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Dietary and Feeding Habits in a Sample of Preschool Children in Severe Early Childhood Caries (S-ECC)

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Abstract. The aim of the present study is to investigate dietary and feeding habits in a sample of preschool children with Severe Early Childhood Caries. The design followed a case control study; sixty children were selected, and another thirty caries free children were selected as controls. Children were healthy, diagnosed as Severe Early Childhood Caries, with age range 36-71 months. A clinical examination was done to measure decayed, missing and filled index. A questionnaire interview was performed to evaluate dietary habits, feeding habits and behavior. There was a highly significant differences between both groups regarding the dietary habits, mainly the frequency of eating sugar ($p = 0.003$), the eating frequency of salty snacks (fishfash, chips) ($p = 0.006$, $p = 0.002$), frequency of drinking flavored milk ($p = 0.008$), and the consumption of soda drinks ($p = 0.001$). A significant difference was found between both groups regarding the child feeding behavior, indicating increased risk of caries in a child who went to bed with bottle and who was fed at will ($p = 0.000$). Based on the sample of patient studied, it was concluded that snacks and sugar consumption between meals, night feeding and at will feeding are significant risk factors.

Keywords: Dietary and feeding habits, Preschool children, Severe early childhood caries.

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Introduction

Early Childhood Caries (ECC) was the term adopted in 1994 to denote dental caries in infants and preschool children, however, there was no universally accepted definition and criteria for the diagnosis of ECC. Definitions have been based on the type of teeth (*e.g.,* incisors or molars, excluding mandibular incisors), tooth surface (*e.g.,* labial and lingual caries on at least two maxillary incisors) and number of teeth (*e.g.,* five or more decayed, missing, filled, tooth (DMFT)) involved[1]. The American Academy of Pediatric Dentistry guidelines, defined ECC as the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a child 71 months (5 year + 11months) of age or younger[2]. In children younger than 3 years of age, any sign of smooth-surface caries was indicative of S-ECC. It was also diagnosed when from age 3 through 5, one or more cavitate was missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth, or decayed, missing, or filled score of ≥ 4 (age 3), ≥ 5 (age 4) or ≥ 6 (age 5) surfaces constitutes as S-ECC[3].

Although ECC is an infectious disease, the role of diet in acquisition of the infection and development of the disease was critical[4,5]. Children with ECC had frequent and prolonged consumption of sugars from liquids[6-10]. Caries-promoting sugars such as sucrose, glucose and fructose, contained in fruit juices and many infant formula preparations; even readily metabolized by *Streptococcus mutans (S. mutans)* and *Lactobacilli* to organic acids that demineralized enamel and dentin[11-13].

Sucrose, glucose and fructose found in fruit juices and vitamin C drinks as well as in solids were probably the main sugars associated with infant caries[11-14]. Sucrose, the most widely used sugar, was considered the most important in dental caries, as it was the only substrate used for bacterial generation of plaque dextrans which was essential for bacterial adherence, and thus facilitated the implantation of cariogenic bacteria in the oral cavity[11,15,16]. Other common sugars of significance in ECC included the monosaccharides glucose and fructose, which are present in fruit and honey[13,14].

Fruit juices are thought to cause damage to teeth because of two properties: first of all, the low pH and high titratable acidity of some

drinks can cause erosion on enamel surface, and secondly the fermentable carbohydrates in the drinks are metabolized by plaque microorganisms to generate organic acids in the dental plaque that can cause demineralization, leading to dental caries[13,17,18].

Both the World Health Organization (WHO) and Committee on Medical Aspects of Food Policy (COMA)[19] recommended that non-milk products and cellular extrinsic sugar should not represent more than 10% of the total daily caloric intake, and that sugars should comprise no more than 10-20% of the human diet. Rosenblatt and Zarzar[20] found that the association between the type of feeding and the presence of caries did not prove to be statistically significant, but caries was more prevalent in children with a cariogenic diet than in those children without a cariogenic diet. Children with ECC have a high frequency of sugar consumption, not only of fluids given in the nursing bottle, but also of sweetened solid foods [10,21,22]. Results of early clinical studies suggested that this dietary characteristic is likely to be one of the most significant caries risk factors in ECC[23]. The increased frequency of eating sucrose, also increased the acidity of plaque, and enhanced the establishment and dominance of the aciduric *S. mutans*[24]. The increased total time sugar was in the mouth increased the potential for enamel demineralization, allowing inadequate time for remineralisation by saliva; with the result that demineralization becomes the predominant mechanism[25]. A study performed on female teenagers showed that risk of caries significantly increased when the girls skipped breakfast and had irregular meals which would probably be substituted by light meals, and snacks with high sugar content during the day which may enhance the caries activity[26].

