International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 02, 2020
ISSN: 1475-7192

AWARENESS OF CLINICAL APPLICATIONS OF VITAMIN K AMONG DENTAL STUDENTS

Article: Original Research
Running title: Awareness on clinical application of vitamin K

Nandakumar.E[1], Dhanraj Ganapathy[2], Kiran Kumar Pandurangan[3], Ashok Velayudhan[4]

ABSTRACT:

BACKGROUND:Vitamin K was first identified in 1936 to be a key factor in blood clotting. When chickens were fed a low-fat diet, they exhibited significantly lower coagulation capacity, resulting in severe bleeding. The lipid fraction of diet was analyzed, and a novel antihemorrhagic factor was discovered. This lipid soluble factor was given the first letter in the alphabet available which coincided with the first letter of the German word Koagulation and deemed to be only essential for its anti-haemorrhagic trait. Since then, non-coagulant functions have been discovered and have attracted research interest in several fields around the world. vitamin K occurs as two vitamins: vitamin K1 (also known as phylloquinone) and vitamin K2 (designated also as menaquinones (MKs).

AIM: To evaluate and compare the awareness of clinical application of vitamin K among dental students.

MATERIALS AND METHODS: A cross sectional survey was carried among 100 dental practitioners using a questionnaire. Questionnairecontained 10 questions on awareness of clinical applications of vitamin E among dental students. The data were extracted and analysed.

CONCLUSION: The purpose of the study is to create awareness of clinical applications of vitamin K among dental students.

KEYWORDS: Vitamins, Bleeding, toxicity, fruits, vegetables, haemorrhage, coagulation etc.

1. INTRODUCTION:

Vitamin K was first identified in 1936.Vitamin K is a fat-solublevitamin. It is very important for the function of protein C and protein S and coagulation factors such as (II, VII, IX, X)and osteocalcin (a bone-forming protein) and matrix-gla protein (MGP) (an ant calcification protein).[1–3] Vitamin K exists naturally as vitamin K1 (phylloquinone) and vitamin K2 (menaquinone).[4–5] Vitamin K1 is mainly found in green leafy vegetables as well as olive oil and soyabean oil, whereas vitamin K2 (menaquinone) is found in small amounts in chicken, butter, egg yolks, cheese and fermented soyabeans (better known as natto).[6–9]

Vitamin K1 and vitamin K2 are required for the γ-glutamyl carboxylation of all vitamin K dependent proteins.[2] Despite the fact that mammalian bacterial intestinal flora are able to produce vitamin K2, the amount produced is

[1]*Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai-600077, Email id-nandudpi2014@gmail.com*
[2]*Professor and H.O.D, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai-600077, Email Id: dhanraj@saveetha.com*
[3]*Senior Lecturer, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai-600077, Email id: kirankumar.sdc@saveetha.com*
[4]*Professor and Head, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai-600077*
Corresponding Author: Dr. Dhanraj Ganapathy
Professor and H.O.D, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, 162, P. H Road, Velappanchavadi, Chennai- 600077

Received: 10 Dec 2019 | Revised: 20 Jan 2020 | Accepted: 02 Feb 2020

thought to be negligible.[2]The adequate intake (AI) for vitamin K has been proposed to be 90 μg/day for women and 120 μg/day for men.[10] However, it has been speculated that the AI for vitamin K (90–120 μg/day) is not sufficient to induce complete carboxylation of all vitamin K dependent proteins.

Vitamin K is an essential fat-soluble micronutrient. Vitamin K dependent proteins have been identified in bone, kidney and other tissues. These proteins bind calcium and may be involved in bone crystalline formation. Vitamin K functions as a catalyst for synthesis of blood clotting factors primarily in maintaining prothrombin levels, which is the first stage in forming a clot. A low prothrombin level results in impaired blood coagulation.[5] Low dietary intake of vitamin K has been linked to reduced bone mass density in women, increasing the risk of hip fractures. New-born infants may develop haemorrhagic disease secondary to vitamin K deficiency because the gut is sterile during the first few days after birth. Newborn infants are usually given a single dose of vitamin K intramuscularly immediately after birth to prevent hemorrhage.

