



# The level of Vitamin C and Some Mineral Elements in the Blood Serum for Cases of Dental Caries And its Relationship to the Caries Rate Index (D.M.F.T.I)

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## Abstract :

This study was conducted to estimate serum level of Calcium, Potassium, Sodium, and Vitamin C in population suffering from dental caries, and a cross-sectional study was conducted on a sample of 143 people, males 43.356% and females 56.643%, with average age 27.72 y. Data was collected from a questionnaire and clinical examination and analyzed to determine the rate of dental caries (D.M.F.T.I), and blood samples were drawn. The result found that the prevalence of caries was high 86.014%, and the average( DMFTI) for each sample was 8.1, and there was an effect of age on dental caries, as the highest indicators of infection were found in the age group (38-48), and their average ( D.M.F.T.I) was 11.3684. Also there was a difference between females and males in the results of the ( D.M.F.T.I) , and its average in females was 7.81 higher than the average in males, which was 5.68. Moreover, the differences in the averages of the elements included in the study were studied (Calcium, Potassium, Sodium, and Vitamin C), the result shows that there was no difference between females and males in the averages of mineralents in the blood serum. On the other hand, serum level of vitamin was higher in females (16.16 in Females and 13.20 in males). Finally, the study concluded that , serum level of potassium, sodium had an impact on the results of ( D.M.F.T.I)

**Key words : Dental caries , Vitamin C , Mineral Elements , Blood Serum , D.M.F.T.I , Calcium , Potassium , Sodium .**

Citation. Abdul Rahman Alfagie. N, The level of Vitamin C and Some Mineral Elements in the Blood Serum for Cases of Dental Caries And its Relationship to the Caries Rate Index (D.M.F.T.I) 2022;16(1):<https://doi.org/10.54361/ljmr.15203>

**Received:** 28/02/22**accepted:** 15/03/22; **published:** 31/06/22

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## Introduction

Dental caries is one of the most common diseases of the age, and it affects a person at any stage of his life due to the availability and overlap of many factors, and it is the main cause

of oral pain and tooth loss, but it can be stopped in the early stages, and it is the lack of mineralization that affects the hard tissues of the tooth and occurs It is a bacterial disease that

affects the hard tissues of the tooth and causes damage to it due to the bacterial acids that are produced in the mouth from the fermentation of carbohydrates by bacteria such as (*Lactobacillus*, *Streptococcus Mutans*, *Actinomyces*) in the dental plaque that covers the surfaces of the teeth. If it remains on the surface of the tooth without removing it acids are secreted, including lactic acid, which lowers the PH level in the mouth and transforms the environment surrounding the tooth from a neutral medium PH = 7.5 to an acidic medium PH = 4.2, which dissolves the enamel and causes tooth decay and initially appears in the form of a black spot. Then it continues in size until it eats part of the tooth crown and continues to advance from the outside of the tooth to the inside, causing infections, and it may result in damage to the pulp and then creating an abscess under the tooth wall, and it appears at first as a black spot and then increases in size until it eats part of the crown of the tooth. It does not stop until after the complete eradication of the tooth if it is not treated early [1]. The ability of the teeth to resist decay is related to the lack of mineral elements, especially during the stage of tooth formation, which leads to the weakening of the bones and the outer layer of the teeth, which results in the roughness of the surface of the tooth, and this helps to stick the bacterial plaque on it, which if it is not still leads to tooth decay, and the nature of Food is directly related to the occurrence of such cases, as nutritional deficiencies cause changes in the oral cavity[ 2], Food habits, the nature of food composition, the way of feeding, taking care of oral

and dental hygiene, the health and social behavior of the individual and society, environmental and cultural factors, and education all play an important role in the occurrence of caries [3], and dental caries is considered one of the most widespread diseases. Approximately 4 teeth affected by caries and more than 10 teeth affected by caries at puberty, and it is prevalent until the age of 18 by 80%, and more than 90% in adults, and its prevalence increases especially in developing societies, while it decreases in developed countries as a result of increased health awareness in them [4], Vitamins, including vitamin C, and minerals, including calcium, sodium, potassium, and potassium, are important nutrients for oral and dental health that give the mouth immunity against diseases. They are important materials for building and forming teeth and increasing the resistance of their surfaces. It gives well-calcified teeth, increases the hardness of the basic material of which the tooth is made, and is important for the strength of the bones that protect and support the teeth [5],. It should be taken according to the daily needs, which are approximately per day for adults (Vitamin C60 mg, Calcium 1000 mg, Sodium 5 g, Potassium 4.7 g) [6], and many studies have been conducted on this subject, including a study in Romania by Costache (And Danaial, 2010) it was found that the main factors causing caries are neglect of oral hygiene, and malnutrition, and he explained that the good formation of the tooth helps to increase the ability of the tooth not to be penetrated by oral acids [7], as indicated by a study (Moynihan, 2005)