In infants with ECC, the sleep time consumption of sugar was another common characteristic. The low salivary flow during sleep decreased oral clearance of sugars and increased the length of contact time between plaque and substrates, thus, increasing the cariogenicity of the substrate significantly[27].

Feeding habits were said to be of prime importance in the etiology of dental caries at any age, but more especially, in preschool children[28]. Unfortunately, the introduction of sugary drinks and confectionery at an early age is known to lead to the establishment of habits that persisted even after a child gets older[29].

The literature suggested that prolonged natural breast-feeding after 12 months was a risk factor for the occurrence of early childhood caries in infants[30,31].

Baby bottles predispose to S-ECC because their nipple blocks the access of saliva to the upper incisors. On the other hand, lower incisors are close to the main salivary glands and are protected from liquid contents in the bottle or nipple, as well as the tongue[32]. Bottle feeding during the night was associated with a reduction in salivary flow and in the capacity of salivary neutralization, this caused food stagnation in the teeth and prolonged exposure to fermentable carbohydrates[33,34]. Again, the habit of dipping the pacifier in sugar was associated with early colonization by *S. mutans* in predentate infants[35]. However, the American Academy of Pediatric Dentistry[3] in its oral health policies on early childhood caries (ECC), did not make recommendations about pacifier use. Studies investigating public health messages that described the potentially harmful effects of pacifier used on children's health have not been limited to ECC. Some studies also suggested that pacifier use was a risk factor for otitis media in young children[36-39].

Several infant feeding practices were significantly associated with caries pattern and severity, depending on the duration of feeding. The bottle fed children had an anterior caries pattern compared with none bottle-fed. Furthermore, anterior caries pattern was significantly higher in children put to sleep with a bottle or allowed to sip from a bottle during the day, compared with those who did not feed in this manner[40].

Therefore, the aim of the present study was to investigate dietary and feeding habits in a sample of preschool children with severe early childhood caries (S-ECC) in Jeddah, Saudi Arabia.

Materials and Methods

Study Design

Case control and cross sectional study.

Study Sample

The sample used in this study was selected from the screening clinics of Faculty of Dentistry (FOD), King Abdulaziz University. Children attending the dental clinics in the FOD were referred from the screening clinic during a period of 2 months. Sixty children diagnosed to have S-ECC were selected and matched against 30 caries free children who were selected as controls.

Sample Selection:

Study Group

Children were selected according to the following criteria

- Healthy, normal
- Diagnosed as S-ECC (according to criteria of AAPD 2006-07)[3].
- Age range 36-71 months

Referred children were re-examined by the principle examiner to reconfirm selection criteria.

Control Group

An age matched control group was selected by reviewing dental records and screening files. Children diagnosed to be caries free were called for clinical examination together with their brothers and sisters. It was only possible to collect 30 children, due to difficulty in obtaining caries free children attending the faculty. Children were examined clinically and bitewing X-rays were performed to exclude proximal caries.

Consent Form

A verbal informed consent was obtained from the parents before clinical examination of their children. The parents were motivated by offering full dental treatment for their children and performing preventive procedures for caries free children.

In order to study the dietary and feeding habits associated with S-ECC, the following parameters have been investigated through:

- I. Clinical examination to measure DMF index.
- II. Questionnaire interview to evaluate:
  - 1. Dietary habits.
  - 2. Feeding habits and behavior.

I. Clinical Examination

1) Intra Oral Radiographs

Bitewing radiographs were taken from children to confirm presence or absence of proximal caries and to confirm presence of sound proximal contacts to exclude Class II caries in the control group.

2) Intra Oral Examination

Clinical examination and recording of observations were carried out by one dentist using mouth mirror and blunt explorer on the dental chair using dental light.

DMFs Score

Caries was recorded in terms of DMFs.

Caries was diagnosed when there were:

- Cavity or white spot apparent on visual and tactile inspection.
- Tooth with history of extraction due to pain and presence of cavity prior to extraction.
- Presence of dental restoration.
- Radiolucency as seen in bitewing radiographs.

Teeth missing because of trauma, congenital absence or normal shedding (exfoliated) were not included in the DMFs index.

The criteria of the American Academy of Pediatric Dentistry was used which defined ECC as the presence of one or more decayed (noncavitated, white lesion, or cavitated lesions), missing tooth due to caries or filled tooth surfaces in any primary tooth in a child 71 month of age or younger. From age 3 through 5, one or more cavitate, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth, or decayed, missing, or filled score of ≥ 4 at age 3, ≥5 at age 4 or ≥ 6 at age 5 constituted S-ECC[3].