Various vitamins are required for maintaining health oral and periodontal tissues. Nutritional deficiency of vitamins results in Ariosto oral manifestations. Vitamin K is a group of vitamins required for the synthesis of proteins that are precursors or prerequisites of the formation of blood coagulation factors such as prothrombin and factors VII, IX, and X [11] In addition, research has indicated that vitamin K also plays a role in the formation of proteins required for bone metabolism such as osteocalcin and periostin [12-13]. A number of foods such as kale, spinach, collards, and mustard are a source of vitamin K1. However, vitamin K2 deficiency is rare owing to the fact that anaerobic bacteria present in the gut can convert vitamin K1 to K2. Nevertheless, intake of antibiotics may disrupt the balance of intestinal bacteria, leading to a deficiency of vitamin K [14]. Hence, if antibiotics are to be made part of periodontal therapy for a long period of time, coagulopathies might be observed. Vitamin K is an important pharmacological agent used to reverse the anticoagulant effects of warfarin and routinely administered for patients undergoing haemodialysis [15]. Hence, if periodontal therapy is to be administered to patients with kidney failure, vitamin K can be used to treat any bleeding incidents. The routine diet provides enough vitamin K for a healthy individual, hence the deficiency of vitaminK is very rare. Hence, the aim of this study was to assess the awareness Clinical application of vitamin K among dental students.

2. MATERIALS AND METHODS:

Participants and study design:

It is a questionnaire-based survey study was conducted at the Saveetha Dental College and hospital. The subjects of the study were dental students who are in their undergraduate years in theSaveetha Dental College and Hospital. The students were informed in advance about the objective of the study and identities were kept anonymous.

Data Collection Methods:

This study was conducted to assess the responses of 10 selected questions related to herbal mouthwash among 100 dental students through a survey planet. A Questionnaire was self-constructed about the knowledge and awareness toward herbal mouthwash. The questionnaire was developed to gain information on knowledge and awareness of vitamin K among dental students. After excluding the incomplete responses, the results were recorded and analyzed.

1.)Vitamin.K deficiency most commonly seen in ?

A.)Adults

B.)infants

C.)Don’t know

2.)What is the role of vitamin K in oral cavity?

A.)Anticoagulant

B.)prevents Bleeding

C.)Don't know

3.)Is vitamin K important during dental treatment.?

A.)Yes

B.)No

4.)Vitamin.K is primarily involved in?

A.)Antitoxic activity

B.)Blood clotting

C.)Don't know

5.)What are the types of vitamin K?

A.) Vitamin k1(Phylloquinone)

B.)Vitamin k2(Menaquinone)

C.)Both A&B

D.)Don't know

6.)Vitamin K available in?

A.) Fruits

B.)Green leafy vegetables

C.)Don't know

7.)Normal range of vitamin.K ?

A.)0.3-3.2ng/ml

B.)0.1-2.4ng/ml

C.)Don't know

8.)Drug supplements of vitamin K deficiency?

A.)Phytonadione

B.)Mephytone

C.)Don't know

9.)Did food intake play a major role in vitamin K deficiency?

A.) yes

B.)No

10)What are the symptoms of vitamin K deficiency?

A.)Bruising

B.)Blood clot under nails

C.)Don't know

3. RESULTS AND DISCUSSION:

Awareness of dental students related to clinical applications of vitamin.K was evaluated by assessing the first set of questions; most of students(65%) of them responded that vitamin K deficiency most commonly seen in adults,(31%) of them says that it is commonly seen in infants and other (4%) of them don't know the answer [Figure

1]As for the second question dental students responds for uses of vitamin k in oral cavity,(55%)responded as anticoagulant,where as(39%) responded as it helps in prevents bleeding,(6%)don't know the answer

