Prescribing trends of vitamins in specialized healthcare facilities of Dhaka

A project submitted

by

Jaina Humayra Rafa

ID: 13146035

Session: Spring 2013

to

the Department of Pharmacy

In partial fulfillment of the requirements for the degree of

Bachelor of Pharmacy (Hons.)

Dhaka, Bangladesh

February, 2018

This work is dedicated to my parents, my sibling and my supervisor Fabliha Ahmed Chowdhury, Lecturer, Department of Pharmacy, BRAC University from whom I got the most support.

Certification statement

This is to certify that, the project titled 'Prescribing trends of vitamins in specialized healthcare facilities of Dhaka' is submitted for the completion of the precondition for the degree of Bachelor of Pharmacy from the Department of Pharmacy, BRAC University. This contains my personal work under the supervision of Fabliha Ahmed Chowdhury, Lecturer, Department of Pharmacy, BRAC University and proper acknowledgement goes to those from whom I got the ideas.

Signed,

_____

Counter signed by the supervisor

_____

Acknowledgement

First of all I would like to praise and thank ALLAH for His blessings and help in the achievement of this research and preparation of this paper.

I am really fortunate that I had the kind association and supervision of my supervisor Fabliha Ahmed Chowdhury, Lecturer, Department of Pharmacy, BRAC University. I would like to give my heartfelt thanks to her for her continuous support, guidance and patience from the very beginning of the project work. Throughout the project work she encouraged me with her skill of teaching which motivated me to be more passionate about the project. I am also very thankful to our honorable Chairperson, Dr. Eva Rahman Kabir, Chairperson, Department of Pharmacy, BRAC University, for her continuous inspiration and kind cooperation during the project. Last but not the least, I would like to thank the faculty members of Department of Pharmacy at BRAC University, my friends and my family for their moral support, motivation and patience, which all together enabled me to complete my project work successfully.

Abstract

Vitamins are necessary micronutrients that people need in small amounts for immunity, metabolism, normal growth and various important functions in our body. Now a days, vitamins are widely prescribed in our country for different health complications. In this project entitled 'Prescribing trends of vitamins in specialized healthcare facilities of Dhaka' six different classes of disorders which are: neurological, nephrological, oncological, diabetic, ophthalmic, chest were chosen. We conducted our survey in six different specialized healthcare facilities of the metropolitan city Dhaka and 100 samples were collected from each. After compilation and extensive analysis of the collected data I found that 60% of prescriptions for nephrological complications contained vitamins which is the highest among all six types of disorder chosen. Vitamin B has the highest prevalence in the prescriptions when it comes to the type of vitamins prescribed for each disease. When analyzed the prescribing tendency for vitamins was found the highest in the prescriptions for ophthalmological complications which was 29% in comparison to total number of drugs prescribed. The composition of supplements for vitamin A, C, E and B complex were found to have the higher dose more than RDA for daily consumption. It was also found that the majority of prescribed brands of vitamins are manufactured by Square Pharmaceuticals Limited.

Table of contents

Chapter One: Brief overview about Vitamin

Chapter Two: Vitamin A

Chapter Three: Vitamin B complex

Chapter Four: Vitamin C

Chapter Five: Vitamin D

Chapter Six: Vitamin E

Chapter Seven: Vitamin K

Chapter Eight: Rationale

Chapter Nine: Methodology

Chapter Ten: Result

Chapter Eleven: Discussion

List of tables

List of Figures

Abbreviation

UL= Upper Intake Level

RDA= Recommended Daily intake

RAE = Retinol activity equivalents

AI= Adequate Intake

IU= International Unit

Chapter 1: Brief overview about Vitamin

Vitamins are known as organic substances that exist in the foods found in nature. They are the nutrients that are the necessities of our body in order to continue the functions such as immunity and metabolism. Vitamins do not give us calories but do help us to stay healthy. If someone does not take adequate amount of vitamin, a number of medical conditions can occur (Nordqvist, 2017). Multiple recent studies proved that the frequency of cancer, diabetes, obesity and heart diseases in older people is directly connected to insufficient supplement of nutrition during childhood and adulthood. Vitamins can only be attained through receiving a balanced diet every day. Besides that the importance of receiving a balanced diet each day came from that our bodies do not have the power to synthesize or create vitamins (Rasool Hassan, 2012).

Some important facts about vitamins:

- 13 vitamins are known to us
- Vitamins can be categorized as either water-soluble or fat-soluble
- Vitamins are known as organic because they always contain Carbon
- Our body can store fat soluble vitamin easily than water soluble ones
- The best source of vitamin is food, but certain people may be advised by physicians to take supplements (Nordqvist, 2017).

1.1 Types of vitamins

Vitamins can be classified into two types:

1. Fat soluble vitamins
2. Water soluble vitamins

1. Fat soluble vitamins: There are some vitamins which liquefy in fat prior their absorption in the bloodstream to perform their work, which are classified as fat soluble vitamins. It is not necessary to take them with everyday diet. Vitamin A, D, E, K are known as fat-soluble vitamins. There is high risk of toxicity when fat soluble vitamins are consumed in high amounts because they are accumulated in the body for a long period of time. A well-balanced diet will not lead to toxicity in healthy people. However supplements containing a high amount of vitamin A, D.E, K can lead to toxicity. Our body only require a small amount vitamins. It is very rare for a reason to develop a

disorder because of insufficient amount of vitamins in diet. Mild deficiency can develop often. There are some health complications which may reduce the absorption of fat, and in turn, reduce the absorption of vitamins A,D,E and K (Bellows & Moore, 2012) .

2. Water soluble vitamins: The vitamins which can dissolve in water and are not accumulated by the body are known as water soluble vitamins. We need a continuous daily supply of water soluble vitamins in our diet because they are excreted in urine. Vitamin B complex and Vitamin C comprise the water soluble vitamin group. Animal foods or dietary supplements are the sources of water soluble vitamins. They must be taken in a daily basis. (Nordqvist, 2017).

1.2 Food or supplements

The best way to get proper nutrients for good health is the complete diet. We can get vitamin from smooth and varied diet with lots of fruits and vegetables. Sometimes, fortified foods and supplements can be appropriate sources of vitamins. In some cases, a health professional may suggest vitamin supplements for some people with certain conditions, such as, during pregnancy, or for those on a restricted diet. People taking supplements should take care not to go beyond the maximum dose, for the avoidance of health problems. There are some drugs which can interact with vitamin supplements, too, so talking with a healthcare professional is important before using supplements (Nordqvist, 2017).

1.3 Vitamin Stability

A group of organic substances in known as vitamin. They are very susceptible in destruction of chemical and physical agents. The stability of vitamins depend on several factors. The production of vitamins is monitored in their feed production. Now a days more advanced specialized forms of vitamins are available for better stability of the product. It is done by enhancing the value to feed manufacture. A number of physical and chemical factors affect the stability of vitamins such as when a vitamin is exposed in moisture in high humidity, it significantly increases the degradation rate. It can also be similar in case of high temperature and strong light (Frye, 1994).

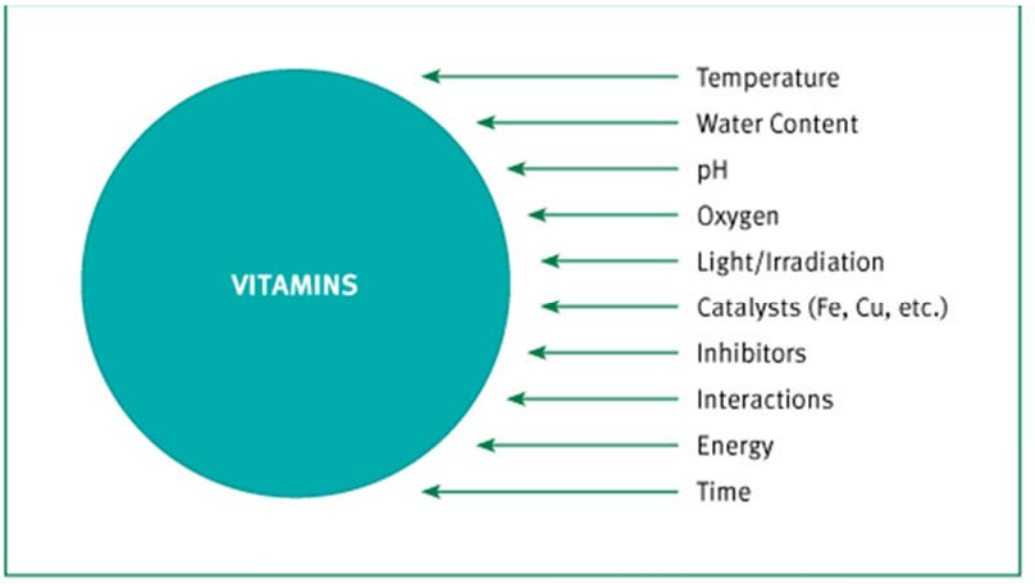


Figure 1.1: Factors affecting the stability of vitamins

Vitamin	Temperature	Oxygen	Humidity	Light	pH acid-alkaline	
A	XX	XX	X	XX	X	O
D_3	X	XX	X	X	X	O
E	X	O	X	X	X	X
K_3	X	X	XX	X	XX	O
Thiamin (B_1)	X	X	X	X	O	XX
Riboflavin (B_2)	O	O	X	X	O	O
Pyridoxine (B6)	XX	O	X	X	X	O
B_{12}	X	X	X	O	O	O
Calcium pantothenate	X	O	X	O	O	O
Nicotinic acid	O	O	O	O	O	O
Biotin	O	O	X	X	O	O
Folic acid	XX	O	X	XX	XX	O
C	O	XX	XX	O	O	X
C, as STAY-C"	O	O	O	O	O	O

O stable X slightly sensitive to sensitive XX very sensitive Sources: Gadient, 1986

Figure 1.2: Sensitivity of vitamin on external factors

Chapter 2: Vitamin A

Chemical names: Retinol, Beta-carotene and various other carotenoids.

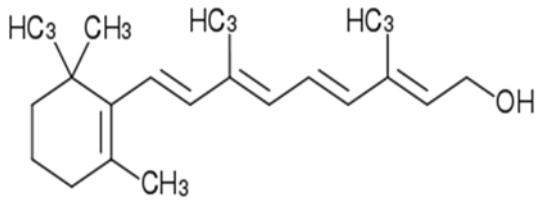


Figure 2.1: Structure of Vitamin A

2.1 Functions

Vitamin A, has several functions throughout the body. It plays important roles in bone growth, reproduction, cell division, gene expression, and regulation of the immune system. The moisture of skin, eyes, and mucous, development of tooth, membranes of the mouth, nose, throat and lungs depend on vitamin A. In the prevention of certain cancer vitamin A has a significant role. (Bellows & Moore, 2012) Protecting the surface of the eye (cornea), is essential for good vision. Vitamin A helps in protecting the surface layer of eyes (Heiting, 2017).

2.2 Sources

Eating a variation of food is the ideal way to make sure that the body gets proper Vitamin A. Foods of animal origin such as dairy products, fish and liver, supply retinal and retinoic acid which are the forms of vitamin A. Fruits which are orange and dark green in color are best source of beta carotene which our body converts to vitamin A (Bellows & Moore, 2012).