II. Questionnaire Interview

A structured questionnaire was prepared after literature reviewing.

The parents or caregivers were interviewed in order to complete the questionnaire, which was encompassed to gain information regarding, dietary habits, feeding habits and behavior.

1. Dietary Habits

The daily dietary habits were assessed by asking about snacking habits and fruits; vegetables and sweets consumption.

2. Feeding Habits and Behavior

The feeding habits and behavior of the child were evaluated through the reported history of breast or bottle-feeding**,** history of day, at

will or night feeding, the inclusion of other juices and sugar, plus age of weaning and when child started using a cup.

Statistical Analysis

All the data were collected, tabulated and statistically analyzed using Statistical Package for Social Sciences (SPSS) version 10. Odds ratio and unpaired t-test were used according to the need. The level of significance used was 5%.

Results

The sample was composed of 90 children (60 study and 30 controls); 39 males and 51 females, the mean age of children in the study group was 4 years and 8 month compared to 4 years and 5 month in the control; the study and the control groups did not differ significantly in the age.

The mean of decayed teeth (d) was 16.5, missing (m) 2, filled (f) 4.8 and DMFs was 23.3 while the mean number of teeth was 19.6.

Dietary and feeding habits were evaluated through a questionnaire interview.

Dietary Habits

Eating Vegetables and Fruits

Table 1 shows that there was a highly significant difference in the eating frequency of vegetables and fruits between study and control groups ($p = 0.003$). The value of the odds ratio showed that a child who ate vegetables and fruits at least once a day had lesser chance (0.71) times to be carious, or at lower risk of caries than the child who did not eat vegetables and fruits (Fig. 1).

Table 1. The frequency of eating vegetables and fruits in study and control groups.

How many times does the child eat vegetables & fruits?	Study		Control		Odds Ratio	p
	Count	%	Count	%		
Rare	18	30.0	7	23.3	1	0.003
Frequent	42	70.0	23	76.7	0.71	
Total	60	100.0	30	100.0		

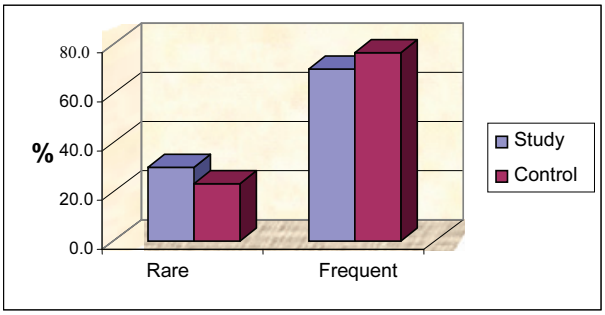

Fig. 1. Frequency chart shows eating vegetables and fruits in both study and control groups.

Frequency of Sugar Consumption

Frequency of sugar consumption showed a significant result (p = 0.019), (Table 2). The value of the odds ratio shows that the child who consumed sugar more frequently may have a greater chance of about 2.89 times to develop caries than the child who consumed sugar rarely (Fig. 2).

Table 2. Frequency of sugar consumption in study and control groups.

How many times does the child eat sugar?	Study		Control		Odds Ratio	p
	Count	%	Count	%		
Rare	10	16.7	11	36.7	1	
Frequent	50	83.3	19	63.3	2.89	0.019
Total	60	100.0	30	100.0		

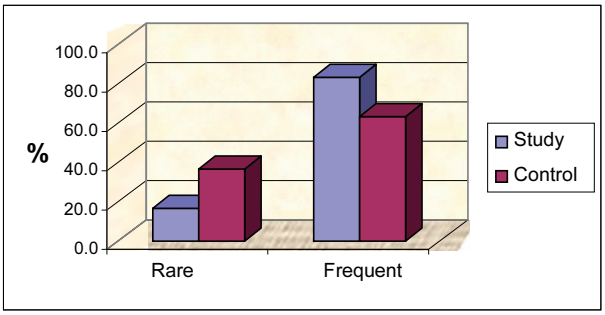

Fig. 2. Frequency shows of sugar consumption in study and control groups.

Timing of Sugar Consumption

Table 3 shows a highly significant difference in the time of consuming sugary food between both groups (p = 0.005). In Table 3, the value of the odds ratio shows that the child who consumed sugary food between, and with meals may have a greater chance of about 1.37 times to caries than the child who consumed sugar only with meal (Fig. 3).

Table 3. The time of consumption of sugary food in study and control groups.