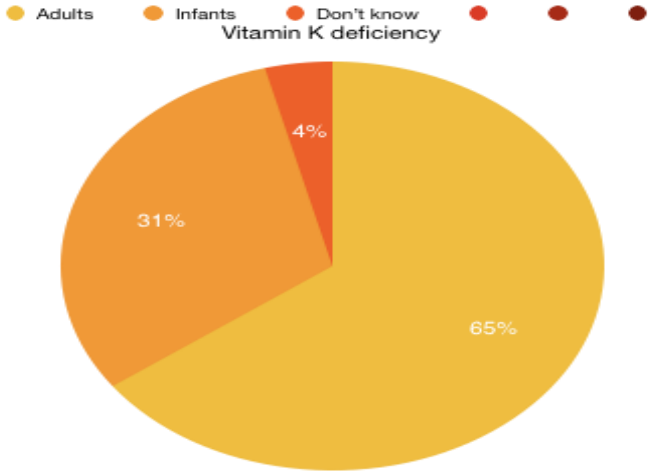


Figure 1: Pie chart represents the awareness of vitamin K deficiency towards dental students most of students (65%) of them responded that vitamin K deficiency most commonly seen in adults, (31%) of them says that it is commonly seen in infants and other (4%) of them don't know the answer.

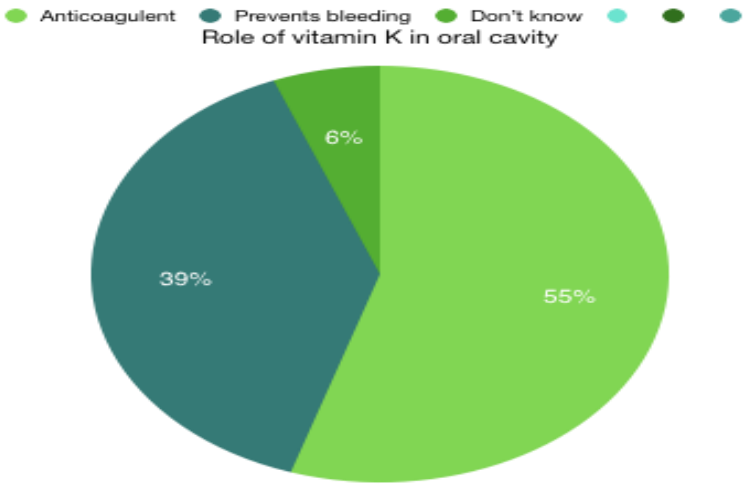


Figure 2: Pie chart represents the dental students responding for uses of vitamin k,(55%)responded as anticoagulant, whereas(39%)responded as it helps in prevents bleeding,(6%)don't know the answer.

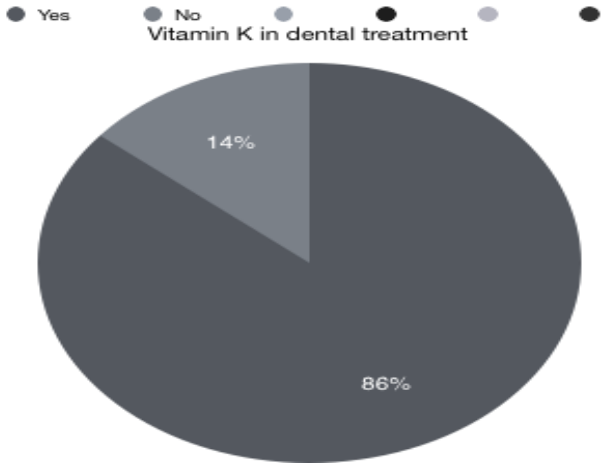


Figure 3: Pie chart represents the dental students responding for importance of vitamin K during dental treatment (86%)of them responded that vitamin K is important during dental treatment and (14%) of them responded that it is not important during dental treatment.