2.3 Recommended daily intake

The recommendation for vitamin A Intake is measured as micrograms (mcg) of retinol activity equivalents (RAE). Retinol activity equivalents account for the fact that the body converts only a portion of beta- carotene to retinol. One RAE equals 1 mcg of retinol or 12 mcg of beta carotene. The Recommended Dietary Allowance (RDA) for vitamin A is 900 mcg/ day for adult males and 700 mcg/day for adult females. Compared to vitamin A, it takes two times excess amount of

carotene rich foods to meet the body's vitamin A requirements, so one may need to rise the consumption of carotene containing plant foods.. (Bellows & Moore, 2012)

Table 2.1. Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamin A : (Bellows & Moore, 2012)

Life Stage Group	Vitamin A (mcg1/RAE)
Infants	
0 – 6 months	400*
6 months – 12 months	500*
Children	
1-3 years	300
4-8 years	400
Male	
9 – 13 years	600
14 – 18 years	900
19 – 30 years	900
31 – 50 years	900
51 – 70 years	900
>70years	900
Female	
9 – 13 years	600
14 – 18 years	700
19 – 30 years	700
31 – 50 years	700
51 – 70 years	700
>70years	700
Pregnant	
14 – 18 years	750
19 – 30 years	770
31 – 50 years	700
Lactation	
14 – 18 years	1200
19 – 30 years	1300
31 – 50 years	1300

*=AI value

AI value= Adequate intake value

2.4 Deficiency

There are many clinical manifestations of vitamin A deficiency, such as xerophthalmia ,growth disorder and sensitivity to severe infection (Sommer, 1995). Because of being stored in liver, the sign of scarcity of vitamin A may take up to 2 years to appear, and this may be indicated by night blindness and very rough and dry skin. (Bellows & Moore, 2012) .

2.5 Hypervitaminosis

Toxicity of vitamin A is a matter of concern than deficiencies. The Tolerable Upper Intake Level (UL) for adults is 3,000 mcg RAE. It would be tough to obtain this level by taking food alone, but a good number of multivitamin supplements contain a large amount of doses of vitamin A. Before taking a multivitamin, the label should be checked (Bellows & Moore, 2012). Women who have a chance of being pregnant should not take high doses of vitamin A supplements. (Tidy, 2015)

2.5.1 Acute hypervitaminosis:

The following happens after over dosage of the Vitamin A:

Symptoms:

- Abdominal pain
- Nausea or vomiting
- Lethargy
- Drowsiness
- Irritability
- Abdominal pain
- Increased pressure on the brain (Tidy, 2015)

2.5.2 Chronic hypervitaminosis:

This requires in excess of 50,000 units/day for more than three months. The following happen when Vitamin A is taken in excess of 50,000/ day for more than 3 months

Symptoms:

- Stomatitis
- Loss of appetite
- Nausea

- Vomiting
- Blurry vision or other vision changes
- Swelling of the bones
- Bone pain
- Dizziness
- Sensitivity to sunlight
- Dry, rough skin
- Itchy or peeling skin
- Cracked fingernails
- Skin cracks at the corners of your mouth
- Mouth ulcers
- Yellowed skin (jaundice) (Tidy, 2015)

Chapter 3: Vitamin B complex

There are eight water soluble vitamins named as follows

- Vitamin B1 (Thiamin)
- Vitamin B2 (Riboflavin)
- Vitamin B3 (Niacin)
- Vitamin B5 (Pantothenic acid)
- Vitamin B6 (Pyridoxine)
- Vitamin B7 (Biotin)
- Vitamin B9 (Folic acid)
- Vitamin B12 (Cobalamin)

These are altogether known as vitamin B complex Group. The influence of vitamin B is felt many parts in the body and they are distributed hugely in foods. For helping the body to attain energy from food they works as coenzyme. In several pain pathways vitamin B complex have separate effects, but they have shown to be more effective when coupled. The benefits of these vitamins in neuropathic pain treatment (Thus, 2008), nephrological disease, and oncological disease (Jankowska, Rutkowski, & Dębska-Ślizień, 2017).

3.1 Vitamin B1

Chemical name: Thiamine.

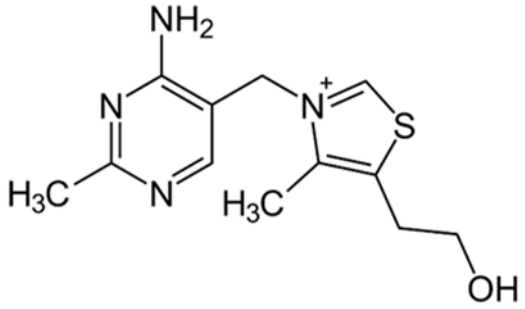


Figure 3.1: Structure of Vitamin B1

3.1.2 Functions

It assists to discharge energy from foods, promotes normal craving, and helps to maintain proper nervous system function. It is a cofactor for several enzymes which are involved in energy metabolism (Moore, 2012) .

3.1.3 Sources

Main sources consist of peas, pork, liver, and legumes. Usually we can also get Thiamine from whole grains and fortified grain products like cereal, and enriched products like bread, pasta, rice, and tortillas (Moore, 2012).

Table 3.1 Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamin B1 (Moore, 2012):

Life Stage Group	Thiamin B1 (mg/d)
Infants	
0 – 6 months	0.2*
6 months- 12 months	0.3*
Children	
1-3 years	0.5
4-8 years	0.6
Males	
9 – 13 years	0.9
14 – 18 years	1.2
19 – 30 years	1.2
31 – 50 years	1.2
51 – 70 years	1.2
>70years	1.2
Female	
9 – 13 years	0.9
14 – 18 years	1.0
19 – 30 years	1.1
31 – 50 years	1.1
51 – 70 years	1.1
>70 years	1.1
Pregnant	
14 – 18 years	1.4
19 – 30 years	1.4
31 – 50 years	1.4
Lactation	
14 – 18 years	1.4
19 – 30 years	1.4
31 – 50 years	1.4

*=AI Value, AI Value = Adequate intake value

3.1.5 Deficiency

Thiamin deficiency can occur due to low calorie diets and diets high in refined and processed carbohydrates. Alcoholics have a high risk of thiamin deficiency because excessive alcohol intake generally changes food or meals. Signs of thiamin deficiency include: mental confusion, muscle weakness, wasting, water retention (edema), impaired growth, and the disease known as beriberi. (Moore, 2012)

3.1.6 Hypervitaminosis

No problems discovered due to overconsumption of hypervitaminosis.

3.2 Vitamin B2:

Chemical Name: Riboflavin (Vitamin B2).

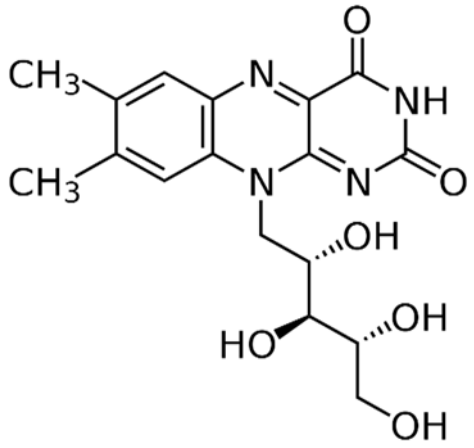


Figure 3.2: Structure of Vitamin B2

3.2.1 Functions

Vitamin B2 must be supplied by diet (Buehler, 2011). For releasing energy from foods vitamin B2 helps a lot, it also aids to achieve proper vision, and healthy skin. . Humans also require dietary riboflavin for DNA repairing, production of energy, fatty acid, amino acid synthesis and folic acid activation (Buehler, 2011).

3.2.2 Sources

Sources consists liver, eggs, dark green vegetables, legumes, whole and enriched grain products, and milk. Instead of clear container milk is packaged in opaque container for keeping safe from ultraviolet ray because ultraviolet ray can destroy riboflavin of milk (Moore, 2012).

.2.3 Recommended daily intake

The Recommended Dietary Allowance (RDA) for riboflavin is 1.3 mg/day for adult males and 1.1 mg/day for adult females. Alike thiamin, these values are closely tied to energy expenditure (Moore, 2012).

Table 3.2 Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamin B2 (Moore, 2012):

Life Stage Group	Riboflavin B2 (mg/d)
Infants	
0 – 6 months	0.3*
6 months- 12 months	0.4*
Children	
1-3 years	0.5
4-8 years	0.6
Males	
9 – 13 years	0.9
14 – 18 years	1.3
19 – 30 years	1.3
31 – 50 years	1.3
51 – 70 years	1.3
>70 years	1.3
Female	
9 – 13 years	0.9
14 – 18 years	1.0
19 – 30 years	1.1
31 – 50 years	1.1
51 – 70 years	1.1
>70 years	1.1
Pregnant	
14 – 18 years	1.4
19 – 30 years	1.4

31 – 50 years	1.4
Lactation 14 – 18 years 19 – 30 years 31 – 50 years	 1.6 1.6 1.6

*=Al value

AI Value = Adequate intake value

3.2.4 Deficiency

Riboflavin deficiency, known as ariboflavinosis, causes cheilosis .Shortage of Riboflavin has also been combined with night blindness, photosensitivity, cataracts, migraines, mild anemia, and fatigue/depression. Treatment of deficiency can be food sources or special supplementation. For the activation of pyridoxine riboflavin is essential (Buehler, 2011).

3.2.5 Hypervitaminosis

No harmful effect with overconsumption are known for riboflavin (Moore, 2012).

3.3 Vitamin B3:

Chemical name: Niacin.

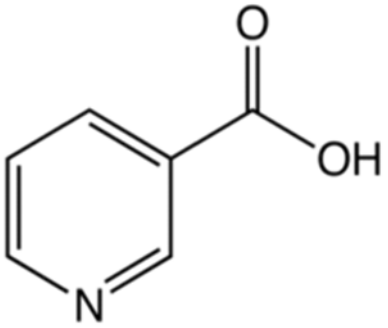


Figure 3.3: Structure of vitamin B3

3.3.3 Recommended daily intake

Dietary Allowance (RDA) for niacin is 16 mg/day for adult males and 14 mg/day for adult females. These values are closely tied to energy expenditure**.**

Table 3.3 Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamin B3 (Moore, 2012) :

Life Stage Group	Niacin B3 (mg/d)
Infants	
0 – 6 months	2*
6 months- 12 months	4*
Children	
1-3 years	6
4-8 years	8
Males	
9 – 13 years	12
14 – 18 years	16
19 – 30 years	16
31 – 50 years	16
51 - 70years	16
>70 years	16
Female	
9 – 13 years	12
14 – 18 years	16
19 – 30 years	16
31 – 50 years	16
51 – 70 years	16
>70 years	16
Pregnant	
14 – 18 years	18
19 – 30 years	18
31 – 50 years	18
Lactation	
14 – 18 years	17
19 – 30 years	17
31 – 50 years	17

*=AI value, AI Value =Adequate intake Value

3.3.1 Functions For the conversion of food into energy it has an important role. It helps the body for the proper utilization of proteins and fats, and it keeps the skin, hair, and nervous system healthy .It works a vasodilator. It stops pellagra (Nordqvist, 2016).

3.3.4 Deficiency

There are many causes of niacin deficiency, some causes are enlisted here: Alcoholism, protein malnourishment, low calorie diets. As a result of result of severe niacin deficiency a disease state occur named pellagra. Signs consists of cramps, nausea, mental confusion, and skin problems (Moore, 2012).

3.3.5 Hypervitaminosis

Flushed skin, rashes, liver damaging can be occurred because of extra doses of niacin supplement. If the sources of niacin is food ,extra doses is not a problem (Moore, 2012).

3.4 Vitamin B5

Chemical name: Pantothenic Acid

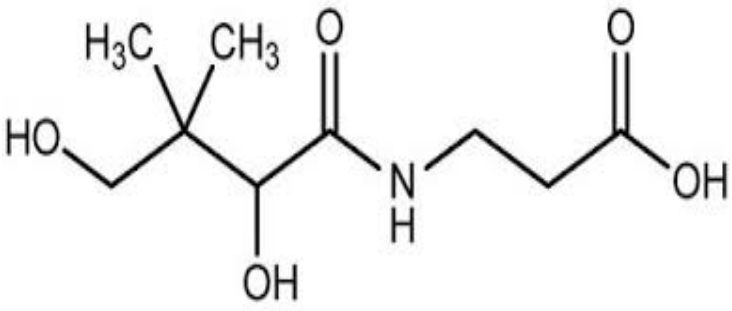


Figure 3.4: Structure of Vitamin B5

3.4.1 Functions

It is related to energy production. It helps to form hormones and the metabolize of fats, proteins, and carbohydrates from food pantothenic acid plays an important role (Moore, 2012) .