When does the child eat this sugary food?	Study		Control		Odds Ratio	p
	Count	%	Count	%		
Between meals	52	86.7	19	63.3	1	0.005
With meals	0	0.0	4	13.3	0.00	
Between and with meals	8	13.3	7	23.3	1.37	
Total	60	100.0	30	100.0		

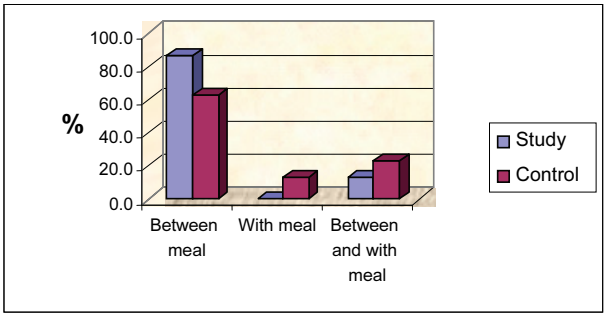

Fig. 3. The time of consumption of sugary food in study and control groups.

Salty Snacks

The eating frequency of salty snacks (fishfash & chips), showed a highly significant differences between both groups (fishfash, p = 0.006, chips, p = 0.002), (Table 4). The value of the odds ratio shows that the child who consumed salty snacks frequently may have a chance of about 5.68 to 6.54 times to develop caries more than the child who did not eat salty snacks at all (Fig. 4).

Table 4. Frequency of eating salty snacks (fishfash &chips) in study and control groups.

Salty Snacks	Study		Control		Odds Ratio	p
	Count	%	Count	%		
Fishfash						
Do not eat	14	23.3	19	63.3	1	0.006
Eat	46	76.7	11	36.7	5.68	
Total	60	100	30	100		
Chips						
Do not eat	10	16.7	17	56.7	1	0.002
Eat	50	83.3	13	43.3	6.54	
Total	60	100	30	100		

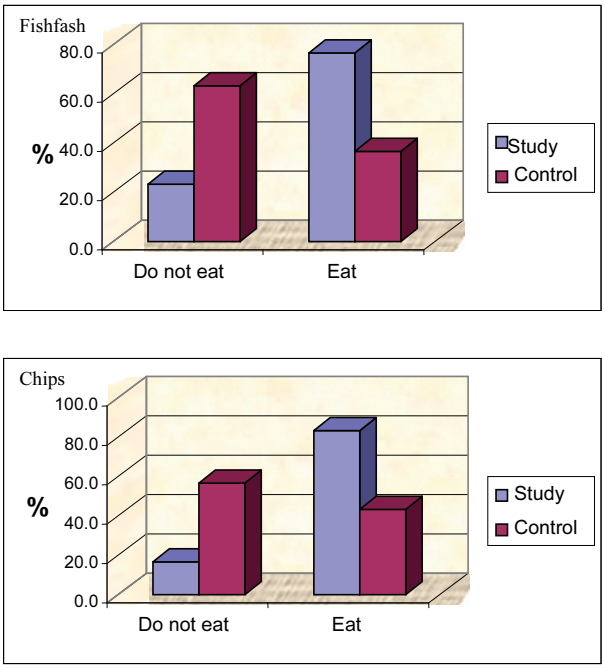

Fig. 4. Frequency of eating salty snacks in study and control groups

Flavored Milk

There was a significant difference between the children in the study group and the control in the frequency of drinking flavored milk p = 0.008 (Table 5). The value of the odds ratio shows that the child who

drank flavored milk frequently had more chance about 4.5 times to develop caries (Fig. 5).

Table 5. Frequency of drinking flavored milk in study and control groups.

Flavored Milk	Study		Control		Odds Ratio	p
	Count	%	Count	%		
Do not drink	15	25.0	18	60.0	1	0.008
Drink	45	75.0	12	40.0	4.50	
Total	60	100	30	100		

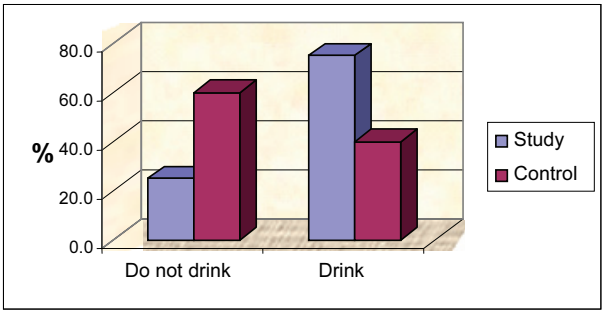

Fig. 5. Frequency of drinking flavored milk in study and control groups.

