 28 (28%) children less than one year of age. 15(15%) children between 1-4 years of age. 6 (6%) children between 4-6 years of age. 4 (4%) children above 6 years of age. (Table 2, Figure 1).Thumb sucking was less common in males 22(44.6%) than females 31(58.4%), (Figure 2). Thumb sucking was more common in children from urban area 44 (15%) than children from rural area 9(8%) (Table 3). Sucking was less common among children on breast feeding 34 (12%) than children on bottle 16(16%) or combined breast and bottle feeding 3(20%) (Table 4). Sucking was less common among children with pacifier sucking 5(6%) than children without pacifier sucking 48(15%) (Table-5). Children with thumb sucking 35(66%) had positive family history among siblings, cousins, parents, uncles, or aunts (Figure-3). Various types of family actions against thumb sucking were done, most of these action were traditional wrong ways as follow

- Hitting
- Slapping the hand
- Shouting
- Biting the thumb
- Cautery
- Wrapping the hand with socks
- Bandaging the hand
- Adding aversive taste and bitter substance over the thumb.
- Advice and suggestion
- Consulting pediatrician
- Make the child interested with other things.
- Pull the thumb from the mouth.

Thirty one actions were done against 86 thumb sucking children, 21(86%) actions found in the age groups C&D (i.e. above 4 years old children), 8(38%) of these actions were succeeded, while only 10(32%) actions were found in the age groups A&B (i.e. below 4 years old children), all of these

Table 1. The distribution of the sample according to sex and age

	Age group	Male	Female	Total
A	< 1year	50	50	100
B	1-4years	50	50	100
C	4-6 years	50	50	100
D	6-12 years	50	50	100
	Total	200	200	400

Table 2. Frequency of thumb sucking in various age group

Age group	Male No. (%)	Female No. (%)	Total No. (%)
A < 1year	13 (26)	15 (30)	28 (28)
B 2-4years	6 (12)	9 (18)	15 (15)
C 4-6 years	2 (4)	4 (8)	6 (6)
D 6-12 years	1 (2)	3 (6)	4 (4)
Total	22 (11)	31 (15.5)	53 (13.25)

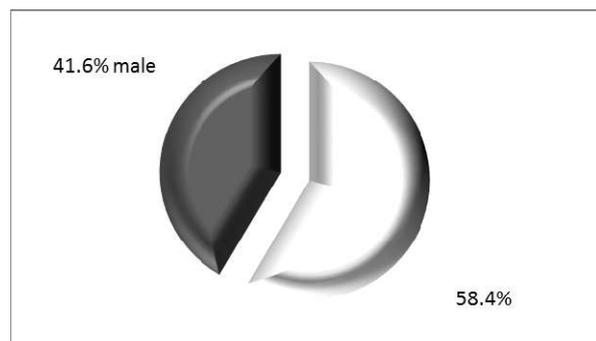
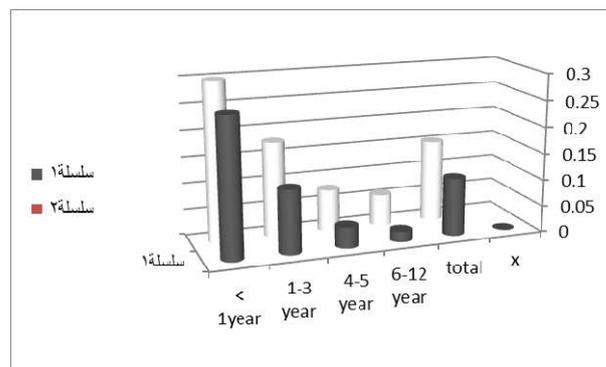


Figure – 2. Frequency of thumb sucking according to sex

Table 3. Frequency of thumb sucking according to residence

Residence	Samples	Thumb sucking
Urban	291	44(15%)
Rural	109	9(8%)
Total	400	53(13.25%)

Table 4. Relationship between type of feeding and thumb sucking

Type of feeding	Sample	Thumb sucking
Breast feeding	283	34(12%)
Bottle feeding	102	16(16%)
Breast and bottle feeding	15	3(20%)

Table 5. Relation between pacifier and thumb sucking

Use of pacifier	Sample	Thumb sucking
Present	79	5(6%)
Absent	321	48(15%)

actions were failed (Table 6). The habit was at daytime in infants 21(75%), at day and night in toddlers 9(60%) and at night and at sleeping time in preschool and school age children 8(80%) (Table 7). Thumb sucking was more among children born for house wives 17 (12.8%) than among children born to

