ORIGINAL RESEARCH PAPER
Volume - 13 | Issue - 12 | December - 2024 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

PREVALENCE AND DIET HABIT AS DETERMINANT OF DENTAL CARIES AMONG CHILDREN ATTENDING THE DIFFERENT PRIMARY HEALTH CARE CENTERS OF AL AHSA REGION OF SAUDI ARABIA

Dentistry

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ABSTRACT

Background: Dental caries, a chronic infectious resulting from tooth-adherent cariogenic bacteria is a the oldest and the most common disorder reported so far. Studies suggest that more than half of the children in the age group of 6-8 have had a dental cavity in at least one of their primary teeth and similar number of adolescents in the age group of 12-19 have had cavity in at least one of their permanent teeth. Dietary habit is closely associated with the development of caries. Frequent snacking by parents, taking sweet drinks to bed , sharing food with adults and maternal caries status were predispose to early colonization of cariogenic bacteria and hence damage to the teeth/ Bad oral hygiene plays an important role in promoting the development of dental caries. It has been reported that children from low socio economic, care givers educational status and dental insurance coverage are some important factors which influence the oral hygiene habit of children. Dental caries among children is also a major public health problem in Saudi Arabia. The present study was conducted at the primary health care centers of Al ahsa region of Saudi Arabia to assess the prevalence of dental caries among the children and its determinants. **Materials And Methods:** The present study was a cross sectional survey conducted at the dental clinics of Al Ahsa region of Saudi Arabia. The study sample was calculated by Epi info software assuming that 60% of the children attending the primary health care centers may be having dental caries (WHO) To achieve this at the 95% of confidence interval with an acceptable error of 5%, at least 320 children attending the dental clinics for dental problem were needed .The sampling was be done by stratified sampling from the list of all the children attending the 100 dental clinics of Primary Health care centers of Al ahsa district The sample was selected proportionate to the children attending the different sectors of Primary health care. The data were collected on the google specially prepared for this study which contained three sections. The data were entered and analyzed by using SPSS Version 24. Frequency distribution of basic information and dental caries among children were expressed as numbers and percentages. Bivariate analysis was conducted by using a Chi-squared test to examine the association between variables and to assess the relationship between basic information of the children diet habit and dental caries. A P value of < 0.05 was considered as statistically significant. **Result:** A total of 320 children were examined in this study. The mean age of the children was 6 years with std. dev. ±1.82 . The majority of the participant (60%) was male. The majority of the participants were from urban area (55.6%). Parents of the three fourth of the children (75%) were having the history of dental caries. More than fifty-six percent (56.3%) of the children were suffering from dental caries. according to the DMFT calculation, As far as the severity of the caries is concerned almost nineteen percent (18.8%) of the children had low dental caries while 31.3% had moderate degree of dental caries and 6.3% of the children had severe grade of dental caries. Prevalence of dental caries was significantly more among the male children as compared to female children (64.0% vs.44.53%, P=0.0000. The children of the parents who had history of dental caries had significantly higher prevalence of dental caries (58.3% vs.50.0%, P=0.045). Frequency of meal per day did not have any significant association with the dental caries (P=0.239). The children who were taking others food in breakfast such as junk food had significantly higher prevalence of dental caries than those bread with egg , sandwich and bread with milk combination (66.66% vs.66.17%vs.58.10% and vs.47.10, P=0.043). The children who were taking fast food in their lunch had significantly higher rate of dental caries followed by those who were taking other food and non-vegetarian . food as their lunch (67.22%vs.663.54% vs.65%, P=0.045). Those children who were consuming snacks three times a day were significantly more suffering from dental caries than those who were consuming it one , twice or occasionally (61.66% vs.45.83% vs.53.12 vs.53.84%, P=0.032). Similarly, those children who were taking chocolate were significantly more affected by dental caries than those who were taking chocolate occasionally or never (61.07% vs.57.77% vs.50.0%, P= 0.023). Using of soft was not significantly associated with increase prevalence of dental caries (P=0.550). However, those children who did not have the habit of chewing gum had significantly higher prevalence of dental caries as compared to those who did not chew the gum (64.51% vs.48.4%, P=0.042). Teeth brush habit was not significantly associated with the prevalence of dental caries.