Received: 10 Dec 2019 | Revised: 20 Jan 2020 | Accepted: 02 Feb 2020

[Figure 2]. The third question gives the importance of vitamin K deficiency towards dental students (86%)of them responded that vitamin K is important during dental treatment and (14%) of them responded that it is not important during dental treatment [Figure 3].while the fourth question gives the primary involvement of vitamin K deficiency among dental students in oral cavity most of the students (61%)responded for anti toxic activity(28%) responded for blood clotting and others (11%)don't know the answer [Figure 4].According to fifth question dental students responds for types of vitamin K among (89%)of dental students aware that Phylloquinone is the only type of vitamin K deficiency and (5%) of them says that Menaquinone is the type of vitamin K deficiency and (5%) of them told that both Phylloquinone and Menaquinone are the sub types of vitamin K deficiency and less one percent says they they don't know about the types of vitamin K deficiency[Figure 5].

1.

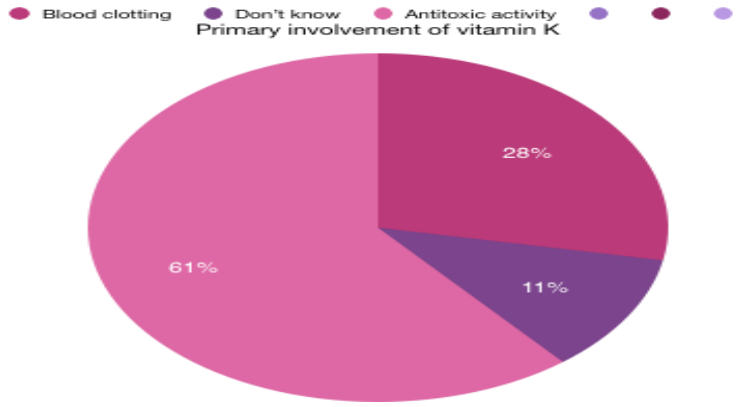


Figure 4: Pie chart represents the dental students responding for primary involvement of vitamin K in oral cavity, most of the students (61%) responded for anti-toxic activity(28%) responded for blood clotting and others (11%) don't know the answer.

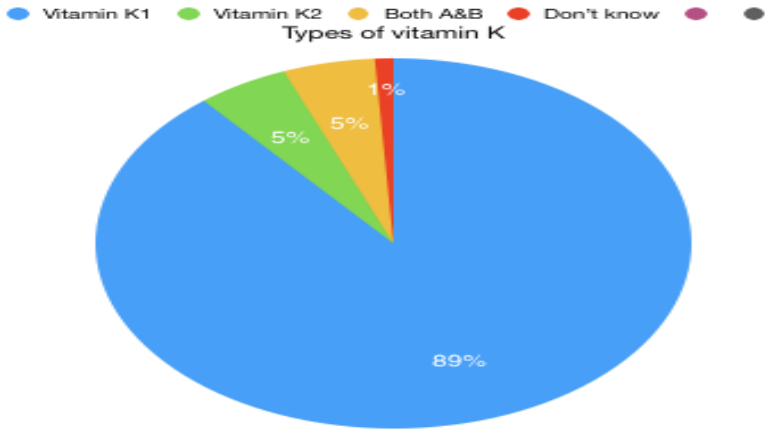
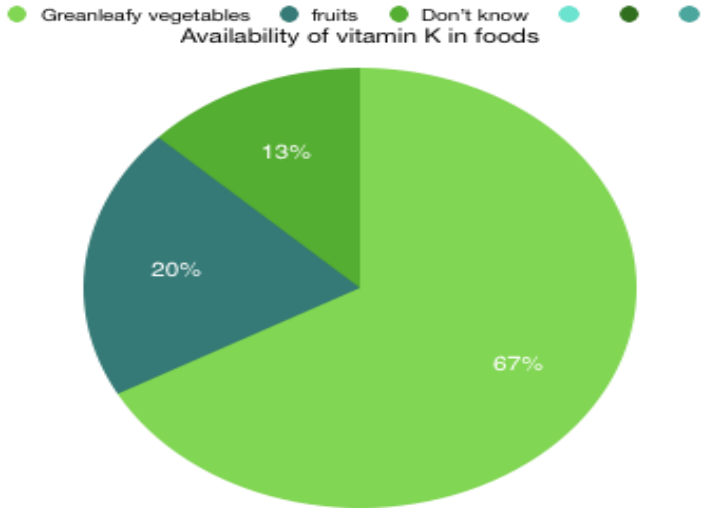