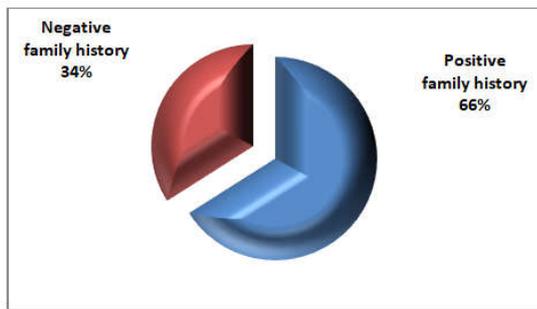


Figure 3. Family history and prevalence of thumb sucking

mothers work outside the house 1(6%) (Table 8). Out of the 53 children with thumb sucking 11(20.7%) children had other associated habits these are: trichotillomania, tongue sucking, blanket sucking pulling hair of his or her mother, toes sucking, lips sucking, playing with his umbilicus. All the 4-children in the age group over 6 years of age with prolonged thumb sucking had dental malocclusion class II.

DISCUSSION

Review of literature on oral habits among children revealed wide range of prevalence existing between population, races, and countries, and it is believed to be influenced by various factors, such as gender, rank of the child in the family, feeding methods, socioeconomic status, maternal age, maternal occupation, and education (AL-Hussyeen, 2009). The frequency of thumb sucking habit appears to vary by the race and culture, this is in consistence with Curzon (Curzon, 1974). Different studies were done about prevalence of thumb sucking among children in different countries, these studies gives different result (Table 9). With the increase in age the prevalence was lower in all age groups, this is in consistence with Zadik (1977) (Table 2, Figure 1). The frequency of thumb sucking among males were less than that among females, similar findings seen by Baalack *et al.* (1971) in Sweden. While it was more in males than females in Sarkar study (Sarkar, 1992) in India. So the frequency of thumb sucking according to sex is different between different cultures (Table 9).

Table 6. Number of family actions against thumb sucking in various age groups and its results

Age group	No. of thumb sucking	Family action	Success rate
< 1year	28	4(14%)	Zero (0%)
1-4years	26	6(23%)	Zero (0%)
4-6 years	16	10(62.5%)	5(20%)
6-12 years	16	11(68.7%)	3(27%)
Total	86	31(45.6%)	8(26%)

Table 7. Timing of thumb sucking around the day

Age group	Number of thumb sucking	Day	night	Day and night
< 1year	28	21(75%)	2(7%)	5(18%)
1-4years	15	4(27%)	2(13%)	9 (60%)
4-6 years	6	0(0%)	5(83%)	1(17%)
6-12 years	4	0(0%)	3(75%)	1(25%)
Total	53	25(47%)	12(23%)	16(30%)

Table 8. Association between occupation of the mother and thumb sucking in their children

Occupation	Sample	Thumb sucking
House wife	133(89%)	17(12.8%)
Work outside of the home	16(11%)	1(6%)
Total	149	18(12%)

Table 9. The prevalence of thumb sucking in this study and in other studies

No.	study	Year of study	country	Age range	% of Thumb sucking	Sex difference
1.	Current	2018	Iraq	< 13 years	13.25	F > M
2.	Traisman and Traisman ⁽²⁴⁾	1958	USA	< 4 Years	45.6	F = M
3.	Baalack et al.(old + new habit) ⁽²²⁾	1971	Sweden		30.7	F > M
4.	Nanda et al ⁽²⁵⁾ .	1972	India		17	
5.	Curzon ⁽¹⁶⁾	1970	Eskimo		Zero	
6.	Sarkar ⁽²³⁾	1992	India	3 – 6 years		F < M

Table 10. Relation between pacifier and thumb sucking in this study and Zadik study

Study	Number of children	Total Suckers (%)	Pacifier and thumb %	Thumb Only (%)	Pacifier Only (%)
Current	400	127 (31.75%)	5 (1.25%)	48 (12%)	74 (18.5%)
Zadik ⁽²¹⁾	333	88 (26.5%)	3 (0.9%)	29 (8.7%)	56 (17%)

Thumb sucking was more among children from urban areas, this is in consistence with Sarkar's study who stated that thumb sucking was more in cities (Sarkar *et al.*, 1992). Calsti, Cohen and falls report significantly more oral habits in the higher Socioeconomic group than in the middle and low group (2) (Table 3). Children on breast feeding show less thumb sucking than children on bottle or combined breast and bottle feeding, this is in consistence with Sarkar study (Sarkar *et al.*, 1992) (Table 4). Thumb sucking was less in children use pacifier in their early infancy, this is in consistence with Zadik study who stats that offering the use of a pacifier may be of value because it might prevent the child from finger sucking which may cause greater damage (Zadik, 1977) (Table 11). Sixty six percent of thumb sucking children had positive family history, this is in consistence with Larsson who stated that, there was a correlation, however, between presence of thumb sucking and number of siblings with the same sucking habit (Larson, 1997). There is increase in the family action against the habit with the increase in age, this might reflect more parental concern about its dental complications and also because this habit was considered abnormal socially not accepted by the parents if it persist after 4 years of age (Table 7).