Soda Drinks

A highly significant difference between study and control groups in reference to the consumption of soda drinks ($p = 0.0001$), (Table 6). The odds ratio shows that the child who drank soda drinks (Pepsi, Seven-Up, or Miranda) had a greater chance of about 10.71 times to develop caries more than the child who did not drink these types of drinks (Fig. 6).

Table 6. Frequency of soda drinks consumption in study and control groups.

Variable	Study		Control		Odds Ratio	p
Soda Drinks	Count	%	Count	%		
Rare	34	56.7	28	93.3	1	0.001
Frequent	26	43.3	2	6.7	10.71	
Total	60	100.0	30	100.0		

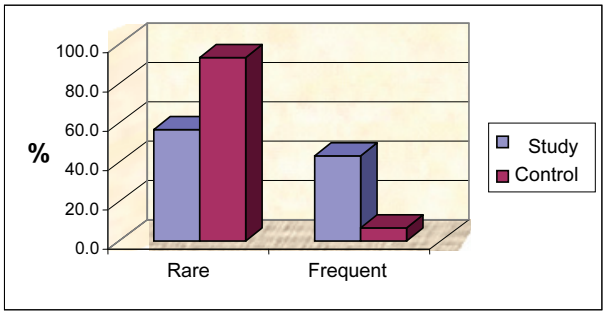

Fig. 6. Frequency of soda drinks consumption in study and control groups.

Table 7. Different types of milk used in study and control groups.

Type of Milk Used	Study		Control		Odds Ratio	p
	Count	%	Count	%		
Mixed	26	43.3	4	13.3	1	
Similak	11	18.3	20	66.7	0.084615	
S26	8	13.3	3	10.0	0.410256	
Nan	5	8.3	2	6.7	0.384615	
Nedo	2	3.3	0	0.0		0.002
Promid	4	6.7	1	3.3	0.615385	
Progress	3	5.0	0	0.0		
Saudia	1	1.7	0	0.0		
Total	60	100.0	30	100.0		

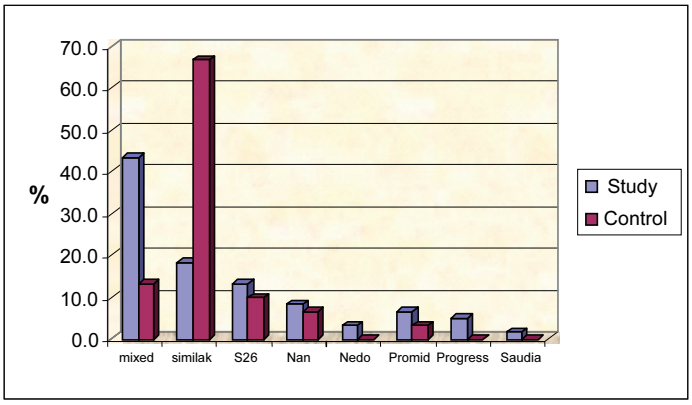

Fig. 7. Percentages of different types of milk used in study and control groups.

Feeding Habits and Behavior

Type of Milk

Table 7 shows a highly significant difference between the two groups regarding type of milk used (p = 0.002). The odds ratio signified that the least risk of caries was obtained with Similac (0.084) (Fig. 7).

Night Feeding

This present study shows a highly significant results between the two groups regarding the child who goes to bed with a feeding bottle (p = 0.000) (Table 8). The odds ratio suggested that the child who does not go to bed with a milk bottle may have a less chance of 0.09 times to develop caries than the child who goes to bed with a bottle (Fig. 8).

Table 8. Difference between the study and the control groups regarding going to bed with a bottle.

Does the child go to bed with a bottle?	Study		Control		Odds Ratio	p
	Count	%	Count	%		
Yes	52.0	86.7	11	36.7	1	0.000
No	8.0	13.3	19	63.3	0.09	
Total	60	100.0	30	100.0		

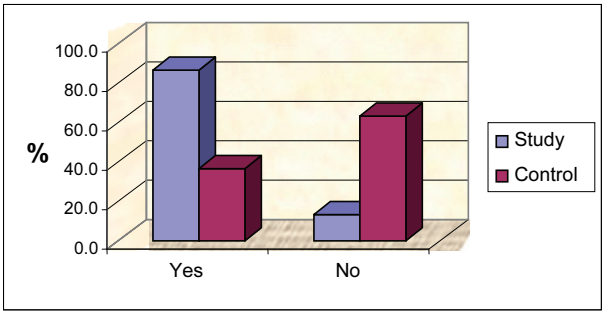

Fig. 8. Percentages of children who go to bed with a milk bottle in study and control groups.