at Newcastle University, British The relationship between nutrition and oral diseases and showed that malnutrition increases the severity of oral diseases, and is considered a risk factor in its occurrence, especially dental caries and erosion (Dental Erosion), and the occurrence of developmental defects in the enamel, information on cases was collected in a questionnaire about dental health, and the study showed that the prevalence of caries in Libyan children It was high 57.8% of the sample [9], and Nguyen et al., 2010) conducted a study in southern Vietnam to assess oral health using (DMFT Index) in adults, and it was found that tooth loss was high at all ages, and increased gradually with age from 1 in Each jaw at the age of 20 years, to 8 at the age of 80 years, and females have a higher frequency in decayed and filled teeth, while the loss is higher in males [10], And the study of Van der Putten (and others, 2009) on the relationship of deficiency of some nutrients, namely calcium and vitamins (C, D, and B-complex) with diseases of the supportive tissues, showed that there is no relationship between the dietary intake of these elements and their level in the blood serum and diseases of the supportive tissues. Except for vitamin C, which they found that there is a relationship between its deficiency and an increased risk of developing diseases of the supporting tissues [11], While it was clearly observed in a study (Javed et al., 2006) in Pakistan about the possible rules for the prevention of **Materials and Methods :**

**Sample of The Study :** The sample was randomly selected and its size was 143 cases, which included

which increases its ease of exposure to acids and the occurrence of dental caries [8], as (Huew et al., 2011) presented a study on the prevalence and severity of caries among Libyan children in schools in Benghazi, and caries was assessed by (DMFT Index), and

dental caries, the presence of dental caries among people who have calcium deficiency when determining the level of calcium in the blood serum in cases of caries after conducting an analysis of the serum samples collected from the sample and they were 100 people aged 10-40, and( D.M.F.T.I) was used to measure the rate of caries, and the sample was divided into groups according to (D.M.F.T.I) rates, so the control group had the caries rate less than 3, then from 4 to 8 total, 9-16 total, 17-24 total , more than 24 sets [12], Accordingly, this study was conducted with the aim of knowing the level of vitamin C concentration and mineral elements (calcium, sodium, potassium) in the blood serum of patients who have dental caries, and determining the rate of caries using the( D.M.F.T Index). And knowing the effect of the level of these elements in the blood serum on the rate of caries, as the study was based on the hypothesis that there is a prevalence of dental caries in the study sample, as well as the hypothesis that there is an effect of (calcium, potassium, sodium, and vitamin C) on (D.M.F.T.I).

volunteers of both sexes (males and females) for the age groups between (18-50) years, and their average age

was 27.72 years with a standard deviation of 8.38 years, and 62 of them were males with a percentage of 43.356% and their average age was  
Data collection methods:

1-Questionnaire: The purpose of the questionnaire is to assess the level of oral health awareness among the sample members, as well as to obtain some information about the individual, in order to link it with the results of the study

2-Clinical examination of teeth and a medical examination for them (Visuals Tatal Examination):

A clinical examination was conducted to detect dental caries inside the central dental clinic in Misurata, and the tools and equipment that are normally used in the examination procedure were used in the dental clinic by a tangible visual examination method, where the case's teeth were examined and started with the upper jaw from the last tooth on the right side until the last tooth in The left side, then examines the teeth of the lower jaw in the same way, then the results of the medical examination are recorded in the clinical detection form for caries , In this study the DMFT Index was used to measure the caries rate (Dayed Teeth (D) Decayed Teeth, Filled Teeth (F) Filled Teeth, Missing Teeth (M), and (DMFTI) is calculated for each individual from the sample by

25.40 years And 81 cases are females, 56.643%, and their average age is 29.50 year

adding F + M + D and then The mean (DMFTI) for the study sample is calculated by dividing the total caries rate of individuals by the total number of individuals.

3-Blood samples were drawn inside the laboratory of the Central Dental Clinic and about 7 ml was taken from each of the detected cases.