3.4.2 Sources

There are many sources of vitamin B5 including liver, kidney, meats, egg yolk, whole grains, and legumes. Intestinal bacteria can also form pantothenic Acid (Moore, 2012).

3.4.3 Recommendation of daily intake

The Adequate Intake (AI) for Pantothenic Acid is 5 mg/day for both adult males and females (Moore, 2012).

Table 3.4 Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamins B5 (Moore, 2012):

Life Stage Group	Pantothenic Acid (mg/d)
Infants	
0 – 6 months	1.7*
6 months- 12 months	1.8*
Children	
1-3 years	2*
4-8 years	3*
Males	
9 – 13 years	4*
14 – 18 years	5*
19 – 30 years	5*
31 – 50 years	5*
51 – 70 years	5*
>70 years	5*
Female	
9 – 13 years	4*
14 – 18 years	5*
19 – 30 years	5*
31 – 50 years	5*
51 – 70 years	5*
>70 years	5*
Pregnant	
14 – 18 years	6*
19 – 30 years	6*
31 – 50 years	6*
Lactation	
14 – 18 years	7*
19 – 30 years	7*
31 – 50 years	7*

*=AI value, AI value = Adequate intake value

3.4.4 Deficiency

Due to the unavailability of pantothenic acid in most of the food ,its deficiency is not so common (Moore, 2012).

3.4.5 Hypervitaminosis

No problem are associated with the overconsumption of pantothenic acid. Diarrhea and water retention can take place with additional amounts (Moore, 2012).

3.5 Vitamin B6:

Chemical name: Pyridoxine

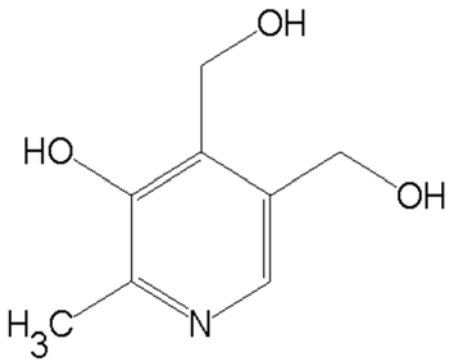


Figure 3.5: Structure of vitamin B6

3.5.1 Functions

It poses an widespread range of purposes in the human body and has been linked with cancer, cardiovascular events, seizures, , immune deficiency etc (Kjeldby, Fosnes, Ligaarden, & Farup, 2013) .

3.5.2 Sources

Sources comprise pork, meats, whole grains and cereals, legumes, and green, leafy vegetables (Moore, 2012).

3.5.3 Recommendation of daily intake

The Recommended Dietary Allowance (RDA) for vitamin B6 is 1.3 mg/day for adult males and females through age fifty.

Table 3.5: Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamin B6 (Moore, 2012) :

Life Stage Group	Vitamin B6
Infants	
0 – 6 months	0.1*
6 months- 12 months	0.3*
Children	0.5
1-3 years	0.6
4-8 years	
Males	1.0
9 - 13y	1.3
14 - 18y	1.3
19 - 30y	1.3
31 - 50y	1.7
51 - 70y	1.7
>70y	
Female	1.0
9 - 13y	1.2
14 - 18y	1.3
19 - 30y	1.3
31 - 50y	1.5
51 - 70y	1.5
>70y	
Pregnant	1.9
14 - 18y	1.9
19 - 30y	1.9
31 - 50y	
Lactation	2.0
14 - 18y	2.0
19 - 30y	2.0
31 - 50y	

*=Al value,

AI Value = Adequate intake value

3.5.4 Deficiency

Deficiency signs subsume skin disorders, dermatitis, cracks at corners of mouth, anemia, kidney stones, and nausea. (Moore, 2012) .

3.5.5 Hypervitaminosis

Symptoms:

- Paresthesia in the hands and feet.
- Difficulty walking (poor co-ordination, 'staggering').
- Reduced sensation to touch, temperature, and to vibration.
- Tiredness (Tidy, 2015).

3.6 Vitamin B7:

Chemical name: Biotin

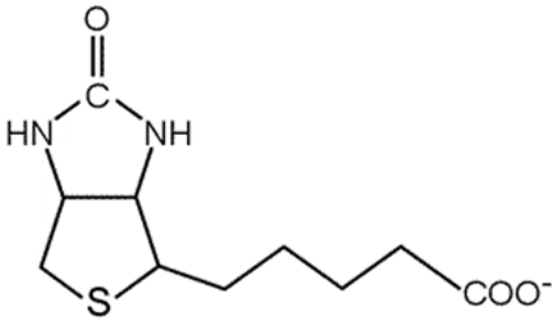


Figure 3.6: Structure of Vitamin B7

3.6.1: Function

Biotin helps in the release of energy from carbohydrates and assists in the metabolism of fats, proteins carbohydrates from foods (Moore, 2012).

3.6.2: Source

Liver, kidney, egg yolk, milk, most fresh vegetables, yeast breads and cereals are some common sources of Biotin (Moore, 2012).

3.6.3 Recommendation of daily intake

The Adequate Intake (AI) for Biotin is 30 mcg/day for adult males and females .

Table 3.6 Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamin B7 (Moore, 2012):

Life Stage Group	Biotin (mcg/d)
Infants	
0 – 6 months	5*
6 months- 12 months	6*
Children	
1-3 years	8*
4-8 years	12
Males	
9 - 13y	20*
14 - 18y	25*
19 - 30y	30*
31 - 50y	30*
51 - 70y	30*
>70y	30
Female	
9 - 13y	20*
14 - 18y	25*
19 - 30y	30*
31 - 50y	30*
51 - 70y	30*
>70y	30
Pregnant	
14 - 18y	30*
19 - 30y	30*
31 - 50y	30*
Lactation	
14 - 18y	35*
19 - 30y	35*
31 - 50y	35*

*=Al value

AI Value = Adequate intake value

3.6.4 Deficiency

The deficiency of Biotin is not common under normal surroundings, but symbols including fatigue, loss of appetite, nausea, vomiting, depression, muscle pains, heart abnormalities and anemia (Moore, 2012).

3.6.5 Hypervitaminosis

No problems are found regarding with overconsumption of Biotin (Moore, 2012).

3.7 Vitamin B9:

Chemical name: Folate

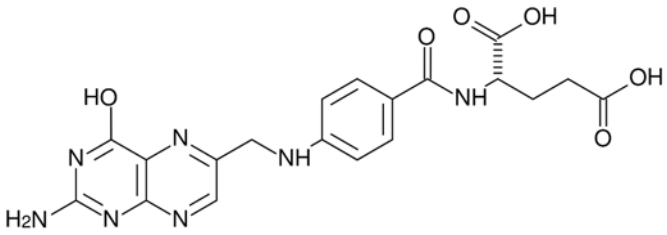


Figure 3.6: Structure of Vitamin B9

3.7.1 Function

It helps in the metabolism of protein, and in the promotion of red blood cell formation (Moore, 2012).

3.7.2 Sources

Liver, kidney, dark green leafy vegetables, meats, fish, whole grains, fortified grains and cereals, legumes, and citrus fruits are some of the sources of folate (Moore, 2012).

3.7.3 The recommendation of daily intake

The Recommended Dietary Allowance (RDA) for folate is 400 mcg/day for adult males and females.

Table 3.7 Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamin B9 (Moore, 2012) :

Life Stage Group	Folate (mcg/d)
Infants	
0 – 6 months	65*
6 months- 12 months	80*
Children	
1-3 years	150
4-8 years	200
Males	
9 - 13y	300
14 - 18y	400
19 - 30y	400
31 - 50y	400
51 - 70y	400
>70y	400
Female	
9 - 13y	300
14 - 18y	400
19 - 30y	400
31 - 50y	400
51 - 70y	400
>70y	400
Pregnant	
14 - 18y	600
19 - 30y	600
31 - 50y	600
Lactation	
14 - 18y	500
19 - 30y	500
31 - 50y	500

*=AI value,

AI Value= Adequate intake value

3.7.4 Deficiency

Folate shortage disturbs cell growth and protein manufacture, which can lead to reduced growth. Deficiency signs also include anemia and diarrhea. A folate deficiency pregnant women or of child bearing age may result in the delivery of a baby with neural tube defects such as spine bifida (Moore, 2012).

3.7.5 Hypervitaminosis

Over retention of folate offers no known benefits, and may mask B12 deficiency as well as interfere with some medications (Moore, 2012)**.**

3.8 Vitamin B12:

Chemical name: It is also known as cobalamin

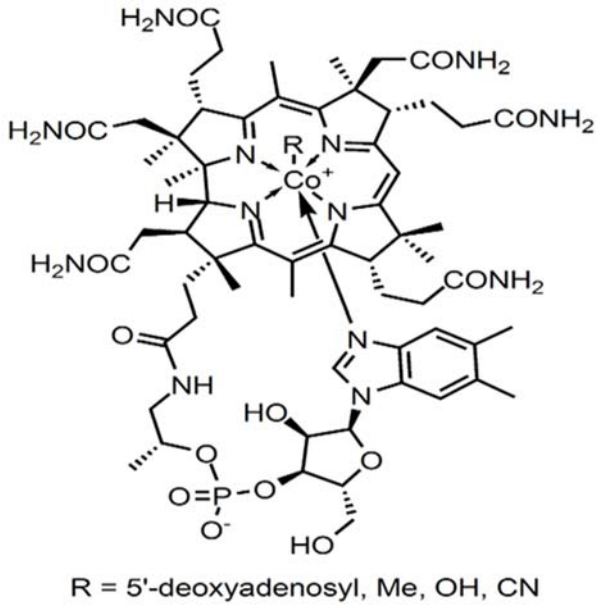


Figure 3.8: Structure of Vitamin B12

3.8.1 Functions

Helps in the constructing of genetic material, manufacture of normal red blood cells, and protection of the nervous system (Moore, 2012).

3.8.2 Recommendation of daily intake

The Recommended Dietary Allowance (RDA) for vitamin B12 is 2.4 mcg/day for adult males and females. For the people over the age of fifty, the dietary guidelines advise consuming vitamin B12 in its crystalline form (fortified foods or multivitamin) (Moore, 2012).

Table 3.8 Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamin B12 (Moore, 2012) :

Life Stage Group	Vitamin B12(mg/d)
Infants	
0 – 6 months	0.4*
6 months- 12 months	0.5*
Children	
1-3 years	0.9
4-8 years	1.2
Males	
9 - 13y	1.8
14 - 18y	2.4
19 - 30y	2.4
31 - 50y	2.4
51 - 70y	2.4
>70y	2.4
Female	1.8
9 - 13y	2.4
14 - 18y	2.4
19 - 30y	2.4
31 - 50y	2.4
51 - 70y	2.4
>70y	
Pregnant	2.6
14 - 18y	2.6
19 - 30y	2.6
31 - 50y	

Lactation	2.8
14 - 18y	2.8
19 - 30y	2.8
31 - 50y	

*=AI value

AI value= Adequate intake value

3.8.3 Deficiency

Vitamin B12 deficiency usually affects strict vegetarians, infants of vegan mothers, and the older age people. Symptoms of deficiency include anemia, fatigue, neurological disorders, and deterioration of nerves resulting in numbness and tingling (Moore, 2012).

3.8.4 Hypervitaminosis

There is no problem with the overconsumption of vitamin B12 (Moore, 2012).