KEYWORDS

INTRODUCTION:

Dental caries, a chronic infectious resulting from tooth-adherent cariogenic bacteria is a the oldest and the most common disorder reported so far. It is a multifactorial infectious disease characterized by demineralization of the inorganic and destruction of the organic structure of the teeth .Dental caries has been reported the most common chronic disease of childhood in the United States (AAP, USA) Studies suggest that more than half of the children in the age

group of 6-8 have had a dental cavity in at least one of their primary teeth and similar number of adolescents in the age group of 12-19 have had cavity in at least one of their permanent teeth[1]. It has also been reported by American Academy of Pediatric Dentistry that older children in the age group of 5-19 years and from low income families are more prone to have cavities (25%) as compared to children from higher income group (11%) [1] **According to WHO estimate Untreated dental caries (tooth decay) in permanent teeth is the most common health condition according to the Global Burden of Disease 2019[2]**. Dental caries is considered a condition caused by simultaneous three factors which consists of quality of the dental hard structure and quantity of and quality of saliva ,fermentable carbohydrate in the diet and the microbial flora colonizing the tooth surface Exposure time of dental surface with the fermentable carbohydrate also play an important role in developing the caries. Dental caries occurs due to the disturbance of the biofilm microbiota (Resides in the oral cavity in homeostatic) by acidogenic ,aciduric and cariogenic population of the bacteria resulting from frequent consumption of sugar [4]. The imbalance of the micro organism with cariogenic potential behavior leads to a net mineral loss within the tooth's hard structures. A heterogenous group of streptococcus especially streptococcus mutans have been found associated with dental cariers in children. Colonization of this bacteria causes demineralization and dissolution of hard dental structure Drop in the pH at the bacterial plaque helps in this destructive process. Plaque metabolism is responsible for the drop of pH but only plaques with high content of streptococcus mutans and lactobacillus can cause a pH low enough for tooth demineralization to occur [5]. Clinically the dental caries is recognized at the initial stage as dull, white dematerialized enamel which quickly advances to obvious decay along the gingival margin. It has been seen that primary maxillary incisors are generally affected earlier than the four maxillary anterior teeth [6,7] . Dietary habit is closely associated with the development of caries. Apart from the high fermentable carbohydrate diet, Inappropriate feeding practice can prolong exposure of teeth to fermentable carbohydrates. One systematic study has reported that breast feeding for more than a year and at night might be associated with an increased prevalence of dental caries [8] . Paglia L et al in their study have reported that frequent snacking, taking sweet drinks to bed , sharing food with adults and maternal caries status were predispose to early colonization of cariogenic bacteria and hence damage to the teeth. Bad oral hygiene plays an important role in promoting the development of dental caries [9] . It has been reported that children from low socio economic, care givers educational status and dental insurance coverage are some important factors which influence the oral hygiene habit of children [10]. One study suggest the smoking habit among the parents is also indirectly associated with the dental caries among the children [10].The multiple functions of saliva play a significant role in the prevention of dental caries. Any condition which reduces the saliva secretion and its quality can be contributing factor in developing the dental caries. Role of chewing gum has been studied and the result showed that chewing gum cause stimulation of saliva secretion, clearance of food particles , neutralization of dental plaque acids and reduction of dental caries [11]. The knowledge of prevalence of dental caries and its determinant risk factors is vital to formulate a suitable awareness and teaching programme regarding its control. The present study was conducted in Al Ahsa district of Saudi Arabia to estimate the prevalence of dental caries among children and its risk factors. To the best of our knowledge no such study has been conducted in past in this region of Saudi Arabia.

