

JIGNASA
STUDENT STUDY PROJECT 2022 -23
COMMISSIONER OF COLLEGIATE EDUCATION
GOVERNMENT DEGREE COLLEGE NARSAPUR
MEDAK DISTRICT, TELANGANA

CHEMISTRY PROJECT
ON
“DETERMINATION OF VITAMIN C CONTENT IN FRUIT JUICE &
ROLE OF VITAMIN C IN THE PREVENTION OF COVID-19
PANDEMIC.”



Project Prepared by

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Lecturer in Chemistry
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CERTIFICATE

This is to certify that **B. Sc Students of Government Degree College Narsapur, Medak Dist.** have successfully completed their Student Study project “**Determination of Vitamin C content in fruit juices and Role of Vitamin C in the prevention of the COVID-19 Pandemic**” under the supervision of **Mr. L.Narender, Lecturer in Chemistry, GDC Narsapur** during the academic year **2022-23** as per the guidelines given by **CCE, Hyderabad, Telangana.**

Signature of the Lecturer

Signature of the Principal
GDC Narsapur



Power Point Presentation

ACKNOWLEDGEMENT

We would like to express our thanks to our Lecturer Sri **L. Narender**, College Principal **Dr. P. Damodar** and **CCE**, Hyderabad for giving us a great opportunity to excel in our learning through this project.

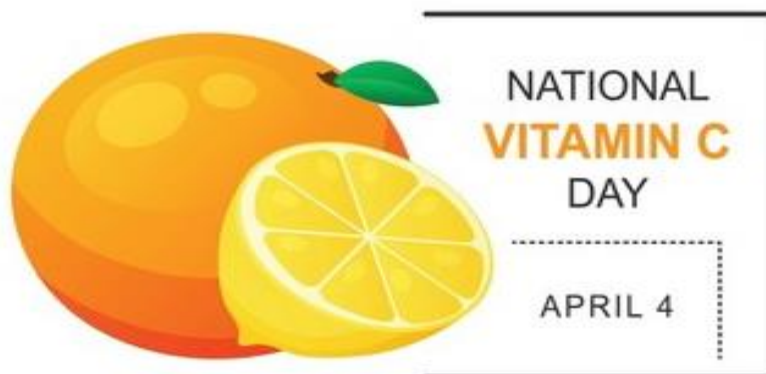
We have achieved a good amount of knowledge through this Student Study Project, this practical experience, guidance and inputs that we got from our Project Lecturer helped us to understand the subject in more effectively when compared to simply reading from books.

Apart from this, we would like to express special thanks to our **parents** and **friends** who have supported us and helped us out in our **Jignasa student study project**.

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PURPOSE

Vitamin C (Ascorbic acid) is an essential nutrient for humans and certain other animal species. In this student study project, we will determine the amount of vitamin C in different fruit juices. How it boosts immunity in humans and reveals the role of vitamin C in the COVID-19 pandemic.



CONTENT

1. Title
2. Statement of problem
3. Aims and Objectives
4. Introduction
5. Sources of vitamin C
6. Functions of Vitamin C
7. Vitamin C Deficiency Symptoms
8. Diagnosis, Causes and Treatment of Low Vitamin C Deficiency
9. Recommended daily intake of Vitamin C
10. Determination of vitamin C content in fruit juices
11. Result
12. Role of vitamin c in the prevention of COVID-19 pandemic
12. Conclusion
13. Photos

Title: “Determination of Vitamin C content in fruit juices and Role of Vitamin C in the Prevention of the COVID-19 Pandemic”

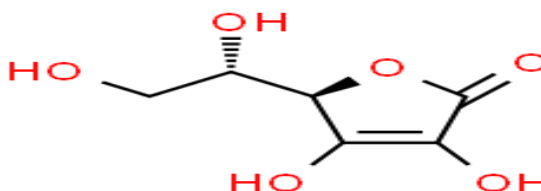
Statement of problem: Vitamins provide many benefits to humans. To explain the disadvantages of vitamin C deficiency to humans. Identifying the immune system that the human body loses due to this and explaining the role of vitamin C in the COVID - 19 pandemic.