4-Laboratory analysis of blood samples to measure the level of concentration of vitamin C, sodium, potassium and calcium, which was done in the laboratory of the Central Dental Clinic, the laboratory of Misurata Central Hospital and the laboratory of the National Center for Oncology in Misurata

Statistical analysis: One-way ANOVA and T-analysis for two independent samples were used.

#### Results:

The age groups were divided into 4 categories, the first category (18-28), the second category (28-38), the third category (38-48), and the fourth category (48-58) as shown in Figure (1), and they were studied with all the variables in All the sample, as well as in males and females, and the results were as follows:

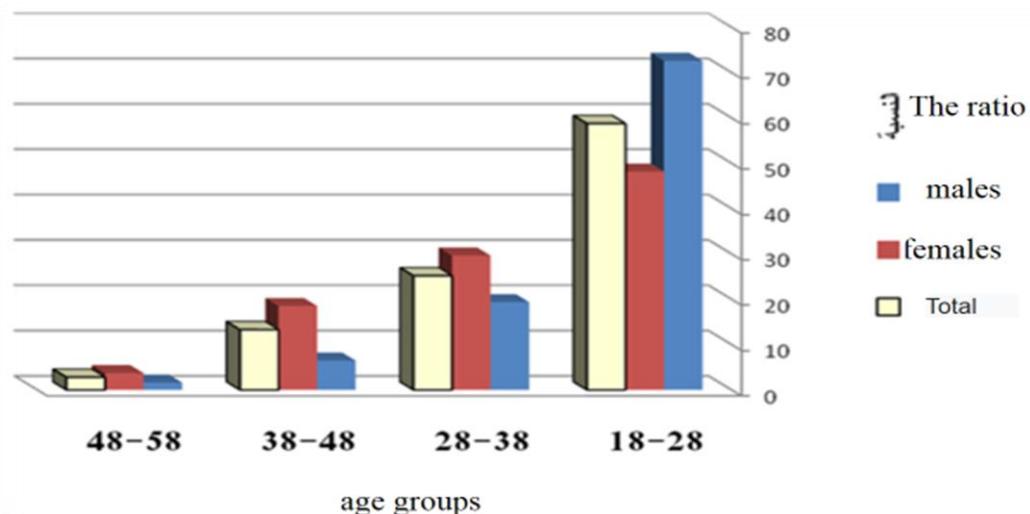


Figure (1) Distribution of males and females in different age groups

1- Clinical examination results (D.M.F.T.I) for different age groups: It was found that the average D.M.F.T.I for every 8.14.

Class I (18-28): 84 cases, mean D.M.F.T.I white was 5.05.

Class II (28-38): 36 cases The mean (D.M.F.T.I.) oval was 8.61, as in Table (1).

Table (1) shows the mean indicators of D.M.F.T.I in both sexes for the age group (first and second)

( 38-28) age group			( 28-18)age group		
D.M.F.T.I	The ratio	the number	D.M.F.T.I	The ratio	the number
Average			average		
8.6111	25.18	36	5.0595	58.74	84
					per sample
9.08333	8.4	12	4.4000	32.17	46
					males
8.3750	16.8	24	5.8205	27.27	39
					females

The third category (38-48): included 19 cases, and the average (D.M.F.T.I) was 11.3684 for each

Fourth category (48-58): It included 4 cases, and the average (D.M.F.I.) had 7.5, as in Table (2).

Table (2) shows the averages of D.M.F.T.I in both sexes for the third and fourth age groups

( 48-38) age group			( 58-48) age group		
D.M.F.T.I	The average	the ratio	D.M.F.T.I	The average	the ratio
		number			number
11.3684	13.29	19	7.5000	2.8	4
9.7500	2.8	4	10.000	0.07	1
11.8000	10.5	15	6.66667	2.098	3

And it was found that the highest values of the averages of the D.M.F.T.I indicators. I in the different age groups

were in the age group (38-48) as in Table(3).