MATERIALS AND METHODS:

The present study was a cross sectional survey conducted at the dental clinics of Al Ahsa region of Saudi Arabia. There are 100 dental clinics at the primary health care centers of Al Ahsa district. According to recent statistic each dental clinic recieve on avarage recieve 9 chidren every day for their dental problem .The expected number of children attending at all the 100 dental clinics was expected to be 8100 children who were study population..The study sample was calculated by Epi info software assuming that 60% of the children attending the primary health care centers may be having dental caries (WHO,.) It is assumed that a study population of 8100 children may be attending the 100 dental centers of Al Ahsa region during the three months of study. To achieve this at the 95% of confidence interval with an acceptable error of 5%, at least 320 children attending the dental clinics for dental problem were needed .The sampling was be done by stratified sampling from the list of all the children attending the 100 dental clinics of Primary Health care centers of Al ahsa district There are four sectors of primary health care system of Al Ahsa. These are North , East , West and central .The sample was selected proportionate to the children attending the different sectors of Primary health care.

The data were collected on the google specially prepared for this study which contained three sections. The first section of the data sheet included on demographics characteristics such as - age, gender, parents educational level ,their living area and history of dental caries among them.; the second part contain ed10 items regarding diet habbit of children while the third section recorded the dental caries status of the deciduous and permanent teeth of the children. The data were entered and analyzed by using SPSS Version 24. Frequency distribution of basic information and dental caries among children were expressed as numbers and percentages. Bivariate analysis was conducted by using a Chi-squared test to examine the association between variables and to assess the relationship between basic information of the children diet habit and dental caries. A P value of < 0.05 was considered as statistically significant. A pilot study on 10 children was done before starting the study to validate the reliability of the questionnaire. The pilot survey was administered giving more emphasis on internal consistency reliability and the construct validity. A reliability test (Cronbach's alpha) was utilized to measure the internal consistency of the items. The item analysis with Cronbach's alpha was carried out via SPSS for the same respondents in the pilot study to identify problematic items.

Dental caries were assessed by clinical oral assessment. Dental caries was measured by the sum of Decayed, Missing and Filled Teeth (DMFT). DMFT is a tool used for measuring the prevalence of dental caries. The "D" component represented Decayed tooth, "M" component meant the Missing tooth, "F" component was the Filled tooth and "T" represented the Tooth involved. A DMFT score above 0 indicated the presence of caries, whereas a null score indicated the absence of caries. The severity of dental caries were classified based on WHO using DMFT values, values between 0.0–1.1 very low; 1.2–2.6 low; 2.7–4.4 moderate; 4.5–6.5 high; values exceeding 6.6 will be very high[3].

RESULTS:

A total of 320 children were examined in this study making the response rate of hundred percent. The mean age of the children was 6 years with std. dev. ±1.82 (Range4-13 years). The majority of the participant (60%) was male. The father of 37,8% of the children were secondary school educated followed by 26.3% who were graduate and 17% were primary educated. Around fifteen percent of the father of the children were uneducated and only 2.8% were postgraduate. As far as the education of the mother is concerned ,30.3 % were graduate followed by 26,6% and 25.5% who were primary educated and secondary educated respectively. Around ten percent (9.7%) were postgraduate and only 7.8% were uneducated. The majority of the children were from urban area (55.6%). Parents of the three fourth of the children (75%) were having the history of dental caries. Majority of the children (62.5%) had three times a day frequency of meal followed by those (23.4$%) who had twice a day meal and 14.1% who had four times a day frequency of meal. Almost thirty-eight percent (37.8%) of the parents of the children answered that their children had bread and milk in their breakfast and 23.1% of the parents told that their children had bread and egg in the breakfast. Sandwich and others food were the choice of breakfast among 23.1% and 17.8% of the children respectively. As for the choice of food for lunch is concerned, majority of the children (56.3%) were having fast food in their lunch followed by those (30% who were non vegetarian and 7.5% who were mainly vegetarian. Only 6.3% of the children were having other food in their lunch. Snacks eating frequency was one, two, three and occasional times among 7.5%, 30.0%, 56.3%and 6.3% of the children respectively. Consumption of chocolate was frequent among 46.6% of the children while 28.1% and 25.3% of the children consumed chocolate occasionally and never respectively. Consumption of soft drink was frequent among the 38.1% of the children while 36.9% of the children consumed it occasionally and 25% of the children never consumed soft drink. As far as habit of teeth brushing is concerned more than thirty-eight percent (38.1%) of the children brushed their teeth once daily while 14.7% of the children brushed their teeth twice and 12.2% did it on alternate day. Thirty five percent of the children brushed their teeth irregularly. Habit of chewing gum was prevalent among 58.1% of the children. The details of the socio demographic characteristics of the study subjects is shown in table1.