Chapter Four: Vitamin C

Chemical name: Ascorbic acid or Ascorbate,

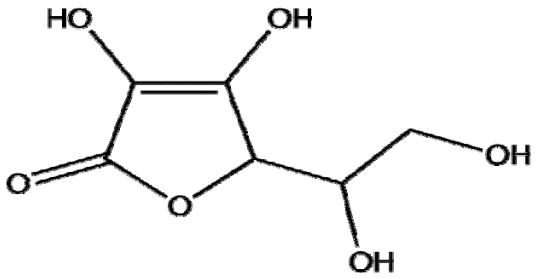


Figure 4.1: Structure of Vitamin C

4.1 Function

Collagen is a connective tissue that holds muscles, bones, and other tissues together and Vitamin C benefits the body by holding cells through collagen synthesis. Vitamin C also assists in wound recovery, bone and tooth formation, strengthening blood vessel walls, improving immune system function, aggregate absorption and utilization of iron, and acting as an antioxidant. Our bodies cannot synthesize Vitamin C, suitable daily intake of this nutrient is essential for optimum health. Vitamin C and Vitamin E works together as an antioxidant, and plays a significant role in neutralization of free radicals throughout the body (Moore, 2012).

4.2 Sources

To have an adequate intake of vitamin C taking vitamin-rich food is the best way. Many common plant foods contain vitamin C but, the best sources are citrus fruits. For example: Mango, Citrus fruit, Papaya, Pine apple, Watermelon, Strawberries (Moore, 2012).

4.3 Recommended daily intake

The suggested Dietary Allowance (RDA) for Vitamin C is 90 mg/day for adult males and 75 mg/day for adult females. For the smokers, the RDA for vitamin C increases by 35 mg/day, in order to counteract the oxidative effects of nicotine.

Table 4.1: Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Water-Soluble Vitamin C (Moore, 2012) :

Life Stage Group	Vitamin C(mg/d)
Infants	
0 – 6 months	40*
6 months- 12 months	50*
Children	
1-3 years	15
4-8 years	25
Males	
9 – 13 years	45
14 – 18 years	75
19 – 30 years	90
31 – 50 years	90
51 – 70 years	90
>70 years	90
Female	
9 – 13 years	45
14 – 18 years	65
19 – 30 years	75
31 – 50 years	75
51 – 70 years	75
>70 years	75
Pregnant	
14 – 18 years	80
19 – 30 years	85
31 – 50 years	85
Lactation	
14 – 18 years	115
19 – 30 years	120
31 – 50 years	120

*=AI value,

AI value = Adequate intake value

4.4 Deficiency:

Vitamin C shortage may cause the disease known as scurvy, causing a loss of collagen strength within the body. Damage of collagen eventually results in loose teeth, bleeding and swollen gums, and improper wound healing. Vitamin C deficiency presents as a secondary deficiency in the people who consume a lot of alcohols, the aged people, and in smokers. Vitamin C requirements have increased for the following conditions : environmental stress, such as air and noise pollution, Results of a couple of drugs, such as oral contraceptives, Tissue healing of wounds, fever and infection (Moore, 2012).

4.5 Hypervitaminosis

Toxicity of Vitamin C is not common. Therefore there are few clinical state regarding this. This includes oxalate stones, gout, adverse effects of ascorbate on biotransformation or absorption of other vitamins. Increased amounts of Vitamin C can cause diarrhea and stomach cramps. The tolerance of human for Vitamin C is highly varies from person to person (Kuo, 2013).

Chapter Five: Vitamin D

Chemical Name: Cholecalceferol

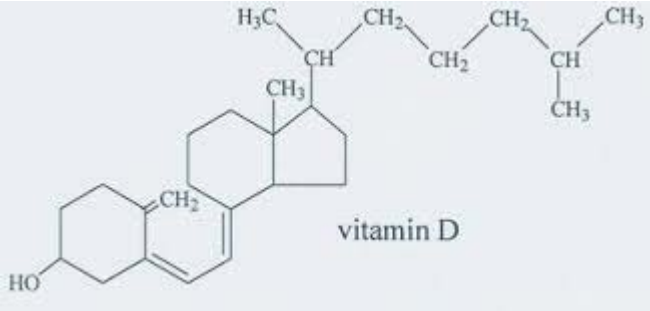


Figure 5.1: Structure of Vitamin D

5.1 Functions

Vitamin D serves an important role in the usage of calcium and phosphorous in the body. By enhancing the amount of calcium absorbed from the small intestine Vitamin D performs its action, aiding to form and maintain bones. Vitamin D favors the body by playing a role in immunity and controlling cell growth Children especially need adequate amounts of vitamin D to develop strong bones and healthy teeth (Bellows & Moore, 2012). It plays an important role in treating neurological disease such as: seizures and headache(Jankowska et al., 2017) Vitamin D supplementation may play an important role in the patients who has CKD and going through Dialysis also in diabetic patients (Kim & Kim, 2014). It is also important in treating colorectal, breast, and prostate Cancers (Jacobs, Kohler, Kunihiro, & Jurutka, 2016).

5.2 Sources:

The general food sources of vitamin D are milk and other dairy products fortified with vitamin D. Vitamin D is also found in oily fish (e.g., herring, salmon and sardines) and in cod liver oil. In addition to the vitamin D supplied by food, we obtain vitamin D through our skin which produces vitamin D in response to sunlight (Bellows & Moore, 2012) .

5.3 Recommended daily intake:

The Recommended Dietary Allowance (RDA) for vitamin D is micrograms (mcg) From 12 months to age fifty, the RDA is set at 15 mcg. Twenty mcg of cholecalciferol equals 800 International Units (IU), which is the recommendation for maintenance of healthy bone for adults over fifty

years of age. Exposition to ultraviolet light is important for the body to produce the active form of vitamin D. Ten to fifteen minutes of sunlight without sunscreen on the hands, arms and face, twice a week is enough to receive sufficient vitamin D. This can spontaneously be achieved in the time spent riding a bike to work or taking a short walk. For reducing the risk for skin cancer one should apply sunscreen with an SPF of 15 or more, if time in the sun overcome 10 to 15 minutes(Bellows & Moore, 2012) .

Table 5.1 Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Water-Soluble Vitamins D (Bellows & Moore, 2012) :

Life Stage Group	Vitamin D(mg/d)
Infants	
0 – 6 months	10*
6 months- 12 months	10*
Children	
1-3 years	15
4-8 years	15
Males	
9 – 13 years	15
14 – 18 years	15
19 – 30 years	15
31 – 50 years	15
51 – 70 years	15
>70 years	20
Female	
9 – 13 years	15
14 – 18 years	15
19 – 30 years	15
31 – 50 years	15
51 – 70 years	15
>70 years	20
Pregnant	
14 – 18 years	15
19 – 30 years	15

31 – 50 years	15
Lactation	
14 – 18 years	15
19 – 30 years	15
31 – 50 years	15

*= AI value,

AI Value = Adequate intake value

5.4 Deficiency

Symptoms of Vitamin D deficiency in growing children consists of rickets (long, soft bowed legs) and flattening of the back of the skull. Vitamin D deficiency in adults can be the reason of osteomalacia (muscle and bone weakness), and osteoporosis (loss of bone mass). Recently published data introduces a concern that some adults and children may be more inclined to developing Vitamin D deficiency due to rise in sunscreen use. Moreover, the people living in urban areas, wear clothing that covers most of the skin, or living in northern climates where sun exposure is very low in winter, are also prone to Vitamin D deficiency. As most of the foods have very low vitamin D levels (unless they are enriched) a deficiency may be more likely to develop without enough exposure to sunlight. Addition of fortified food in everyday diet such as milk, and for adults as a supplements, are useful measure at ensuring enough Vitamin D consumption and preventing low Vitamin D levels. Common cancers, autoimmune diseases, hypertension, and infectious disease have a high risk if there is Vitamin D deficiency (Bellows & Moore, 2012) .

5.6 Hypervitaminosis

Excess vitamin D supplements joined with large amounts of fortified foods may cause gathering in the liver and it may show the signs of toxicity. Signs of Vitamin D harmfulness consist of surplus calcium in the blood, suspended mental and physical growth. Because of the small body size it is very important to look after the fact that neonates and children do not consume extra Vitamin D. (Bellows & Moore, 2012)

Chapter six: Vitamin E

Chemical name: Alpha-Tocopherol;

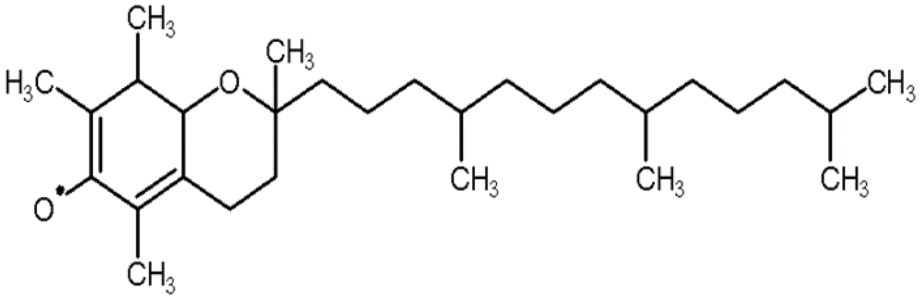


Figure 6.1 Structure of Vitamin E

6.1 Functions

Our body gains benefit from Vitamin E from its work as an antioxidant, and protects Vitamins A and C, red blood cells, and necessary fatty acids from deterioration. To restrain heart disease and cancer antioxidant such as Vitamin E can be very helpful. Numerous studies show a link between regularly eating an antioxidant rich diet full of fruits and vegetables, and a lower risk for heart disease, cancer, and several other diseases (Bellows & Moore, 2012) .

6.2 Source

More than half of the percentage of vitamin E in the diet we get from vegetable oil (soybean, corn, cottonseed) .The list also include products made with vegetable oil (margarine and salad dressing). Vitamin E sources also consist of fruits and vegetables, grains, nuts (almonds and hazelnuts), seeds (sunflower) and fortified cereals (Bellows & Moore, 2012) .

6.3 The Recommended daily intake

(RDA) for vitamin E is founded on the most active and usable form called alpha- tocopherol .Food and supplement labels list alpha-tocopherol as the unit International units (IU) not in milligrams (mg).Males and females over the age of 14 should receive 15 mcg of alpha-tocopherol per day as per RDA Guideline. Consuming vitamin E in excess of the RDA does not result in any added benefits (Bellows & Moore, 2012).

Table 6.1 Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Vitamin E (Bellows & Moore, 2012) :

Life Stage Group	Vitamin E
Infants	4*
0 – 6 months	5*
6 months- 12 months	
Children	
1-3 years	6
4-8 years	7
Males	
9 – 13 years	11
14 – 18 years	15
19 – 30 years	15
31 – 50 years	15
51 – 70 years	15
>70 years	15
Female	
9 – 13 years	11
14 – 18 years	15
19 – 30 years	15
31 – 50 years	15
51 – 70 years	15
>70 years	15
Pregnant	
14 – 18 years	15
19 – 30 years	15
31 – 50 years	15
Lactation	
14 – 18 years	19
19 – 30 years	19
31 – 50 years	19

*=AI value

AI = Adequate intake value

6.4 Hypervitaminosis

When we get vitamin E from food sources generally it does not have a risk for toxicity. Vitamin E supplement is not recommended because of lack of evidence of supporting any added health benefits. People who are taking blood-thinning medications such as Coumadin (also known as warfarin) have a risk in taking large dose of supplemental vitamin E (Bellows & Moore, 2012).