Table (3) shows the difference in the averages of the D.M.F.T.I indicators in the different age groups

age group				The ratio	average D.M.F.T
58-48	48-38	38-28	28-18		
2.8	13.29	25.18	58.74		
7.5000	11.3684	8.6111	5.0595		

The sample was also divided into groups according to the results obtained from conducting a dental DMFTI examination, and the control group (Control) DMFTI results had zero and included 20 cases, 13.98% of the sample, while the second group

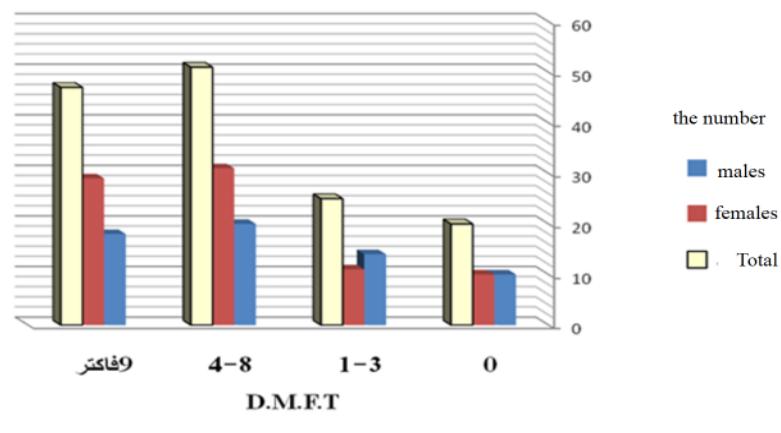
was DMFTI) they had 1-3 17.48%, while the third group had DMFTI with 4-8 and it was 35.66% of the sample, the fourth group had DMFTI results with 9 or more and it was 32.86%, as shown in Table (4) and Figure (2).

Table (4) Distribution of D.M.F.T.I results in the sample

		D.M.F.T.I			
		0	1-3	4-8	or more 9
per sample	the number	20	25	51	47
	The ratio	13.98	17.48	35.66	32.86
males	the number	10	14	20	18

	The ratio	16.12	22.22	31.75	<b>28.57</b>
females	the number	10	11	31	<b>29</b>
	The ratio	12.34	13.75	38.75	<b>36.25</b>

Figure (2) Results of groups (D.M.F.T.I) in both males and females



## 2- Results of laboratory analysis of blood in different age groups:

When comparing the averages of the analyzes for the age groups, it was found that:

The first category (18-28): the average calcium was 1.25, (males 1.27, females 1.21), while potassium was 4.49 (males 4.55, females 4.41), and sodium 140.36 (males 139.93, females 140.87), and as for vitamin C, it was It was 15.06 (males 14.25, females 15.98).

The second category (28-38): their average calcium was 1.23, in males 1.25, and in females 1.23, the average potassium was 4.49 for all cases, in males 4.55, and in females 4.45, and the average sodium 139.25, in males 138.33, and in females 139.70 And the average vitamin C is 13.96 for both

sexes, in males 9.38, and in females 16.2585.

The third category (38-48): their average calcium was 1.26, in males 1.13, and in females 1.29, and the average potassium was 4.55 for all cases, in males 4.50, and in females 4.56, and the average sodium for each was 137.42, in males 137.75, and in females 137.33 The average vitamin C is 14.74, in males 12.93, and in females 15.22.

Fourth category (48-58): the average calcium they have is 1.14, in males 1.02, and in females 1.18, and the average potassium is 40.4 for all cases, in males 4.30, and in females 4.43, and the average sodium was 139.5, in males 135 and in females 141, and

average Vitamin C 18.39, in males 10.77, and in females 20.93.

We find that the averages of vitamin C and mineral elements in age groups vary from one group to another. The age group (38-48) recorded the highest

values in the averages of infection indicators as in Table (5), but did not record the highest values in the averages of vitamin C and other elements. minerals, as shown in Table (4).

Table (4) shows the averages of vitamin C and mineral elements in different age groups

vitamin C	Sodium	potassium	Calcium	Category
average	average	average	average	
15.0605	140.369	4.4924	1.2507	<b>28-18</b>
13.9685	139.250	4.4917	1.2386	<b>38-28</b>
14.7364	137.421	4.5474	1.2571	<b>48-38</b>
18.3922	139.5	4.4000	1.1450	<b>58-48</b>

3- Studying the effect of elements (calcium, potassium, sodium, and vitamin C) on D.M.F.T.I):

Where one-way ANOVA was used to find the P-value, which must be less

than 0.05 in order for the result to have an effect, and it was found that there were elements that had an impact on the results of DMFTI (potassium, sodium, and also vitamin C), as well as It is shown in Table (5).