Table1: Showing The Demographic Characteristics Of The Study

Subjects

Variables	No.	Percentage
Age 6 years with std dev 1.82(Range4-13 years)		
Sex		
Male	192	60
Female	128	40
Location		
Urban	178	55.6
Rural	142	44.4
Educational status of Father		
Uneducated	49	15.3
Primary educated	57	17.8
Secondary educated	121	37.8
Graduate	84	26.3
Post graduate	9	2.8
Educational status of mother		
Uneducated	25	7.8
Primary educated	85	26.6
Secondary educated	82	25.6
Graduate	57	30.3
Post graduate	31	9.7
History of dental caries among the parents		
Yes	240	75.0
No	80	25.0
Frequency of meal per day		
Twice	75	23.4
Thrice	200	62.5
Four times	45	14.1
Type of breakfast		
bread and milk	121	38.8
sandwitch	74	23.1
bread and egg	68	21.3
Others	57	17.8
Type of food for lunch		
Mainly vegetarian	24	7.5
Non vegetarian	96	30.0
Fast food	180	56.3
Others		6.3
Snack frequency per day		
Once	24	7.5
Twice	96	30
Thrice	180	56.3
Occasional	20	6.3
consumption of chocolate and sweet		
Frequently	149	46.6
Occasionally	90	28.1
Never	81	25.3
Consumption ofsoft drink		
Frequently	122	38.1
Occasional	118	36.9
Never	80	25.0
Habit of chewing gum		
Yes	186	58.1
No	134	41.9
Brush of the teeth		
Once daily	122	38.1
Twice a day	47	14.7
Once on alternate day	39	12.2
Irregular	112	35

Prevalence And Status Of Caries:

More than fifty-six percent (56.3%) of the children were suffering from dental caries. according to the DMFT calculation. However 37.50% of the children had complete sound teeth but 21.88% were suffering from carious crown and 15.62% had filled crown with caries. Four percent of the children had filled crown without caries and almost eleven percent (10.90) had missing teeth due to caries. The children with permanent missing teeth due to other reason, with fissure sealant and with fixed dental prosthesis constituted 6.25%,3.13% and 0.63% respectively. As far as the severity of the caries is concerned almost nineteen percent (18.8%) of the children had low dental caries while 31.3% had moderate degree of dental caries and 6.3% of the children had severe grade of dental caries. The details of the prevalence and severity of dental caries among the children is shown in table 2.

Table 2: Showing The Details Of The Prevalence And Severity Of Dental Caries Among The Children

Variables	No.	Percentage
Presence of dental caries		
Yes	180	56.3
No	140	43.7
Nean DMFT score 3.12 ±3.75		
Status of dental caries	120	37.50
Sound	70	21.88
Carious crown	50	15.62
Filled crown with caries	13	4.06
Filled crown without caries	35	10.93
Missing teeth due to caries	20	6.25
Permanent missing teeth due to other reason		
Fissure sealant	10	3.13
Fixed dental prosthesis	2	0.63
Severity of dental caries		
Sound teeth	140	43.75
Mild	60	18.8
Moderate	100	31.25
Severe	20	6.2

Association of the dental caries with the socio demographic characteristics

Prevalence of dental caries was significantly more among the male children as compared to female children (64.0% vs.44.53%, P=0.0000. Fathers' education of the children was not significantly associated with the dental caries of the children (P=0.29). Similarly, mothers' education was not significantly associated with the dental caries of their children (P=0.296). The children of the parents who had history of dental caries had significantly higher prevalence of dental caries (58.3% vs.50.0%, P=0.045). The prevalence of dental caries was more among the children of urban region than the rural region but it was not significantly associate (5786% vs.54.22%, P=0.295). The details of the association of the dental caries with the socio demographic characteristics is shown in table 3.