Chapter seven: Vitamin K

Chemical name: Phytomenadione,

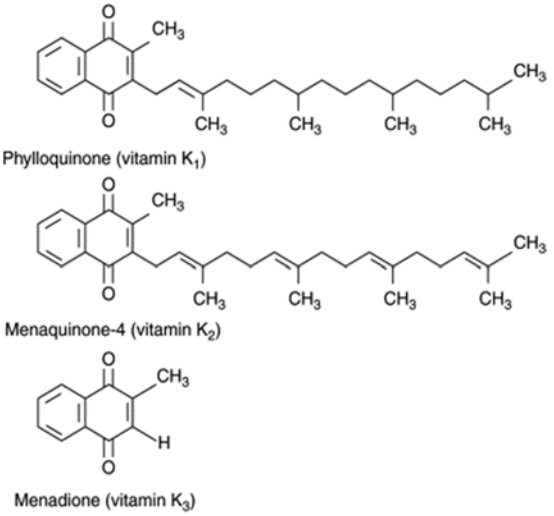


Figure 7.1: Structure of Vitamin K

7.1 Functions

Vitamin K plays some important role in our body. Some important roles are, to normalize blood clotting, to promote bone health, and to help for producing proteins for blood, bones, and kidneys (Bellows & Moore, 2012) .

7.2 Sources

The sources of vitamin K are green, leafy-vegetables such as turnip greens, spinach, cauliflower, cabbage and broccoli, and certain vegetables oils including soybean oil, cottonseed oil, canola oil and olive oil. Animal foods, in general, contain limited amounts of vitamin K(Bellows & Moore, 2012) .

7.3 Recommendation of daily intake:

To help ensure people receive sufficient amounts of vitamin K, an Adequate Intake (AI) has been established for each age group (Bellows & Moore, 2012) .

Table 7.1: Recommended Dietary Intake (RDA) and Adequate Intake (AI) for Fat-Soluble Vitamin (Bellows & Moore, 2012) :

Life Stage Group	Vitamin D(mcg)
Infants	2.0*
0 – 6 months	2.5*
6 months- 12 months	
Children	
1-3 years	30*
4-8 years	55*
Males	
9 – 13 years	60*
14 – 18 years	75*
19 – 30 years	120*
31 – 50 years	120*
51 – 70 years	120*
>70 years	120*
Female	
9 – 13 years	60*
14 – 18 years	75*
19 – 30 years	90*
31 – 50 years	90*
51 – 70 years	90*
>70 years	90*
Pregnant	
14 – 18 years	75
19 – 30 years	90
31 – 50 years	90
Lactation	
14 – 18 years	75
19 – 30 years	90
31 – 50 years	90

*= AI value,

AI value = Adequate intake value

7.4 Deficiency

When there is absence of satisfactory amount of Vitamin K, hemorrhage can happen. We may witness Vitamin K deficiency in infants or in people taking anticoagulants, such as Coumadin (warfarin), or antibiotic drugs. The new born babies need a supplement for the first week because of having the lack of intestinal bacteria for producing Vitamin K. The people who are taking anticoagulant drugs (blood thinners) may become Vitamin K deficient, but they should not alter their Vitamin K intake without consulting a medical personnel. Taking antibiotics may lack Vitamin K for the time being because long-term use of antibiotics may kill intestinal bacteria. Also, people suffering from chronic diarrhea may have problems in absorbing sufficient amounts of Vitamin K through the intestine and should consult their physician to find out if supplementation is necessary (Shearer, Fu, & Booth, 2012) .

7.5 Hypervitaminosis

Additional amount of vitamin K can be the reason of breakdown of red blood cells and liver damage. If anyone is taking blood thinning drug he or she should reduce their level of Vitamin K because high level of vitamin K can change blood clotting times. It is not advised to take excess vitamin K (Bellows & Moore, 2012).

Chapter Nine: Rationale

Vitamins are being prescribed from a very long time for many reasons. Only few vitamins were available in Bangladesh from 1982 (Drug (Control) Ordinance 1982) and people were being treated with these vitamins in a very satisfactory manner. However the intake of vitamins has recently amplified in Bangladesh. It can be the result of the entry of multivitamin into the market. It is very tough to rationalize the vitamin market on the basis of nutritional status of people, as there was no sudden change in the situation. Prescribing trends of vitamins increased without the confirmation of specific deficiencies (IMS 2016). In Bangladesh, people usually take Thiamin and Niacin more than its daily necessity. Vitamin C and Riboflavin deficiency is being observed in a few people. Since we have limited resources in Bangladesh thus by buying unnecessary drugs there will be wastage of money and people may not be able to buy the important and lifesaving drugs. Simultaneously their complications may be prolonged. Thus it is important to monitor the prescribing trend of vitamins for different types of disorders we felt that.

As vitamins are widely prescribed it is important to determine their prescribing trend in specialized health care which is not done yet. The investigation done on this up to now were related to, prescribing trends of Vitamins in primary healthcare level (Rahman and Das, 2011), on the prescribing patterns of prescription available in rural household in Bangladesh (Rahman, Haque and Rahman 2011) and evolution of multivitamins and multi minerals market in Bangladesh (Azhar and Razzak 2015). For our survey we have chosen complications like : neurological, nephrological, oncological, diabetic, ophthalmic and chest. We wanted to find out the prevalence of vitamins in prescriptions for each type of disorder, the classes of vitamins prescribed and their daily consumption.

Additionally there has been a lot of pharmaceutical companies in Bangladesh who have launched different brands of vitamins supplements. We also wanted to explore preference of physicians while prescribing vitamins.

Chapter Ten: Methodology

In order to conduct survey I developed my action plan by dividing my work in the following:

1. Development of a form for collecting necessary information
2. Choosing the classes of complications
3. Deciding the sample size
4. Survey
5. Analysis

1. **Development of a form for collecting necessary information.** The questionnaire covers the basic information of the patient regarding their name, age, height, weight and the information which are important for my study like, current health complications, previous health complications, the medicines, the vitamins, the supplements And other drugs.

2. Choosing the classes of complications: The following six classes of complications were selected on their prevalence in Bangladesh and the survey was conducted in specialized hospitals of Dhaka.

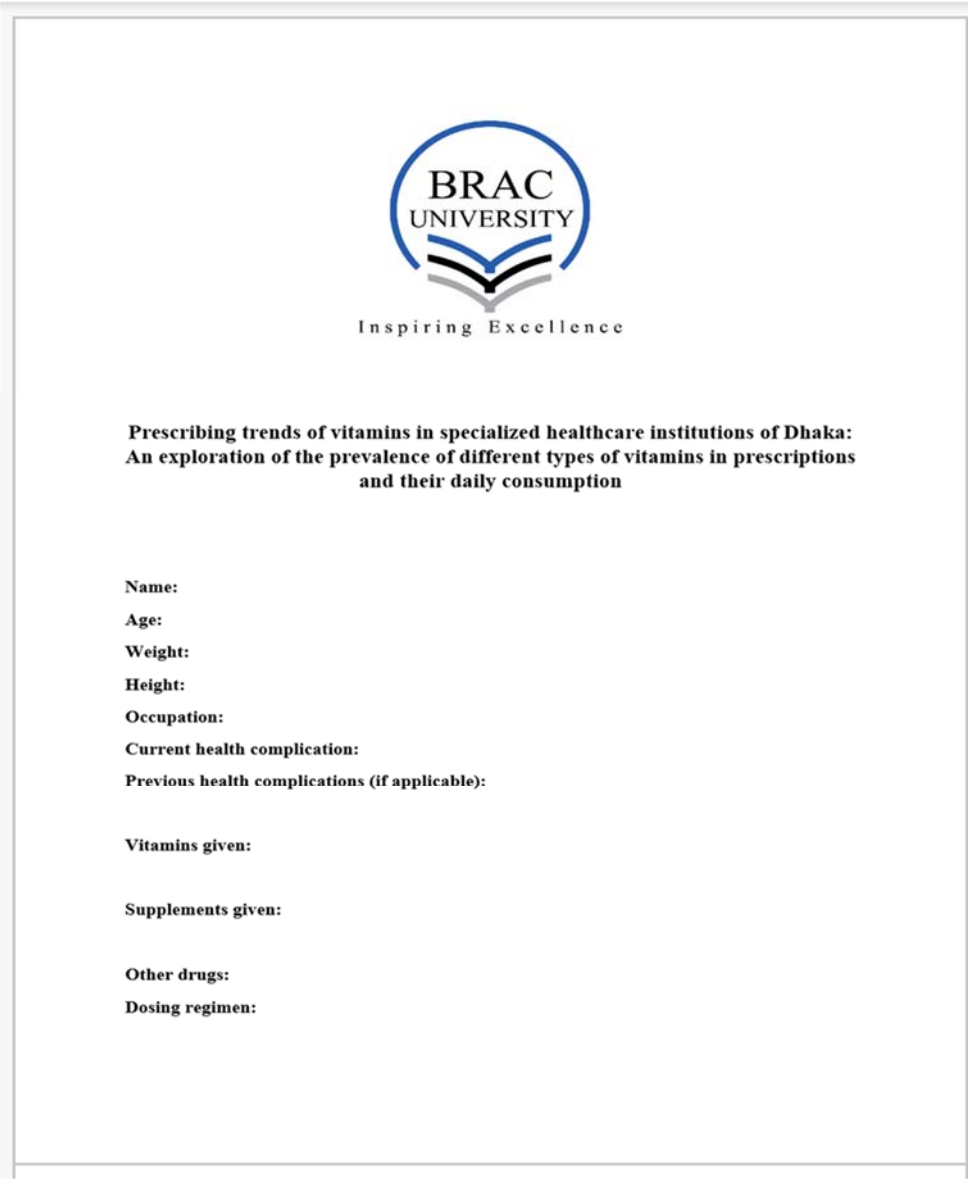
Table 10.1 Complications and hospitals for survey

Complications	**Healthcare facilities**
Neurological complications	National Institute of Neurosciences Hospital
Ophthalmologic complications	National Eye Hospital
Nephrological complications	National Institute of Kidney Diseases & Urology
Oncological complications	National Institute of Cancer Research and Hospital
Diabetic complications	Bangladesh Institute of Research and Rehabilitation for Diabetes
Chest complications	National Institute of Diseases of the Chest and Hospital

3. **Deciding the sample size:** Given the time constraint we decided a standard sample population size of 100 for each of chosen complication.
4. **Survey:** I mainly approached the outdoor patients for collecting information. Some were cordial and few of them hesitated to some extent.