Table (5) P-value T (calcium, potassium, sodium, and vitamin C) in infection indicators

females		males		For all		Indications
The result	P-value	The result	P-value	The result	P-value	D.M.F.T.I
no effect	0.756	no effect	0.322	no effect	0.305	<b>Calcium</b>
There is an effect	0.033	no effect	0.128	There is an effect	0.07	<b>potassium</b>
no effect	0.323	There is an effect	0.03	no effect	0.105	<b>Sodium</b>
no effect	0.258	There is an effect	0.008	no effect	0.203	<b>vitamin C</b>

### Studying the differences between males and females:

The results showed that there are differences between females and males in the results of the DMFTI) where the p-value = 0.019, and the differences

were studied in terms of the averages of the elements included in the study and the results showed that there are no differences between females and males except in the average vitamin C, where p-value=0.013 as shown in Table (6).

Table (6) differences between males and females

average		The result	P-value	Indications
females	males			
7.81	5.68	There are differences	0.019	<b>D.M.F.T.I</b>
1.22	1.26	There are no differences	0.177	<b>Calcium</b>
4.45	4.54	There are no differences	0.464	<b>potassium</b>
139.84	139.45	There are no differences	0.734	<b>Sodium</b>
16.16	13.20	There are differences	0.013	<b>vitamin C</b>

### 5- Survey results:

The number of cases that visited the doctor regularly every 6 months was 4 cases, or 2.79%, and those who visited him every 3 months, 3 cases, or 2.09%, and the cases that visited the doctor when feeling pain was 136 cases, or 95.10%, and it was found that those who used Brush and toothpaste 3 times a day, they were 58 cases, or 40.55%, and those who used them once a day were 49 cases, or 34.26%,

Those who were irregular in brushing were 23 cases, or 16.08%, and the number was 13 cases, or 9.09%, who did not use the brush and toothpaste, and it was found that 128 cases, or 98.51%, eat foods rich in vitamins and elements, compared to 15 cases with a rate of 10.48%, and the number of cases that take vitamins As drug supplements, 9 cases accounted for 6.29%.

### Discussion:

Through what was dealt with in this study, results were reached stating that the prevalence of caries was 86,014%, which is a high percentage

indicating the existence of a health problem in the community that needs to take more preventive measures, which is higher than what was stated

in the study of Huew (and others, 2011) in Benghazi, Libya, about the prevalence and severity of caries, that the prevalence of caries, which was 57.8% of the sample, and through the results of the( DMFTI) that the study showed, we find that the average (DMFTI) for each sample is 8.1, and this average is lower than what was found in the study of Namal (and others, 2008) in Turkey, which was in it The average DMFTI for each sample is 11.4, and the results also showed that the average DMFTI increases with age, as its highest average was in the age group (38-48), which is 11.4, and this is consistent with the results of the study of Namal (and others, 2008), which showed an increase The risk of developing caries with age and this is also consistent with the study of Nguyen et al., 2010) in Viet Nam which found that tooth loss was high at all ages, and increased gradually with age from 1 in each jaw at the age of 20 years, to 8 at the age of 80 years, and the results showed that there are differences between females and males in the results of DMFTI)) and the average for females was higher than the average for men, This is consistent with the study of Nguyen et al., 2010) in Vietnam, which showed that females have a higher frequency of

decayed and filled teeth, as well as studying the differences between males and females in terms of the averages of the elements included in the study, which are (calcium, potassium, sodium, and vitamin C). And the results showed that there are no differences between females and males except in the average vitamin C, which was 7.81 in females, which is higher than the average in men, which was 5.68 as shown in Table (21) and Figure (14), and this is consistent with the study (Breidenassel et al., 2011). ) in Spain, in which blood samples were analyzed to evaluate the vitamin and it was higher in females than males. In this study, the effect of elements (calcium, potassium, sodium, magnesium, phosphorous, chlorine, and vitamin C) on DMFTI was addressed. Females, while we find in the study of Adegbeye (2010) in Denmark that there is an inverse and significant relationship between the amount of calcium and tooth loss in men, while vitamin C has no effect on the indicators of infection in DMFTI)) in all the sample and in females, but there is an effect In males, we find in a study (Nishida et al., 2000) in Japan that there is a relationship between its deficiency and the occurrence of these supporting tissue diseases.

## Conclusion:

- Studying the causes leading to the increase in the prevalence of dental caries, whether they are cultural, educational, educational, or physical, and developing health plans that can reduce this percentage in the future.
- Increasing awareness of the importance of regular check-ups and oral and dental hygiene to reduce the incidence and development of disease.
- Strengthening this research by conducting more comprehensive studies and surveys in our society that

include more samples to accurately assess the extent of the health

problem.

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