Table 3: Showing The Details Of The Association Of The Dental Caries With The Socio Demographic Characteristics

Variables	No dental caries No.(%)	Dental caries No.(%)	P value
Sex			0.000
Boys	69(36.0)	123(64.0)	
Girls	71(55.47)	57(44.53)	
Educational status of Father			0.29
Uneducated	22(44.90)	27(55.10)	
Primary educated	27(47.37)	30(52.63)	
Secondary educated	56(46.22)	65(53.72)	
Graduate	34(40.48)	50(59.52)	
Post graduate	1(11.12)	8(88.88)	
Educational status of mother			0.296
Uneducated	10(40.0)	15(60.0)	
Primary educated	39(45.89)	46(54.11)	
Secondary educated	43(52.44)	39(47.56)	
Graduate	37(38.15)	60(61.85)	
Post graduate	11(35.49)	20(64.51)	
History of dental caries among the parents			0.045
Yes	102(41.7)	140(58.3)	
No	40(50.0)	40(50.0)	
Location			0.295
Urban	75(42.14)	103(57.86)	
Rural	65(45.78)	77 (54.22)	

Association Of Dental Caries With The Diet

Frequency of meal per day did not have any significant association with the dental caries (P=0.239). The children who were taking others food in breakfast such as junk food had significantly higher prevalence of dental caries than those who were taking bread with egg , sandwich and bread with milk combination (66.66% vs.66.17%vs.58.10% and vs.47.10, P=0.043). The children who were taking fast food in their lunch had significantly higher rate of dental caries followed by those who were taking other food and non-vegetarian food as their lunch. (67.22%vs.663.54% vs.65%, P=0.045). However, those children who took vegetarian as lunch had significantly lower prevalence of dental caries (41.66%). Those children who were consuming snacks three

times a day were significantly more suffering from dental caries than those who were consuming it one, twice or occasionally (61.66% vs.45.83% vs.53.12 vs.53.84%, P=0.032). Similarly, those children who were taking chocolate were significantly more affected by dental caries than those who were taking chocolate occasionally or never (61.07% vs.57.77% vs.50.0%, P= 0.023). Using of soft drink whether frequently (59.83%) or occasionally (53.39) or never(55.0) were not significantly associated with increase prevalence of dental caries (P=0.550). However those children who did not have the habit of chewing gum had significantly higher prevalence of dental caries as compared to those who did not chew the gum (64.51% vs.48.4% , P=0.042). Teeth brush habit was not significantly associated with the prevalence of dental caries whether once daily (60.65) or twice daily (51.05) or once on alternate day(61.53) or irregularly (51.78%)(P=0.419).The details of association of dental caries with the diets us shown in table 4.