Figure 5: Pie chart represents the dental students responds for types of vitamin K among (89%)of dental students aware that Phylloquinone is the only type of vitamin K deficiency and (5%) of them says that Menaquinone is the type of vitamin K deficiency and (5%) of them told that both Phylloquinone and Menaquinone are the sub types of vitamin K deficiency and less one percent says they they don't know about the types of vitamin K deficiency.

As the sixth question gives the availability of vitamin K deficiency on oral cavity towards dental students most of the students(67%) of them responded that it was available in green leafy vegetables and (20%) of them responded that fruits and other (13%) of them don't know the answer [Figure 6].The seventh question gives the normal value of

vitamin K towards dental students among male and Female , 59% responded the normal range is (0.1-2.4ng/ml) where as ,23% responded as(0.3-3.2ng/ml),18% don't know the answer



1. Surg. 2008;66:2063-6.

Figure 6: Pie chart represents the dental students responds for availability of vitamin K on oral cavity,most of the students(67%) of them responded that it was available in green leafy vegetables and (20%) of them responded that fruits and other (13%) of them don't know the answer.

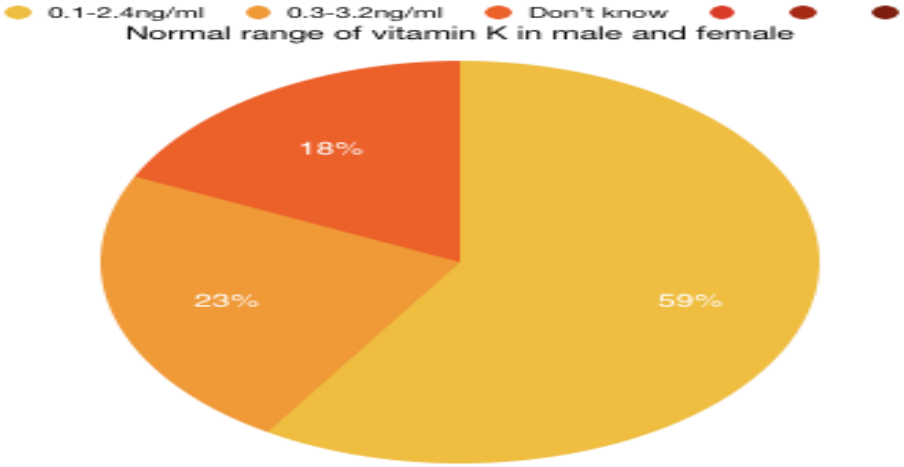


Figure 7: Pie chart represents the dental students responds for normal value of vitamin K in Male and Female , 59% responded the normal range is (0.1-2.4ng/ml) where as ,23% responded as(0.3-3.2ng/ml),18% don't know the answer.