5. **Analysis:** After the collection of all my forms I started analyzing my data on the basis of five points, as given bellow:

- Number of prescriptions containing vitamins for each class of disease
- Types of vitamins prescribed for each class of disease
- Presence of vitamin as a percentage in comparison to total number of drugs prescribed
- Composition, dose and manufacturer of vitamins for each class of patients
- Different brands prescribed for each class of vitamin



BRAC UNIVERSITY

Inspiring Excellence

Prescribing trends of vitamins in specialized healthcare institutions of Dhaka: An exploration of the prevalence of different types of vitamins in prescriptions and their daily consumption

Name:

Age:

Weight:

Height:

Occupation:

Current health complication:

Previous health complications (if applicable):

Vitamins given:

Supplements given:

Other drugs:

Dosing regimen:

Figure 10.1: Survey Form

Chapter Eleven: Result

The analysis of the collected data from the survey are presented as follows:

11.1: Number of prescriptions containing vitamins for each class of disease

Table 11.1 Number of prescriptions containing vitamins for each class of disease

Patients (n)	Neurological Complication (n= 100)	Nephrological Complication (n= 100)	Oncological Complication (n= 100)	Diabetic Complication (n= 100)	Ophthalmic Complication (n= 100)	Chest Complication (n= 100)
Having Vitamins	50	60	44	50	32	10
Without vitamins	50	40	56	50	68	90

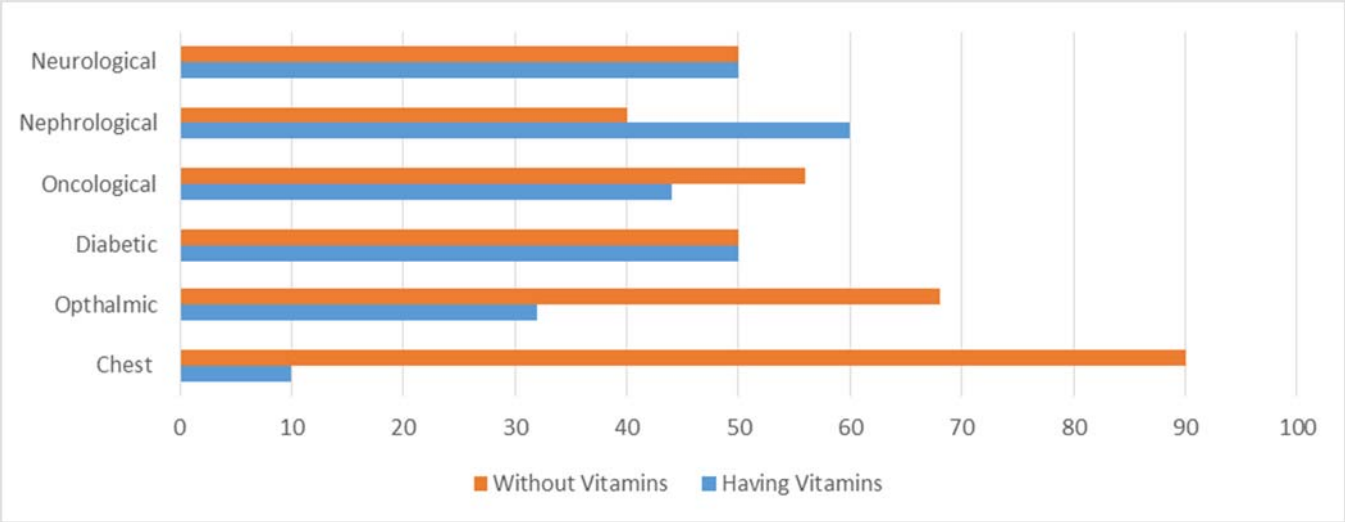


Figure 11.1 Number of prescriptions containing vitamins for each class of disease

11.2 Types of vitamins prescribed for each class of disease

Table 11.2 Different types of vitamins prescribed for each class of disease

Vitamin (n)	Neurological Complication n= 50		Nephrological Complication n= 60		Oncological Complication n=44		Diabetic Complication n= 50		Ophthalmic Complication n= 32		Chest Complication n=10	
	n	%	n	%	n	%	n	%	n	%	n	%
A									12	37.50		
B	24	48	33	55	24	54.54	15	30				
C											5	50
D	20	40	25	41.66	10	22.72	26	52				
Multi Vitamin	6	12	2	3.33	10	22.72	9	18	20	62.50	5	50

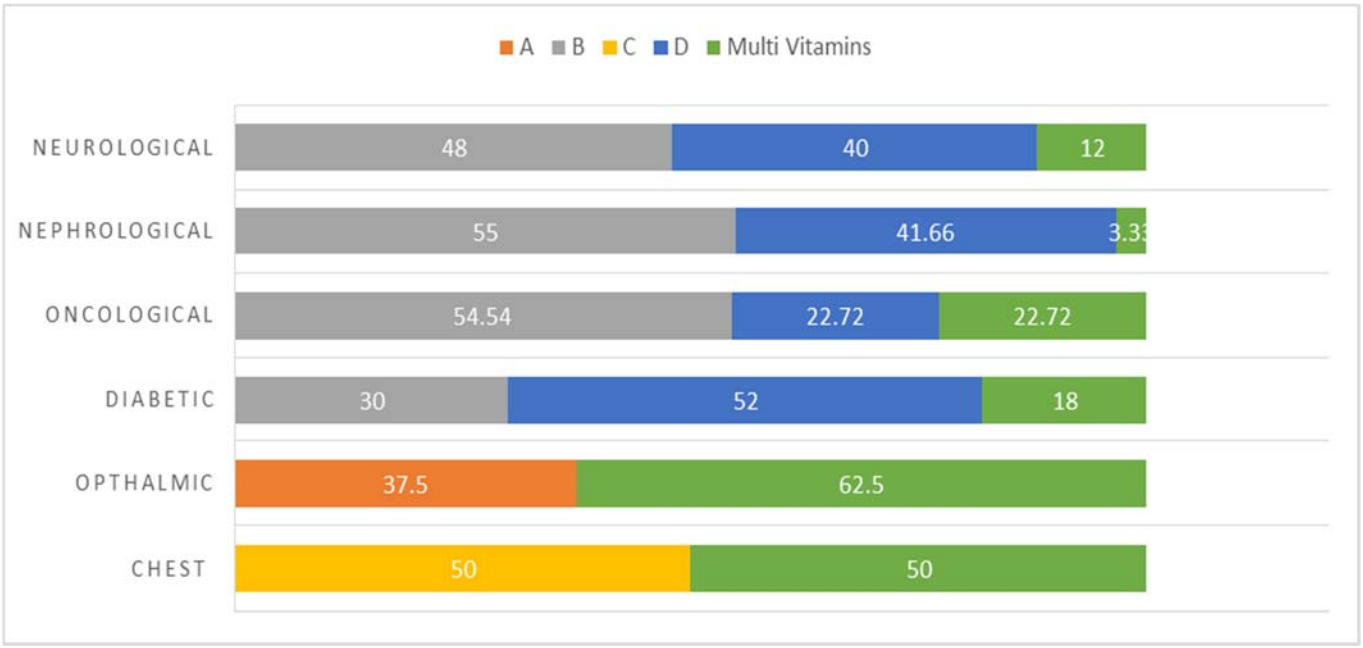


Figure 11.2 Different types of vitamins prescribed for each class of disease

11.3 Presence of vitamin as a percentage in comparison to total number of drugs prescribed

Table 11.3 Determination of presence of vitamin as a percentage in comparison to total number of drugs prescribed for neurological patients

No of prescription	Total number of Drugs	No of vitamin supplements	No of other drugs	Percentage of vitamins
23	4	1	3	25%
7	5	1	4	20%
5	6	1	5	16.66%
15	3	1	2	33.33%
Average				25.96%

Table 11.4 Determination of presences of vitamin as a percentage in comparison to total number of drugs prescribed for nephrological Patients

No of prescription	Total number of Drugs	No of vitamin Supplements	No of other drugs	Percentage of vitamins
27	4	1	3	25%
19	3	1	2	33.33%
9	5	1	4	20%
5	6	1	5	16.66%
Average				26.19%

Table 11.5 Determination of presence of vitamin as a percentage in comparison to total number of drugs prescribed for oncological patients

No of prescription	Total number of Drugs	No of vitamin supplements	No of other drugs	Percentage of vitamins
20	4	1	3	25%
6	5	1	4	20%
5	6	1	5	16.66%
13	3	1	2	33.33%
Average				25.83%

Table 11.6 Determination of presence of vitamin as a percentage in comparison to total number of drugs prescribed diabetic Patients

No of prescription	Total number of Drugs	Vitamins	Other drugs	Percentage of vitamins
22	4	1	3	25%
7	5	1	4	20%
5	6	1	5	16.66%
16	3	1	2	33.33%
Average				26.13%

Table 11.7 Determination of presence of vitamin as a percentage in comparison to total number of drugs prescribed for ophthalmic patients

No of Prescription	Total number of Drugs	No of vitamin supplements	No of other drugs	Percentage of vitamins
16	3	1	2	33.33%
15	4	1	3	25%
1	5	1	4	20%
Average				29.00%

Table 11.8 Determination of presence of vitamin as a percentage in comparison total number of drugs prescribed for chest patients

No of prescription	Total number of Drugs	No of vitamin supplements	No of other drugs	Percentage of vitamins
5	4	1	3	25%
4	3	1	2	20%
1	5	1	4	16.66%
Average				22.16%

Table 11.9 Average presence of vitamin as a percentage in comparison to total number of drugs prescribed

Name of Complications	Percentage
Neurological Complications	25.96%
Nephrological Complications	26.19%
Oncological Complications	25.83%
Diabetic Complications	26.13%
Ophthalmic Complications	29.00%
Chest Complications	27.83%

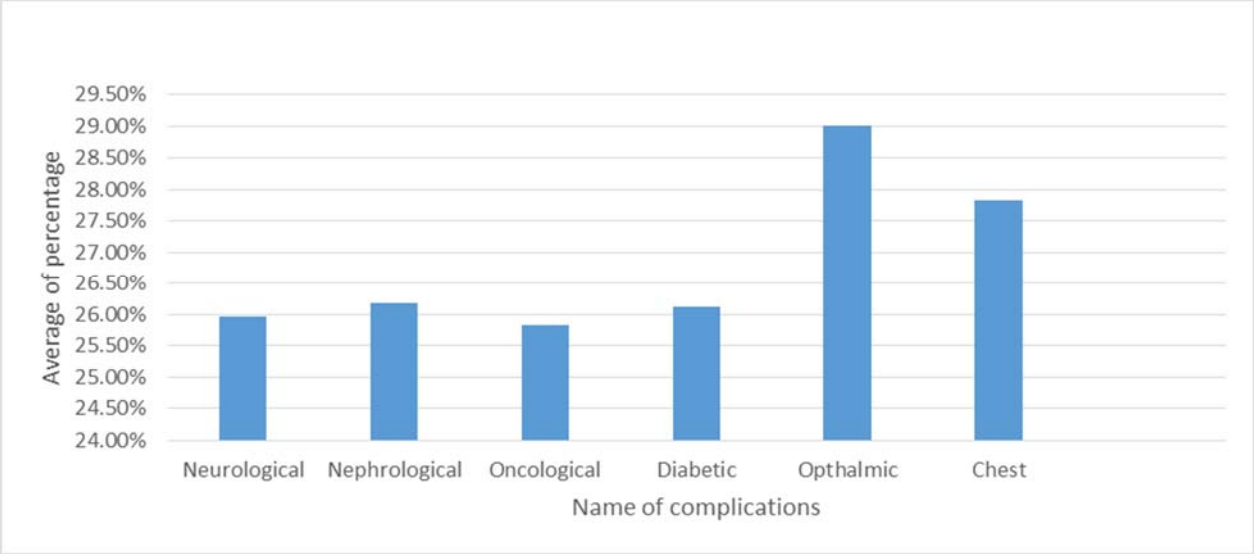


Figure 11.3 Average presence of vitamin as a percentage in comparison to total number of drugs prescribed

11.4 Composition, dose and manufacturer of vitamins for each class of patients

Table 11.10 Composition, dose and manufacturer of vitamins prescribed for neurological patients

Drug	Class + Composition	Company	No of prescription	Dose	RDA	Dose more than RDA
Calbo D	Vitamin D 200 IU	Square Pharmaceutical Ltd.	8	1+0+0	600 IU	
Fossical D	Vitamin D 200 IU	Aristopharma Limited	5	1+0+0	600 IU	
Ostocal D	Vitamin D 200 IU	Eskayef Bangladesh Ltd.	4	0+0+1	600 IU	
Neurobest	Vitamin D 200 IU	Renata Limited	3	0+0+1	600 IU	
Vitabion	1. Vitamin B1=100 mg 2. Vitamin B6=200 mg 3. Vitamin B12=200 mcg	Incepta Pharmaceuticals Limited	8	1+0+0	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12
Neuralgin	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Ibn Sina Pharmaceutical Ind. Ltd	9	1+0+0	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12
Neuro B	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12= 200 mcg	Square Pharmaceutical Ltd.	7	0+0+1	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12

Nipro gold	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7mg 8. Vitamin B3= 20 mg 9 Vitamin B5= 10 mg 10 Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12 Vitamin B9=400 mcg	Nipro JMI Pharma Limited	3	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6
Super GOLD	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10mg 10 Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12 Vitamin B9=400 mcg	General Pharmaceutical LTD	3	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6