Aims and Objectives: The main aims and objectives of this project:

1. National Vitamin C day is celebrated every year on April 4.
2. Vitamins are very essential for human beings.
3. Vitamin C has many benefits, but its deficiency can have adverse effects on us.
4. It boosts immunity in the body and helps to some extent in protecting against COVID-19 Viruses.
5. Educating the villagers about the importance of vitamins

Introduction:

- Vitamin C (also known as Ascorbic acid) is a water soluble vitamin found in citrus, other fruits and vegetables.
- It was discovered in 1912, isolated in 1928 and its structure was determined in 1933. Its Chemical formula is $C_6H_8O_6$
- Structure :





- In human beings it is not synthesized in body so it must be consumed through diet.
- Prolonged storage or cooking may reduce vitamin C content in foods.
- Lack of vitamin C can lead to Scurvy.

Sources of vitamin C:

Vitamin C is abundantly available in many sources, including fresh fruits and vegetables. The richest sources of ascorbic acid including Indian gooseberry, citrus fruits such as limes, oranges and lemons, tomatoes, papaya, green and red peppers, kiwi fruits, strawberries, cantaloupes and green leafy vegetables.

FRUITS AND VEGETABLES ARE THE BEST SOURCES OF VITAMIN C

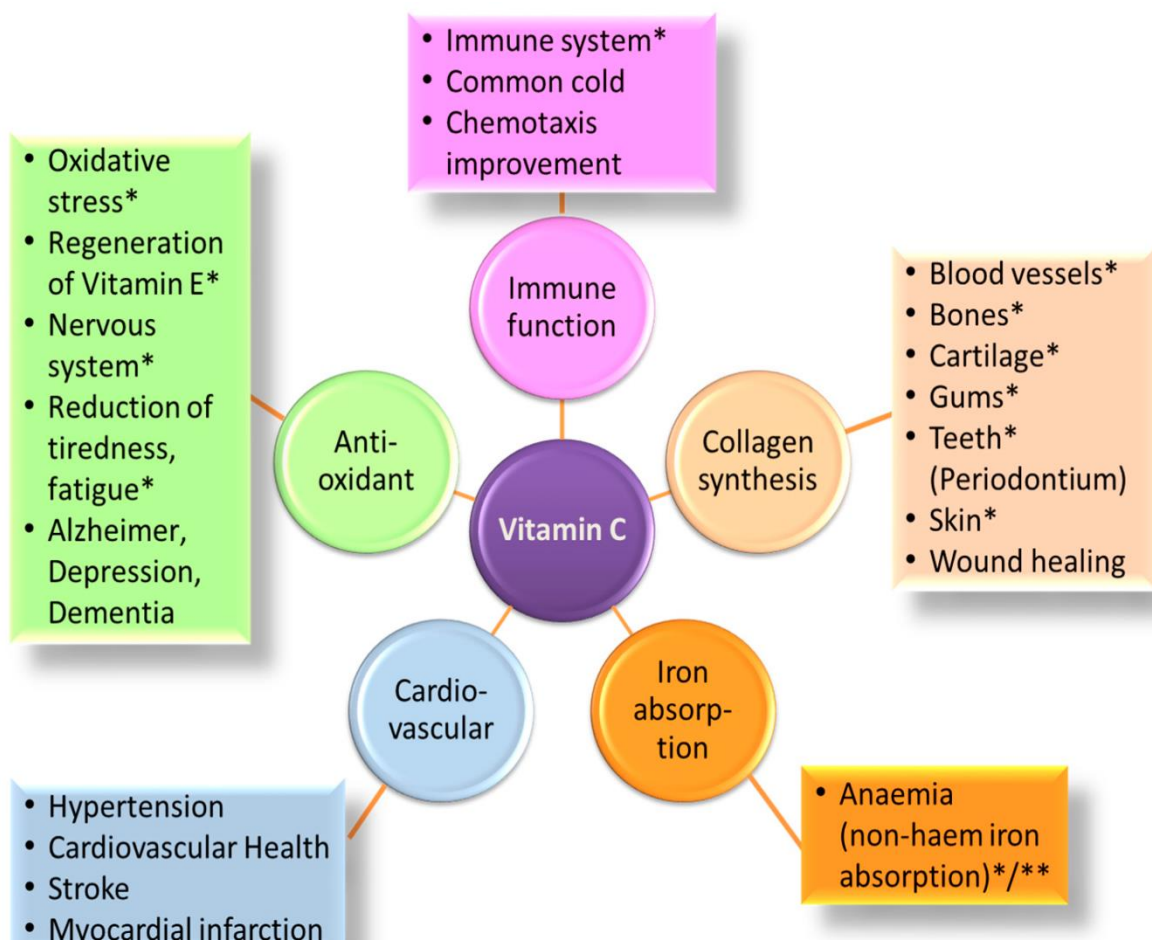
| | |
|---|---|
| Apple  100 grams 4.6 mg vitamin C | Watermelon  100 grams 8.1 mg vitamin C |
| Bananas  100 grams 8.7 mg vitamin C | Plums  100 grams 9.5 mg vitamin C |
| Avocados  100 grams 10 mg vitamin C | Cantaloupe  100 grams 36.7 mg vitamin C |
| Pineapple  100 grams 47.8 mg vitamin C | Lemon  100 grams 53 mg vitamin C |
| Orange  100 grams 53.2 mg vitamin C | Strawberry  100 grams 58.8 mg vitamin C |
| Lychee  100 grams 71.5 mg vitamin C | Kiwi  100 grams 92.7 mg vitamin C |