At will Feeding

The result shows a high significant differences between the children who were fed by schedule than those fed at will (p = 0.000) (Table 9). The value of the odds ratio proved that the child who is fed on demand- will may have a greater chance of about 3.26 times to develop caries than the child who is fed by schedule (Fig. 9).

The Use of Cup

This present research shows a high significance in regards to the age of starting the use of a cup to drink milk rather than the bottle (p = 0.004*)*. Table 10 shows that there was a highly significant differences between study and control groups when the child started using cup at an early age (starting from the first year up to the fourth year). The value of the odds ratio signified that the child who starts-using cup after 2 years of age may have a greater chance, about 10.11 times, to develop caries more than the child who starts using a cup after one year (Fig. 10).

Table 9. Differences between study and control groups; how frequent the child takes the bottle.

How the child takes the bottle?	Study		Control		Odds Ratio	p
	Count	%	Count	%		
Mixed	0	0.0	2	6.7	1*	0.000
Fed by schedule	12	20.0	18	60.0	0.81	
Fed on demand	48	80.0	10	33.3	3.26	
Total	60	100.0	30	100.0		

(*a value of 0.5 was added to each value for the odds ratio to be calculated)

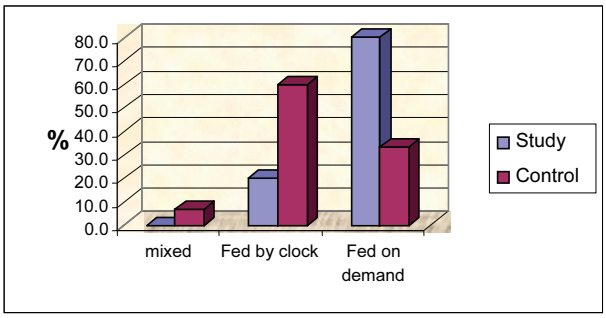

Fig. 9. Percentages of children fed by schedule or fed on demand in study and control groups.

Table 10. The time when children start using a cup for feeding in study and in control groups.

When do you start to use the cup	Study		Control		Odds Ratio	p
	Count	%	Count	%		
After 1 year	12	20.0	14	46.7	1	0.004
After 1.5 years	14	23.3	12	40.0	1.36	
After 2 years	26	43.3	3	10.0	10.11	
After 2.5 years	2	3.3	0	0.0		
After 3 years	5	8.3	0	0.0	5.83	
After 4 years	1	1.7	1	3.3	0.04	
Total	60	100.0	30	100.0		

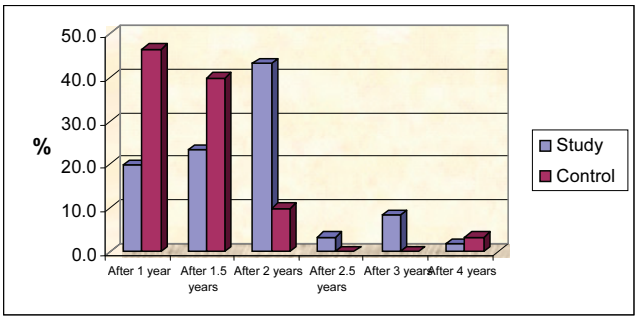

Fig. 10. The time when children start using the cup in both study and control groups.

Discussion

The present study assessed the relationship between dental caries experience, nutritional and feeding habits in a group of preschool children.

Dietary Habits

This study shows a significant difference in the eating frequencies of vegetables and fruits in the two study groups. Increasing the frequency of eating vegetables will lower the risk of caries (OR = 0.71) than those children who rarely eat vegetables.

Also, caries was significantly associated with frequency of sugar consumption; savory and crispy snacks (fishfash, chips); flavored milk and soda drinks, plus eating snacks between meals.

Caries risk increased in children who frequently ate sugar (OR = 2.89) more than children who rarely ate sugar. This was found in another study. It showed that consumption of candies more than once a week, and an inadequate oral hygiene at age 2 years are important long-term risk factors for caries development in both primary and permanent molars[41].

The dental literature revealed a strong statistical association between children who had caries and taking cariogenic diet. This emphasized sucrose as the main carbohydrate responsible for the development of dental caries. The association between the number of sugary meals and caries was statistically significant. Dental caries was more prevalent among the children who had more than four sugary meals per day including the main meal, rather than in those who had four or fewer. Early childhood caries increases with age and with the association

between a cariogenic diet and the frequency of sugary food intake[20, 42-44]. Rodrigues and Sheiham[45] found higher caries increment related to higher daily frequency and weight of sugar intake, which again agrees with our work. Moreover, the association of snacking on sugar containing foods and the high levels of dental caries was supported by Jamieson *et al*.[46], who found that children consuming sugary food had higher mean decayed; filled surfaces than those who consumed non-sugar snacks.