Out of the 31 family actions 23 (74%) were failed either because the habit is normal phenomenon and it is part of exploration of the surrounding by the infants, satisfying sucking urge and oral gratification in infants, negativism by toddlers, or on the top of the list because of the traditional wrong action done by the parents. However success in 8(26%) family action might be due to the habit stopped spontaneously in most of children by the age of 2-3 years and only few of them will continue to have the habit (McDonald, 1994). According to Peterson, tying the hand, stern admonition and punishment should be avoided (Peterson, 1968). Yanking a thumb from a newborn's mouth, Tabasco, socks, bandages, hand slapping, which mostly did not work. When it did, the result was a tense un happy child as much in need of comfort as ever, who might return to his or her thumb if under stress (Mackenzie, 1987). Most of the above mentioned ways were tried by the parents in our study and we notice only 2 (6%) actions was by advice and suggestion both of them give positive result (25%) and in both of them the age of thumb sucking children when they stopped the habit was above 3 years. Also one (3%) action which was also successful (12.5%) was by making the child interested with other things rather than his thumb. The best strategy for dealing with thumb sucking is to provide the child with evidence of interest in his or her wellbeing and other form of satisfaction (Colleen, 2011). Only one family action (3%) was by consultation of pediatrician, this reflect that the parents in our community still dealing with oral habits in their children in traditional ways without trying to get help from pediatrician or dentist. The maximum time of the habit among children less than one year of age is at daytime. This may be explained that children less than one year of age are with normal phenomenon for their age in exploring the surroundings by their mouth. While the maximum time of the habit among children above 4 years of age was at night this is probably because the child above 4years cannot take enough interest from the habitat daytime because he or she knew that his habit is considered wrong by their peers, siblings and parents. Thumb sucking at day and night and at sleeping time was an additional factors to the serious effect on dental occlusion because there is increase in the frequency, duration and intensity (Jenning, 1969; Baer, 1987) (Table 7).

Thumb sucking was more among children born to house wives 17 (12.8%) than children born to working mothers 1(6%), probably because 13(81%) of the working mothers were farmers from rural areas which as shown in Table 3 had less prevalence of the habit than children from cities. Also this might be because of the great difference between the size of the two samples 1:8.5 (Table -8). Thumb sucking is associated with other habits in 11 (20.7%) children. This is in consistence with other studies (Zadik, 1977; Baalack, 1971). All our 4 thumb sucking children above 6 years of age had class II malocclusion, there is great difference between the result in our study and other studies, this may be due to the small number of our sample compared for e.g. with 1258 children in Popovich study who found 41.9% of children above 6 years old with prolonged thumb sucking develop class II malocclusion (Popovich, 1973)

Conclusion

Depending on result achieved in this study, the frequency of thumb sucking appears to vary by the race and culture. The habit decreases with increase in age spontaneously. It is more common in children from urban areas. It is less common in children on breastfeeding. It is less common in children use pacifier in their early life. The parental concern about the habit is greater among children above 4 years of age, and most of the parental actions are traditional wrong ways, most of them failed. The maximum time of the habit was during the night and sleeping time in children above 4 years old which is an additional factor in causing increase risk of dental malocclusion.

Recommendations

Pediatrician should be more concerned about the bad effects of thumb sucking and should offer a proper advice to the parents about this habit. If necessary a pacifier may be a substitute of choice in thumb sucking because it is more readily given up at a later age than thumb sucking, with less dental malocclusion. Further studies about non-dental treatment of thumb sucking and proper follow up to find it's result is needed to be done in the future.