Table 11.11 Composition, dose and manufacturer of vitamins prescribed for nephrological patients

Drug	Class + composition	Company	No of prescription	Dose	RDA	Dose more than RDA
Ostacid D	Vitamin D 200 IU	Rangs Pharmaceutical Ltd.	10	1+0+0	600 IU	
Fossical D	Vitamin D 200 IU	Aristopharma Limited	4	1+0+0	600 IU	
Cal D	Vitamin D 200 IU	Pacific Pharmaceuticals Ltd.	6	0+0+1	600 IU	
Neurobest	Vitamin D 200 IU	Renata limited	5	0+0+1	600 IU	
Vitabion	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Incepta Pharmaceuticals Limited	8	1+0+0	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12
Neuralgin	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Ibn Sina Pharmaceutical Ind. Ltd	9	1+0+0	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12
Neuro B	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Square Pharmaceutical Ltd.	9	0+0+1	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12
Neubin	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Ziska Pharmaceutical Ltd.	7	0+0+1	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12

Nipro gold	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7 mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10 mg 10. Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12. Vitamin B9=400 mcg	Nipro JMI Pharma Limited	2	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6

Table 11.12 Composition, dose and manufacturer of vitamins prescribed for oncological patients

Drug	Class + composition	Company	No of prescription	Dose	RDA	Dose more than RDA
Calbo D	Vitamin D 200 IU	Square Pharmaceutical Ltd.	5	1+0+0	600 IU	
Fossical D	Vitamin D 200 IU	Aristopharma Limited	3	1+0+0	600 IU	
Ostocal D	Vitamin D 200 IU	Eskayef Bangladesh Ltd.	2	0+0+1	600 IU	
Vitabion	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Incepta Pharmaceuticals Limited	6	1+0+0	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12
Neuralgin	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Ibn Sina Pharmaceutical Ind. Ltd	7	1+0+0	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12

Neuro B	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Square Pharmaceutical Ltd.	11	0+0+1	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12
Filwel GOLD	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7 mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10 mg 10. Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12. Vitamin B9=400 mcg	Square Pharmaceutical Ltd.	6	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6
Super GOLD	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7 mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10 mg 10 Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12. Vitamin B9=400 mcg	General Pharmaceutical LTD	4	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6

Table 11.13 Composition, dose and manufacturer of vitamins prescribed for diabetic patients

Drug	Class + composition	Company	No of prescription	Dose	RDA	Dose more than RDA
Miracal M	Vitamin D 200 IU	Navana Pharmaceutical Ltd.	3	1+0+0	600 IU	
Fossical D	Vitamin D 200 IU	Aristopharma Limited	5	1+0+0	600 IU	
Ostocal D	Vitamin D 200 IU	Eskayef Bangladesh Ltd.	8	0+0+1	600 IU	
Neurobest	Vitamin D 200 IU	Renata Limited	10	0+0+1	600 IU	
Vitabion	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Incepta Pharmaceuticals Limited	7	1+0+0	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12
Neuralgin	1. Vitamin B1=100 mg 2. Vitamin B6= 200 mg 3. Vitamin B12=200 mcg	Ibn Sina Pharmaceutical Ind. Ltd	3	1+0+0	1. 1.2 mg 2. 1.3 mg 3. 2.4 mcg	Vitamin B1 Vitamin B6 Vitamin B12
Neuro B	1.Vitamin B1=100 mg 2.Vitamin B6= 200 mg 3.Vitamin B12=200 mcg	Square Pharmaceutical Ltd.	5	0+0+1	1. 1.5mg 2. 2mg 3. 6 mcg	Vitamin B1 Vitamin B6 Vitamin B12

Altrum gold	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7mg, 8. Vitamin B3= 20 mg 9. Vitamin B5= 10mg 10 Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12. Vitamin B9=400 mcg	Ziska Pharmaceutical Ltd.	3	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6
Revital 30	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10mg 10 Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12.Vitamin B9=400 mcg	ACI Limited	6	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6

Table 11.14 Composition, dose and manufacturer of vitamins prescribed for ophthalmological patients

Drug	Class + composition	Company	No of prescription	Dose	RDA	Dose more than RDA
Vitamin A FORTE	Vitamin A = 50000 IU	Drug International Ltd	3	1+0+0	3000 IU	Vitamin A
Ovit A	Vitamin A = 50000 IU	Opsonin pharma Ltd	7	1+0+0	3000 IU	Vitamin A
A Forte	Vitamin A = 50000 IU	Globe pharmaceuticals Ltd	2	1+0+0	3000 IU	Vitamin A
Xtrum GOLD	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7 mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10 mg 10 Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12. Vitamin B9=400 mcg	Globe pharmaceuticals Ltd	5	0+1+0	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6
Azovit gold	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10 mg	Novo Health care and Pharma limited	5		1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6

	10 Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12. Vitamin B9=400 mcg				10. 1.3 mg 11. 30 mcg 12. 400 mcg	
Filwel gold	1. Vitamin A = 5000IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K = 25 mcg 6. Vitamin B1 = 1.5 mg 7. Vitamin B2=1.7mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10mg 10 Vitamin B6 =2 mg 11. Vitamin B7 =30 mcg 12. Vitamin B9=400 mcg	Square Pharmaceutical Ltd.	10	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6

Table 11.15 Composition, dose and manufacturer of vitamins prescribed for chest patients

Drug	Class + composition	Company	No of prescription	Dose	RDA	Dose more than RDA
Ascobex	Vitamin C = 250 mg	Beximco pharmaceutical Ltd	2	1+0+0	90 mg	Vitamin C
Ceevit	Vitamin C = 250 mg	Square Pharmaceutical Ltd.	2	1+0+0	90 mg	Vitamin C
Cecon	Vitamin C = 250 mg	Acme Laboratories	1	1+0+0	90 mg	Vitamin C

Altrum gold	1.Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K =25 mcg 6. Vitamin B1 =1.5 mg 7. Vitamin B2=1.7 mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10 mg 10 Vitamin B6 =2 mg 11. Vitamin B7=30 mcg 12.Vitamin B9=400 mcg	Ziska Pharmaceutical Ltd.	3	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6
Revital 30	1. Vitamin A = 5000 IU 2. Vitamin C= 60 mg 3. Vitamin D =400 IU 4. Vitamin E = 30 IU 5. Vitamin K =25 mcg 6. Vitamin B1 =1.5 mg 7. Vitamin B2=1.7 mg 8. Vitamin B3= 20 mg 9. Vitamin B5= 10 mg 10 Vitamin B6 =2 mg 11. Vitamin B7=30 mcg 12. Vitamin B9=400 mcg	ACI Limited	2	0+0+1	1. 3000 IU 2. 90 mg 3. 600 IU 4. 22.4 IU 5. 122 mcg 6. 1.2 mg 7. 1.3 mg 8. 18 mg 9. 5 mg 10. 1.3 mg 11. 30 mcg 12. 400 mcg	Vitamin A Vitamin E Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6

11.3 Different brands prescribed for each class of disease

Table 11.16 Different brands prescribed for each class of disease

Drugs Class	Company name	Drug name	Total number	%
Vitamin A n= 12	Drug international	Vitamin A FORTE	3	25
	Opsonin pharma Ltd	Ovit A	7	58.33
	Globe pharmaceuticals Ltd	A Forte	2	16.66
Vitamin B complex n= 96	Incepta Pharmaceuticals Limited	Vitabion	29	30.20
	Square Pharmaceuticals Ltd.	Neuro B	32	33.33
	Ibn Sina Pharmaceuticals Ind.Ltd	Neuralgin	28	29.16
	Ziska Pharmaceutical Ltd.	Neubin	7	7.29
Vitamin C n= 5	Beximco pharmaceutical Ltd	Ascobex	2	40
	Square Pharmaceuticals Ltd.	Ceevit	2	40
	Acme Laboratories	Cecon	1	20

	Square Pharmaceuticals Ltd.	Calbo D	13	16.04
	Aristopharma Limited	Fossical D	17	20.98
	Eskayef Bangladesh Ltd.	Ostocal D	20	24.69
Vitamin D	Renata Limited	Neurobest	18	22.22
n= 81	Rangs Pharmaceutical Limited	Ostacid D	10	12.34
	Navana Pharmaceutical Ltd.	Miracal M	3	3.70
	NIPRO JMI Pharma Limited	Nipro Gold	5	9.61
	General Pharmaceutical Ltd.	Super Gold	7	13.46
	Square Pharmaceuticals Ltd.	Filwel GOLD	16	30.76
Multi Vitamin	Ziska Pharmaceutical Ltd.	Altrum Gold	6	11.53
n= 52	Novo Health care and Pharma Ltd	Azovit Gold	5	9.61
	ACI Limited	Revital 30	8	15.38
	Globe Pharmaceuticals Ltd	Xtrum GOLD	5	9.61

Chapter Thirteen: Discussion

From this survey I have found out that use of vitamins are actually quite prevalent in specialized health care facilities in Bangladesh. I have visited six specialized hospitals which are always crowded with mass people and my main intention was to randomly collect 100 samples from each. From this collection I have analyzed the number of prescriptions containing vitamins for each class of disease, the types of vitamins usually prescribed for each class of disease, prescribing vitamin as a percentage in comparison to total number of drugs prescribed, determination of the number of prescriptions containing dose for daily consumption more than the RDA for vitamins and different brands widely prescribed for each class of vitamin.

For neurological complications 50% of the prescriptions contained vitamins. Among the prescriptions, 48% of the prescriptions were containing Vitamin B, 40% Vitamin D and 12% multivitamins. According to different studies, Vitamin B and Vitamin D are actually necessary for neurological patients. Vitamin D simultaneously targets features that cause neurodegeneration, including immunoregulatory, antioxidant, and anti-ischemic factors, neurotropic factors and acetylcholine associated neurotransmission (Care, 2016). On the other hand, Vitamin B complex are known as anti-stress vitamins as these can help reduce depression, banish brain aging, and slow mental declines (Alvarado & Navarro, 2016). So prescribing these two vitamins are actually justified for patients with neurological disorders. When analyzed about prescribing vitamins as a percentage in comparison to total number of drugs prescribed, it was found that 25.96% of the total number of drugs in the prescriptions was vitamins.

In case of nephrological disorders, 60% of the prescriptions contained vitamins. 55% of the vitamins were Vitamin B, 41.66% Vitamin D and 3.33% multivitamins. In kidney patients the amount of Vitamin D falls because of the reduced activity of the enzyme that can convert the body's vitamin D in its active form (Kim & Kim, 2014). As a result kidney patients are given Vitamin D as supplements. Additionally Chronic Kidney Disease (CKD) patients also suffer from Vitamin B12 depletion (Mamede et al., 2011). According to guidelines from National Kidney Foundation, Vitamin A and water soluble vitamins like Vitamin E and K are more likely to build up in body and can cause harm. Over time, they can cause dizziness, nausea, and even death to

CKD patients. When it comes to the prescribing vitamins as a percentage in prescriptions in comparison to total number of drugs prescribed, the average percentage was 26.19%.
44% of the prescriptions for oncological complications containing vitamins. Among them there were 54.54% Vitamin B complex, 22.72% Vitamin D and 22.72% multivitamins. The average percentage of prevalence of vitamin was 25.83% in comparison to the total number of drugs prescribed. According to Cancer research Institute, UK, people with cancer use dietary supplements for reasons like to help fight their cancer or make them feel better alongside their conventional cancer treatments, such as radiotherapy or chemotherapy. But others choose to use them instead of conventional treatments. Although there is no reliable evidence of dietary supplement helping to prevent cancer, but there is evidence that a healthy diet with plenty of fruit and vegetables can reduce your cancer risk (Jacobs et al., 2016).