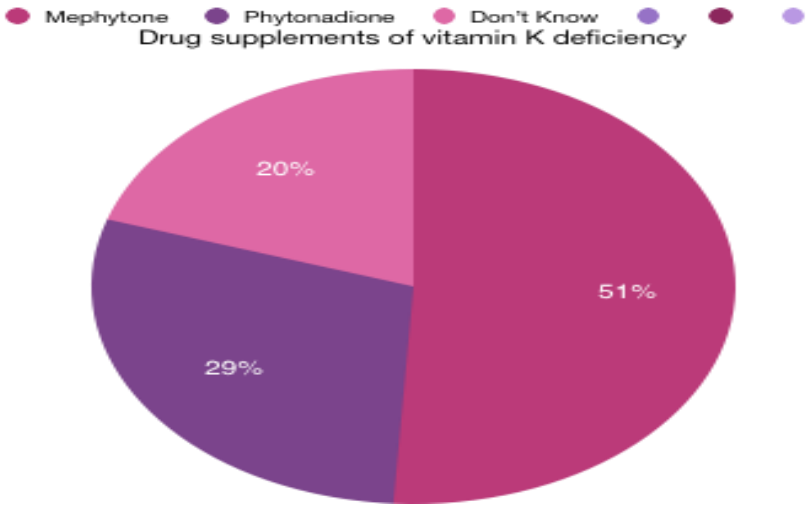


Figure 8: Pie chart represents the dental students responds for drug supplements of vitamin K deficiency in oral cavity and most of the students (51%) of students responded that mephyton is the most common drug supplements of vitamin K deficiency and (29%) of them says that Phytonadione and other(20%) of them don't know the answer.

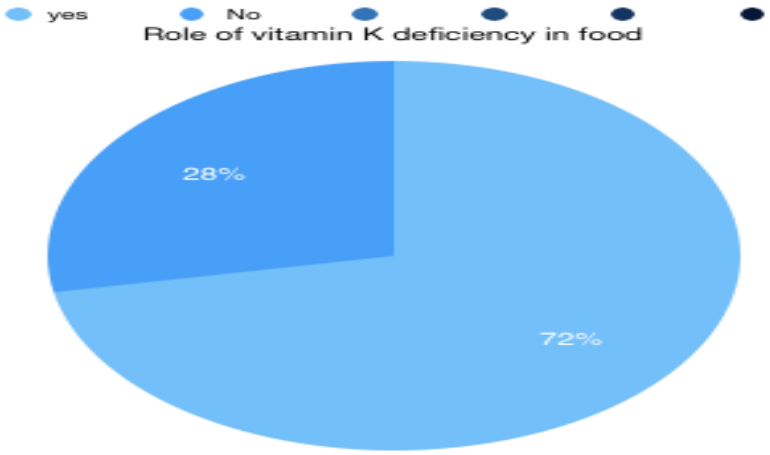


Figure 9: Pie chart represents the dental students responds for the role of vitamin K deficiency in food more than (72%) of them are aware that food intake plays the major role in vitamin K deficiency and (28%) of them says that food intake will not play the major role in vitamin K deficiency.

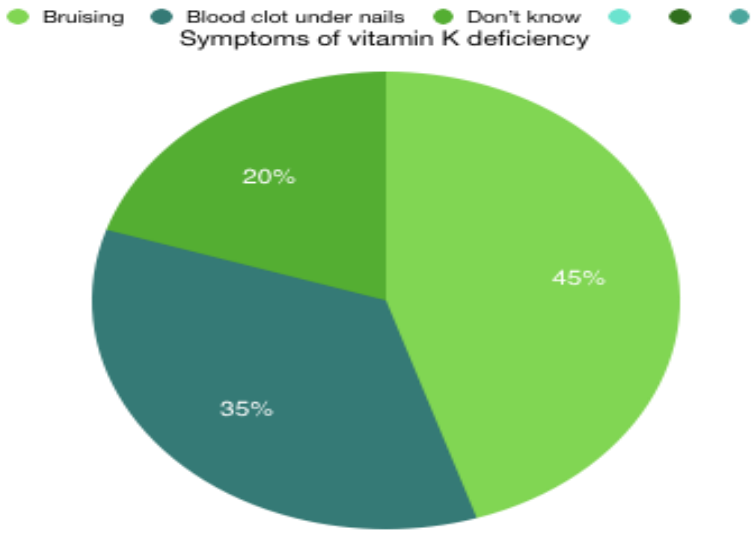


Figure 10: Pie chart represents the dental students responds for symptoms of vitamin K deficiency,and most of the students (45%) of them responded that bruising is one of the most common symptoms of vitamin K deficiency and (35%) of them responded that blood clots under nails and other (20%) of them don't know the answer.