Table 4: Showing The Details Of Association Of Dental Caries With The Diets

Variables	No dental caries No.(%)	Dental caries present No.(%)	P value
Frequency of meal per day			0.121
Twice	29(38.67)	46(61.33)	
Thrice	91(45.5)	109(54.5)	
Four times	20(44.45)	25(55.55)	
Type of breakfast			0.043
bread and milk	64(52.9)	57(47.10)	
sandwich	31(41.90)	43(58.10)	
bread and egg	23(33.53)	45(66.17)	
Others	22(33.34)	35(66.66)	
Type of food for lunch			0.045
Mainly vegetarian	19(58.34)	10(41.66)	
Non vegetarian	35(36.46)	61(63.54)	
Fast food	59(32.78)	12(67.22)	
Others	7(35.0)	13(65.0)	
Snack frequency per day			0.032
Once	13(54.17)	11(45.83)	
Twice	45(46.87)	51(53.13)	
Thrice	69(38.34)	111(61.66)	
Occasional	13(46.16)	7(53.84)	
consumption of chocolate and sweet			0.023
Frequently	65(38.93)	91(61.07)	
Occasionally	38(42.23)	52(57.77)	
Never	37(50.0)	37(50.0)	
Consumption of soft drink			0.50
Frequently	49(40.17)	73(59.83)	
Occasional	55(46.61)	63(53.39)	
Never	36(45.0)	44(550)	
Habit of chewing gum			0.042
Yes	85(51.6)	80(48.4)	
No	55(35.49)	100(64.51)	
Brush of teeth			
Once daily	48	74(60.65)	
Twice aday	23	24(51.05)	
Once on alternate day	15	24(61.53)	
Irregular	54	58(51.78)	

DISCUSSION:

The present study was an attempt to determine the prevalence of dental caries and to assess the effect of diet habit on the dental caries of primary school going children. More than fifty percent of the children in the present study were suffering with different grades of dental caries. The prevalence of dental caries among the studied children was found to be A high prevalence rate of dental caries in both primary dentition (64.2%)and permanent dentition (26.6%) was also reported in one Indian study [12] . Other Indian study has found 78.9% prevalence of dental caries among the primary school going children [13]. An Egyptian study has also found that 74% of the children of primary school level were suffering from dental care [14]. The prevalence of dental caries among the children in the present study is lower than what was found in a similar population-based cross-sectional study in Riyadh, Saudi Arabia which was 83% [15]. A met analysis from 9 countries in the Eastern Mediterranean Region has found prevalence of dental caries among children aged 5–15 years to be 66% [16]. In the present study the prevalence of dental caries was more among male children than the female children. However in the Indian study ,girls were more affected by dental carries (78.4 vs. 78.1%%) [12] .The same result was reposted in the Egyptian study where the highest mean deft was for females (4.34 ±3.41)[17] .Female predominance for dental caries has also been reported by Maria Ferraro who suggest a different salivary composition and flow rate and hormonal fluctuations as the main reason for this [18]. Educational level of the parents was not associated with the increased prevalence of dental caries among their children. However, one systematic analysis has reported one study that showed a significant correlation between education level of parents with dental caries, where parents with both high education level would have lesser DMFT indices, and caries prevalence than children of the parents with lower education level [19]. Junk food in the breakfast and snacks in between have been found related to increase prevalence of dental caries among the children in the present study. However in one study no statistically significant difference was reported between caries occurrence and type of diet (P = 0.07), skipping meals (P = 0.86), frequency of eating in fast food stalls (0.86) and snacking in between meals (0.08) [20].But one Pakistani study has found junk food was responsible for dental caries among the 60% of the studied children. In this study the children who consumed junk food, were four times more, likely to have dental carries with an Odd ratio of 4.1[21].Significant associations were also found between daily consumption of sweets and processed snacks with severe caries among the school going children in one Nepali study [22] .Jessica F Large et al in a systematic review study reported the evidence which indicated that that the consumption of unhealthy food and beverages in children ≤10 years appears to increase the risk of dental caries[22] . However in the present study, beverage was not found to be significantly associated with higher prevalence of dental caries. Chewing gum has been found caries reducing effect in the present study . Evidence suggests that sugar-free chewing gum has a beneficial effect on the teeth and those children who chew the gum has reduced rate ofd dental caries [23].

Risk Estimate			
	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Sexof thechild (Male / Female)	.450	.285	.711
For cohort Cariesstatus = No dental caries	.648	.507	.827
For cohort Cariesstatus = Dental caries present	1.439	1.154	1.793
N of Valid Cases	320		

Risk Estimate			
	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for History of caries among the parents (Yes / 2.00)	.817	.492	1.358
For cohort Cariesstatus = No dental caries	.895	.681	1.176
For cohort Cariesstatus = Dental caries present	1.095	.866	1.386
N of Valid Cases	320		

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