On the other hand, our results disagree with a previous study conducted by Kiwanuka *et al.*[47], which showed no relationship between the frequency of sugar intake and dental caries. It was attributed to the availability and cheap price of sugar, which increase its rate of consumption in different groups, especially low socio-economic groups.

This report supports the recommendations by both the World Health Organization (WHO) and the Committee on Medical Aspects (COMA) of food policy in 1989[19], that non-milk products and cellular extrinsic sugar should not represent more than 10% of the total daily calorie intake. Sugars should comprise no more than 10-20% of the human diet. The COMA report recommended that the frequency of sugary meals should not exceed four per day, including main meals.

Children who were frequently eating savory and crispy snacks, were at higher risk of caries than other children (OR = 5.68 for fishfash, OR = 6.54 for chips). These snacks are most commonly well accepted by children as they are easily available, and sold in both small and big stores. These snacks are cheap in price and used as part of rewarding children. Sometimes they are used as a supplementation for other more healthy food, also reported by Carino *et al.*[48].

Snacking habits were common amongst the dentate children, and the preferred foods were candies or sugary snack type foods that were found to be significantly associated with caries development[49]. Roberts *et al*.[50] reported that access to money by children had a direct influence on sweet snacking. Children who consumed sweets had higher caries prevalence than children who did not consume sweets[43]. Diehnelt and Kiyak[51] found that the prevalence of dental caries was higher in high and middle-income nations, where there was greater availability of cariogenic foods, than in low-income nations.

The positive association of snacking and weaning may promote dental caries more than sugar eaten during meals, as reported by King[52] among children from poor families in the UK. The same was found by Domejean-Orliaguet *et al.*[53] frequent eating of snack, sugar, and cooked starch between meals will increase the risk of caries shown by odds ratio = 1.6.

On the other hand, Mariri *et al.*[54] reported no differences between at meal or between meals sugar consumption. Another study done on female teenagers found that the risk of caries was significantly increased when the girls skipped breakfast and had irregular meals. They were probably substituted by light meals and snacks with a high sugar content during the day which may enhance the caries activity[26].

Children who drink flavored milk and soda drinks were at high risk of caries (OR = 10.71 soda drinks, OR = 4.50 flavored milk) than other children. This finding coincide with other studies; the combined effects of regular soda pop and other sugary beverage consumption, starch consumption, and greater number of eating occasions would increase the risk for dental caries[54]. Marshall *et al.*[55] examined 642 children in Iowa USA and performed a 3 days diet analysis once every year in a 5-year longitudinal study. Subjects with caries had higher intake of soda pop drinks at 2, 3, 4 and 5-years. Higher intake of regular soda drinks was associated with significantly increased odds of caries experience. Sohn *et al.*[56] found a strong significant association of carbonated soft drinks with increased caries risk of primary dentition after examining 5985 children 2-10 ½ years in the USA. Al-Malik *et al.*[57] concluded that there was no clear relationship between erosion and social class, or between erosion and oral hygiene practices; the reverse was true for caries. Dietary factors relating to erosion and caries and/or rampant caries were found in this sample of children.

Feeding Habits and Behavior

Breast feeding is the most commonly accepted practice in Western countries[58]. On the other hand, mixed feeding or partial breast feeding (breast and bottle feeding) is the dominant mode of feeding in our community in Saudi Arabia[59,60], which was also found in our work in both groups (55%). However, there was no significant relation between caries and the type of feeding whether, breast, bottle or mixed