REFERENCES

- Aarts C., Hörnell A., Kylberg E., Hofvander Y., Gebre-Medhin M. 1999. Breastfeeding patterns in relation to thumb sucking and pacifier use. *Pediatrics*, 104(4):e50.
- Al-Hussyeen A., Baidas L. 2009. Prevalence of nonnutritive sucking habits among Saudi children and its effect on primary dentition. *Pak Oral Dent J.*, Jun;29(1):69-78.
- American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome. The changing concept of sudden infant death syndrome: diagnostic coding shifts, controversies regarding the sleeping environment, and new variables to consider in reducing risk. *Pediatrics* 2005;116(5):1245-55.
- Baalack IB., Firsk AK. 1971. Finger sucking in children. *Acta. Odont. Scand.*, 29:499-512
- Baer PN., laster M. 1987. The thumb, the pacifier, the eruption tooth and a beautiful smile. *J Pediatr.*, 11:113-9.
- Calasti LJP., Cohen MM., False MH. 1960. Correlation between malocclusion, oral habits and socioeconomical level of preschool children. *J Dent Res.*, 39:450 - 3.
- Christensen JR., Fields HW., Adair SM. 2005. Oral habits. In: Pinkham JR, Casamassimo PS, McTigue DJ, Nowak AJ,

- editors. *Pediatric Dentistry: Infancy Through Adolescence*. 4th ed. Philadelphia: Elsevier Saunders; p. 431–9.
- Colleen A., Ryan, Gary J., Gosselin, David R. DeMaso (eds): *Nelson text book of pediatrics: Habit and Tic Disorders*. 19th ed. Philadelphia: WB Saunders; 2011. P. 112.
- Curzon MEJ. 1974. Dental implications of thumb sucking. *Pediatr.*, 54:196-200.
- Dentistry AAoP. 2005. Policy on oral habits. *Pediatr Dent.*, 27:40–41.
- Farsi NM., Salama FS. 1997. Sucking habits in Saudi children: prevalence, contributing factors and effects on the primary dentition. *Pediatr Dent.*, 19(1):28–33.
- Friman PC., Barone VJ., Christophersen ER. 1986. Aversive taste treatment of finger and thumb sucking. *Pediatr.*, 78(1):174 – 6.
- Friman PC., Mcherson KM., warzak W.J., Evans J. 1993. Influence of thumb sucking on peer social acceptance in first grade children. *Pediatr.*, 91(4):784-6.
- Hepper PG., Shahidullal S., White R. 1991. Hardness of human fetus. *Neuropsychologia.*, 29(11):1107-11.
- Jenning RE. 1969. At what age should thumb sucking be treated? *Dent Obstucts.*, 14:73-4.
- Larson E. 1997. Artificial sucking habits, etiology, prevalence and effect on occlusion. *Int. J. Orofacial Myology.*, 20:10-21.
- Levy SM., Slager SL., Warren JJ., Levy BT., Nowak AJ. 2002. Associations of pacifier use, digit sucking, and child care attendance with cessation of breastfeeding. *J Fam Pract.*, 51(5):465.
- Lubitz L. Nail biting, 1992. Thumb sucking, and other irritating behaviors in children. *Fam Physician.*, 21(8):1090 – 4.
- Macena MC., Katz CR., Rosenblatt A. 2009. Prevalence of a posterior cross bite and sucking habits in Brazilian children aged 18-59 months. *Eur J Orthod.*, 31:357–61.
- Mackenzie EP. 1987. Thumb sucking debate. *Pediatr.*, 79(3):485-6.
- McDonald RE. 1994. *Dentistry for the child and adolescent*. 6th ed. St. Lois): Mosby. P. 776-82.
- Nanda RS., Khan I., Anand R. 1972. Effect of oral habits on the occlusion of preschool children. *J Dent Child.*, 39:499 452.
- Peterson CT. 1968. Thumb sucking. *Am. Orthod.*, 54(4):290
- Peterson JE. 1982. Jr. Pediatric oral habits. In: Stewart RE, Barber TK, Troutman KC, Wei SH, editors. *Pediatric dentistry: scientific foundations and clinical practice*. St. Louis : C V Mosby; p. 361–72.
- Popovich F., Thompson GW. 1973. Thumb and finger sucking in relation to malocclusion. *Am J Orthod Dentofacorthop.*, 63:148-55.
- Reisinger KS., Bires JA. 1980. Anticipatory guidance in pediatric practice. *Pediatr.*, 66:889-92.
- Sarkar S., Chowdhury K.S., Mukherjee MM., 1992. Prevalence of thumb sucking in children of Calcutta. *J Indian Soc. Pedod. Prev. Dent.* 10(1):33 – 6.
- Tewari A. 1970. Abnormal oral habits relationship with malocclusion and influence on anterior teeth. *J Indian Dent Assoc.*, 42: 81 – 4.
- Traisman AS., Traisman HS. 1958. Thumb and finger sucking: a study of 2650 infants and children. *J Pediat.*, 53:566-572.
- Zadik D., stren N., Litner M. 1977. Thumb and pacifier sucking habits. *Am J Orthod.*, 71(2):197-201.