[Figure 7].While the eighth question shows the advantages of vitamin K deficiency towards drug supplements in oral cavity and most of the students (51%) of students responded that mephyton is the most common drug supplements of vitamin K deficiency and (29%) of them says that Phytonadione and other(20%) of them don't know the answer [Figure 8].The ninth question represents the dental students responded that food intake will play major role in vitamin K deficiency and most of the students (72%) of them responded yes and other (28%) of them responds no the food intake does not plays the major role in vitamin K deficiency in oral cavity

[Figure 9].And the tenth question gives the knowledge of the dental students towards the symptoms of vitamin K deficiency most of the students (45%) of them responded that bruising is one of the most common symptoms of

vitamin K deficiency and (35%) of them responded that blood clots under nails and other (20%) of them don't know the answer[Figure 10].

Basically, the clinical applications of Vitamin K are broad and the amount of data seems to indicate substantial potential for supplementary vitamin K. Currently few guidelines recommend vitamin K therapy for prevention or treatment of osteoporosis. vitamin K1 on its own has already been shown to reduce fractures and cancer in a clinical trial. Dietary vitamin K1 intake, without vitamin K2, may not be sufficient to suppress arterial calcifications and/or reduce risk for subsequent cardiovascular events and death. The menaquinone form of vitamin K (ie, vitamin K2) has been presumed to be more effective than vitamin K1 at preventing and reversing arterial calcifications. Vitamin K is involved in pancreatic β-cell proliferation, insulin sensitivity, production of adiponectin and increased glucose tolerance, all of which may have contributed to these results. As a vitamin K inhibitor, warfarin may potentially negate these effects. In summary, vitamin K may improve insulin sensitivity in men with diabetes.[16]

Vitamins are a group of diverse organic and inorganic compounds which are indispensable for human health and well being. Most of them directly play a vital role in human metabolic pathways which are necessary to maintain health equilibrium. Their deficiencies affect not only general health but also oral health as directly or indirectly associated with the maintenance of oral health status. Hence, this review of literature focuses on the role of vitamins on various aspects of oral health and diseases.[17-19] In developing countries most of the people had been suffering with nutrient deficiency diseases as their low socioeconomic status and lack of education levels will not provide sufficient knowledge and importance on nutritional intake and balanced diet. Unavailability of resources had been making them compromise on daily requirements of diet. Even though some governments of the world are trying to balance this kind of situation through various schemes but lack of sufficient funds and equitable distribution of resources are affecting the success of health schemes.

Research has shown that this vitamin k can reduce acid formation when added to saliva-glucose mixtures in vitro. Previous studies have investigated the usefulness of vitamin K in preventing dental caries by inhibiting the enzymes that have a role in microbial degradation of carbohydrates.

This study was conducted with the objectives of assessing knowledge, and awareness of dental students towards use of Vitamin K. In this study we find that awareness regarding Vitamin K is adequate but not excellent among dental students. Prescription, dose, frequency type and duration of prescribed antibiotics were poor antibiotics In this study more than 83% of students replied correctly to question whether antibiotics are useful in bacterial infections whereas 6% replied for virus and 11% replied for both bacteria and virus [20].

4. CONCLUSION:

Vitamin K has a plethora of potential implications, including prevention and treatment of arterial calcifications, coronary heart disease and cancer, improvements in bone strength and reduced risks of fractures as well as improvements in insulin sensitivity. Additionally, vitamin K may even play a vital role in the stabilisation of INR control for patients on warfarin. On the basis of previously presented data, warfarin may increase arterial calcifications and osteoporosis through the inhibition of vitamin K. Larger trials should be performed to further elucidate the negative long-term health consequences of warfarin and if these can perhaps be prevented through the institution of supplemental vitamin K.In conclusion vitamin K plays a very important role in converting pro coagulant protein prothrombin and other plasma pro coagulants. It also serves as a substrate for an enzyme (Vitamin K dependent carboxylase). That converts glutamic acid by carbon dioxide, apart from its role in blood coagulation it is

also of paramount importance in various skeletal and tissue calcification processes. The students of Saveetha dental college has moderate awareness of vitamin K and its clinical application. Henceforth the students should attend CDE programs,workshops, and conducting surveys can improve their awareness of vitamin K and its clinical application.

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