feeding. This was in accordance with a study done by Rosenblatt and Zarzar[20] among the Brazilian infants to investigate the relationships between ECC and breast, bottle, or mixed feeding, which showed that early childhood caries was not clearly related to the type of feeding. Furthermore, the study by Rodrigues and Sheiham[45] found no association between bottle feeding after the age of 36 months and caries increment. The unexpected finding on bottle feeding raises the possibility that at age of 3 other dietary habits are more important in determining dental caries development rather than bottle feeding. Most of the studies found that the duration of bottle use is not significantly related to caries risk, but that contents of the bottle, such as milk with sugar, or juice, increased the risk of caries. Moreover, risk of caries development may be sensitive to an interaction between tooth eruption patterns and bottle use, its contents, and other dietary practices[22,40,61]. In another study by Carino *et al*.[48] no statistically significant relation was noted between caries and bottle-feeding and weaning at more than age 2 years. Tinanoff *et al*.[62] stated that sleeping with baby bottle milk or other sugary drinks does not always cause caries since the basic reasons for tooth demineralization in very small children include both, frequent exposure to a cariogenic diet and early infection with cariogenic bacteria. However, in our work there was a significant difference between the two groups in relation to night and on demand bottle feeding. 86.7% of children reported taking the feeding bottle that contains infant formula milk during night, and these nocturnal feeding habits are well known to contribute to caries development in young children[63]. The same was found by Ollila and Larmas[41] that prolonged the use of a nursing bottle at night is a risk factor for caries development. A nursing bottle at night may be used as a form of comforter, thus creating a habit that is subsequently difficult to break. The prolonged use of a nursing bottle after the age of 2 years was also common in these children as reported by Chan *et al*.[49]. Therefore, a practical way to control bedtime feeding habit for those young children has to be envisioned.

Eighty percent of the children in our study showed increased risk of caries because they were fed the bottle every time they wanted (on demand), this study showed increased risk of caries in those children (OR = 1.22) than children who were fed by the clock. Also, there was an increased risk of caries in children with prolonged bottle feeding while the children who started using the cup at 12 months had the lowest caries

risk than children who started the cup after 24 months of age (OR = 10). This consigned with other studies, which showed that earlier commencement of cup drinking significantly decreased prevalence of S-ECC but did not affect ECC pattern[40]. Again, some studies have shown that prolonged at will breast-feeding have been associated with severe caries, but this phenomenon has been reported by only a few authors[64,65]. Another study has been carried out on caries and its association with infant feeding and oral health in São Paulo, which showed caries prevalence of 46% in children aged from 3 to 4 years[66].

In addition, there is a significant difference between the type of milk used and the prevalence of caries. There are many milk products in the market and Similac which is an infant formula milk product, showed the lowest caries risk (OR = 0.08) compared to the other types of milk. This may be related to milk components that may need further investigations.

Conclusions

Based on the sample of patient studied, the following was concluded:

1. Snacks and sugar consumption between meals, night feeding and at will feeding are significant risk factors.

2. Eating vegetables and fruits plus early use of cup may reduce caries risk.

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عادات النظام الغذائي والتغذية في عينة من أطفال ما قبل المدرسة ذوي تسوس أسنان حاد في الطفولة المبكرة (S-ECC)

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المستخلص. الهدف من الدراسة الحالية هو البحث في عادات النظام الغذائي والتغذية في عينة من أطفال ما قبل المدرسة ذوي تسوس حاد في الأسنان في فترة الطفولة المبكرة. تصميم الدراسة عبارة عن دراسة ضبط حالات من ستين طفلاً اختيروا، وكذلك لمجموعة أخرى من عدد ثلاثين طفل بدون تسوس كمجموعة ضبط.الأطفال في حالة صحية طبيعية، تم تشخيصهم على أن لديهم تسوس أسنان حاد في الطفولة المبكرة، ويتراوح العمر ما بين٣٦ــ٧١ أسبوع. تم عمل فحص إكلينيكي لقياس مؤشر التسوس و المفقود والمحشو. تم إجراء مقابلة و تعبئة استبيان لتقييم عادات النظام الغذائي وعادات التغذية والسلوك. كان هناك فرق ملحوظ

بدرجة عالية بين المجموعتين بخصوص عادات النظـــام الغـــذائي الذي اشتمـــل على تكرارية أكل السكر (p = ٠,٠٠٣) وتكراريـــة أكل وجبات سريعة مملحـــة (فيـــشفاش، رقـــائق) (p = ٠,٠٠٢، p = ٠,٠٠٦) وتكراريـــة شرب حليب مضـــاف عليـــه نكهـــات (p = ٠,٠٠٨) واستهلاك مشروبات غازية (p = ٠,٠٠١) و وجد فرق ملحوظ بين المجموعتين بخصوص سلوك تغذية الطفـــل مـــع تزايد خطورة التسوس في الأطفـــال الذين يذهبـــــون للنـــوم فـــي الفراش ومعهم الزجاجة، وفي الأطفال الذين تم تغذيتهم عند الرغبة (p = ٠,٠٠٠). بناءً على عينة المرضى التي تم دراســـتها كـــان الاستنتاج أن الوجبات الخفيفة واستهلاك الـــسكر بـــين الوجبـــات والتغذية الليلية والتغذية عند الرغبة عوامل مخاطرة ملحوظة.