For diabetic patients, I found 50% of prescriptions contained vitamins. Among them there were 30% Vitamin B complex, 52% Vitamin D and 18% multivitamins. The 2010 Dietary Guidelines Advisory Committee did not advise the use of multivitamins for the mass healthy population, but some specific diseases might benefit from supplementation as indicated by them, type 2 diabetes mellitus is one of them. For aged patients, having type two diabetes make them susceptible to developing vitamin D deficiency. (Ramos et al., 2015) For diabetic prescriptions I found the average percentage of prescribing vitamins in comparison to total number of drugs prescribed was 26.13%.

In case of ophthalmic complications 32% of the prescriptions contained vitamins. Among them there were 37.50% Vitamin A and 62.50% multivitamins. Vitamin A is important for eye. Night blindness, xerophthalmia, Bitot's spot, keratitis, and kera-tomalacia are the clinical manifestations which occur because of deficiency of Vitamin A (Faustino, et al., 2016). Although multivitamins are said to reduce the rates of cataract but enough studies are not present to validate this statement (reference needed). The average percentage of prevalence of vitamins in prescriptions for ophthalmic patients were found to be 29.00%.

For chest complications, only 10% of the prescriptions contained vitamins. Among them 50% were Vitamin C and 50 % multivitamins. The average percentage of prevalence of vitamins in the

prescriptions was 27.83%. Vitamin deficiency is possibly involved in a number of lung disease. Especially patients with lung diseases have often low Vitamin D serum levels. Epidemiological data indicate that low levels of serum Vitamin D is associated with impaired pulmonary function, increased incidence of inflammatory, infectious or neoplastic diseases. Several lung diseases, all inflammatory in nature, may be related to activities of Vitamin D including asthma, COPD and cancer (Herr et.al 2011). Vitamin A plays a role in proper lung development (in the embryonic stage) and repair of damaged lung tissue. In one study, high dietary vitamin A intake (greater than 2,770 IU daily) was associated with a 52% reduction in risk of COPD (Hirayama 2009). Including good sources of vitamin B6 and folate - as well as methionine - in daily diet may help lower lung cancer risk by maintaining healthy DNA. Vitamin E levels are low in smokers, increasing their susceptibility to free radical damage (Bruno 2005). A study proved that that supplementing with 600 IU of vitamin E reduced the risk of chronic lung disease by 10% (Agler 2011).

During the analysis of the survey results we found out that some of the vitamins were present in amount higher than their RDA in the supplements. Vitamin A, Vitamin B complex and Vitamin C were among those. As mentioned earlier, vitamins have serious stability problems. Vitamin A is very sensitive to fluctuations in temperature, oxygen and light. It is also affected to some extent by humidity and acidic pH. However, Vitamin A is a fat soluble vitamin so if these accumulate in the body because of overdose there might be toxicity problems. Vitamin B complex consists of such vitamins which are very susceptible to humidity since they are water soluble in nature. As a result they are not usually accumulated inside our body. Temperature also affects their stability to some extent. Vitamin C also being a water soluble compound gets extensively degraded because of humidity. The most important matter of concern in case of Vitamin C is it is antioxidant in nature and reacts readily with the oxygen in the environment. Vitamin E is also prone to exposure to temperature, humidity, light and pH (reference needed). Thus keeping all these factors in mind the formulations usually contain doses more than the RDA for such types of vitamins. We have not found extensive calculations in this regard to determine whether the doses are crossing the toxicity limit or not, but it should be noted that the composition of the supplements matched with some of the internationally accepted vitamin products (reference needed). One thing that should be considered is the dietary intake along with the supplements of such vitamins should not cross the toxicity limit, however it is not feasible to keep that in control.

While analyzing the different brands of vitamins prescribed it was found that few companies are given preference in this concern. 58% of the prescriptions for Vitamin A was Ovit A from Opsonin Pharma Ltd. In case of Vitamin B complex 33.33% of the total prescriptions contained Neuro B from Ibn Sina Pharmaceuticals Ltd and 30.20% prescriptions had Vitabion from Incepta Pharmaceuticals Ltd. 40% of Vitamin C containing prescriptions and 30.76% of prescriptions for multivitamins had Ceevit and Filwel Gold respectively, from Square Pharmaceuticals Ltd. Ascobex of Beximco Pharmaceutical Ltd. was present in other 40% of the prescriptions for Vitamin C. Fossical D, Ostocal D, Neurobest and Calbo D are normally prescribed for Vitamin D from Aristopharma Ltd., Eskayef Bangladesh Ltd., Renata Limited and Square Pharmaceuticals Ltd. respectively.

Thus, our overall aim was to find out the prescribing pattern, the daily consumption, the types of vitamins prescribed and the brands preferred for prescribing vitamins in case of different types of complications. We want to continue our work in future by concentrating on each category of disorder extensively, using the information from this project work so that we can help determine the rationality of wide scale prevalence of vitamins in prescriptions, nowadays.

REFERENCE:

Bellows, L., & Moore, R. (2012). Fat Soluble Vitamins: A, D, E and K. Colorado StateUniversity, 213(6), 199. https://doi.org/10.1146/annurev.neuro.24.1.263

Buehler, B. A. (2011). Vitamin B 2 : Riboflavin. Journal of Evidence-Based Complementary & Alternative Medicine, 16(2), 88–90. https://doi.org/10.1177/1533210110392943

Jacobs, E. T., Kohler, L. N., Kunihiro, A. G., & Jurutka, P. W. (2016). Vitamin D and colorectal, breast, and prostate cancers: A review of the epidemiological evidence. Journal of Cancer, 7(3), 232–240. https://doi.org/10.7150/jca.13403

Jankowska, M., Rutkowski, B., & Dębska-Ślizień, A. (2017). Vitamins and microelement bioavailability in different stages of chronic kidney disease. Nutrients, 9(3). https://doi.org/10.3390/nu9030282

Kauffman, J. M. (2009). Benefits of Vitamin D Supplementation. Journal of American Physicians and Surgeons, 14(2), 38–45.

Kim, C. S., & Kim, S. W. (2014). Vitamin D and chronic kidney disease. The Korean Journal of Internal Medicine, 29(4), 416–27. https://doi.org/10.3904/kjim.2014.29.4.416

Kjeldby, I. K., Fosnes, G. S., Ligaarden, S. C., & Farup, P. G. (2013). Vitamin B6 deficiency and diseases in elderly people--a study in nursing homes. BMC Geriatrics, 13(1), 13. https://doi.org/10.1186/1471-2318-13-13

Kuo, S.-M. (2013). Nutrition & Food Sciences The Multifaceted Biological Roles of Vitamin C. J Nutr Food Sci, 3(3). https://doi.org/10.4172/2155-9600.1000231

Mamede, A. C., Tavares, S. D., Abrantes, A. M., Trindade, J., Maia, J. M., & Botelho, M. F. (2011). The role of vitamins in cancer: A review. Nutrition and Cancer, 63(4), 479–494. https://doi.org/10.1080/01635581.2011.539315

Moore, R. (2012). Water-Soluble Vitamins : B-Complex and Vitamin C. Colorado State University, Fact Sheet(9), 5.

Rasool Hassan, B. A. (2012). Medicinal Plants (Importance and Uses). Pharmaceutica Analytica Acta, 3(10), 4172. https://doi.org/10.4172/2153-2435.1000e139

Shearer, M. J., Fu, X., & Booth, S. L. (2012). Vitamin K Nutrition, Metabolism, and Requirements: Current Concepts and Future Research. American Society for Nutrition, 3, 182–195. https://doi.org/10.3945/an.111.001800.182

Sommer, A. (1995). Vitamin A deficiency and its consequences: a field guide to detection and control.

Thus, K. (2008). Vitamin K – Much More Than a Coagulation Vitamin, 3(3), 112–113.

Kjeldby, I. K., Fosnes, G. S., Ligaarden, S. C., & Farup, P. G. (2013). Vitamin B6 deficiency and diseases in elderly people--a study in nursing homes. BMC Geriatrics, 13(1), 13. https://doi.org/10.1186/1471-2318-13-13

Kuo, S.-M. (2013). Nutrition & Food Sciences The Multifaceted Biological Roles of Vitamin C. J Nutr Food Sci, 3(3). https://doi.org/10.4172/2155-9600.1000231

Mamede, A. C., Tavares, S. D., Abrantes, A. M., Trindade, J., Maia, J. M., & Botelho, M. F. (2011). The role of vitamins in cancer: A review. Nutrition and Cancer, 63(4), 479–494. https://doi.org/10.1080/01635581.2011.539315

Moore, R. (2012). Water-Soluble Vitamins : B-Complex and Vitamin C. Colorado State University, Fact Sheet (9), 5.

Buehler, B. A. (2011). Vitamin B 2 : Riboflavin. Journal of Evidence-Based Complementary & Alternative Medicine, 16(2), 88–90. https://doi.org/10.1177/1533210110392943

Care, N. (2016). The Role of the Vitamin D in Neurology : Interrelationships Between Headache, Epilepsy and Vitamin D Deficiency, 3(2), 2–5. https://doi.org/10.15406/jpnc.2016.04.00132

Jacobs, E. T., Kohler, L. N., Kunihiro, A. G., & Jurutka, P. W. (2016). Vitamin D and colorectal, breast, and prostate cancers: A review of the epidemiological evidence. Journal of Cancer, 7(3), 232–240. https://doi.org/10.7150/jca.13403

Jankowska, M., Rutkowski, B., & Dębska-Ślizień, A. (2017). Vitamins and microelement bioavailability in different stages of chronic kidney disease. Nutrients, 9(3). https://doi.org/10.3390/nu9030282

Kim, C. S., & Kim, S. W. (2014). Vitamin D and chronic kidney disease. The Korean Journal of Internal Medicine, 29(4), 416–27. https://doi.org/10.3904/kjim.2014.29.4.416

Kjeldby, I. K., Fosnes, G. S., Ligaarden, S. C., & Farup, P. G. (2013). Vitamin B6 deficiency and diseases in elderly people--a study in nursing homes. BMC Geriatrics, 13(1), 13. https://doi.org/10.1186/1471-2318-13-13

Kjeldby, I. K., Fosnes, G. S., Ligaarden, S. C., & Farup, P. G. (2013). Vitamin B6 deficiency and diseases in elderly people--a study in nursing homes. BMC Geriatrics, 13(1), 13. https://doi.org/10.1186/1471-2318-13-13

Kuo, S.-M. (2013). Nutrition & Food Sciences The Multifaceted Biological Roles of Vitamin C. J Nutr Food Sci, 3(3). https://doi.org/10.4172/2155-9600.1000231

Mamede, A. C., Tavares, S. D., Abrantes, A. M., Trindade, J., Maia, J. M., & Botelho, M. F. (2011). The role of vitamins in cancer: A review. Nutrition and Cancer, 63(4), 479–494. https://doi.org/10.1080/01635581.2011.539315

Jankowska, M., Rutkowski, B., & Dębska-Ślizień, A. (2017). Vitamins and microelement bioavailability in different stages of chronic kidney disease. Nutrients, 9(3). https://doi.org/10.3390/nu9030282

Kauffman, J. M. (2009). Benefits of Vitamin D Supplementation. Journal of American Physicians and Surgeons, 14(2), 38–45.

Kjeldby, I. K., Fosnes, G. S., Ligaarden, S. C., & Farup, P. G. (2013). Vitamin B6 deficiency and diseases in elderly people--a study in nursing homes. BMC Geriatrics, 13(1), 13. https://doi.org/10.1186/1471-2318-13-13

Bellows, L., & Moore, R. (2012). Fat Soluble Vitamins: A, D, E and K. Colorado StateUniversity, 213(6), 199. https://doi.org/10.1146/annurev.neuro.24.1.263

Buehler, B. A. (2011). Vitamin B 2 : Riboflavin. Journal of Evidence-Based Complementary & Alternative Medicine, 16(2), 88–90. https://doi.org/10.1177/1533210110392943