VITAMIN C RICH VEGETABLES



Functions of Vitamin C:

- Vitamin C keeps cells healthy and works as an antioxidant to protect cells.
- It helps to make our bones, ligaments, tendons, teeth and skin strong.
- It helps to convert fats into energy in our body.
- It helps our nervous system to work healthy.
- It helps to boost our Immune system.
- It helps in the synthesis of Collagen.
- It helps regulate Hormonal system
- It helps in healing wound.



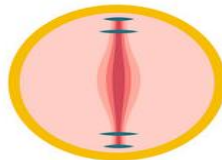
Vitamin C Deficiency Symptoms:

A deficiency in vitamin C will show itself in several different ways, and while the signs and symptoms may not seem too bothersome, the results of long-term vitamin C deficiency can be very detrimental to the body. A severe vitamin C deficiency may result in scurvy, a disease that is the result of collagen breakdown. Some other noticeable signs of vitamin C deficiency include:

- Dry / Hair Splitting
- Slow Wound Healing
- Rough and Dry Skin
- Fatigue and Bones Weakness
- Immune Impairment
- Bleeding form Nose
- Spoon shaped Nails
- Swelling and pain in joints
- Bleeding from Gums
- Digestive Disorders
- Anemia
- Tiredness and Weakness



**DRY/SPLITTING
HAIR**



**SLOW
WOUND HEALING**



EASY BRUISING



DRY SKIN



GINGIVITIS



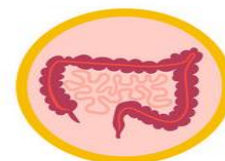
NOSEBLEEDS



**JOINT
PAIN**



**IMMUNE
IMPAIRMENT**



**DIGESTIVE
DISORDERS**

Diagnosis of Vitamin C:

- CBC Test (To Check Anemia).
- Blood Ascorbic Acid Test.
- Blood Iron Test.

Causes of Low Vitamin C in Blood:

- Poor Diet
- Smoking
- Anorexia Nervosa
- Diabetes and AIDS patient
- Dialysis Patient
- Pregnancy
- Patients with Iron overload

Treatment of Low Vitamin C Deficiency:

- Eating Diet Rich in Vitamin C
- Vitamin C Supplements

Recommended daily intake of Vitamin C

| Age | Male | Female | Pregnancy |
|----------------|---|--------|-----------|
| 0 – 6 Months | 40 mg | 40 mg | --- |
| 7 – 12 Months | 50 mg | 50 mg | --- |
| 1 - 3 Years | 15 mg | 15 mg | --- |
| 4 - 8 Years | 25 mg | 25 mg | --- |
| 9 - 13 Years | 45 mg | 45 mg | --- |
| 14 - 18 Years | 75 mg | 65 mg | 80 mg |
| 19+ Years | 95 mg | 75 mg | 85 mg |
| SMOKERS | Individuals who smoke require 35 mg/day more vitamin C than nonsmokers | | |

DETERMINATION OF VITAMIN C CONTENT IN FRUIT JUICES

PROBLEM STATEMENT

Which fruit juice has the highest content of Vitamin C?

HYPOTHESIS

Orange juice has the highest content of Vitamin C compound to lemon juice & pine apple juice.

MATERIALS

- (1) Three different fruit juices (Orange juice, Lemon juice and Pine apple juice)
- (2) Concentration of DCPIP solution (1%)
- (3) Concentration of DCPIP solution (0.1%)

APPARATUS

- (1) Measuring cylinders
- (2) 50 ml beakers
- (3) Graduated Pipette (or) Burette
- (4) Test tubes
- (5) Stop watch
- (6) Droppers etc.,

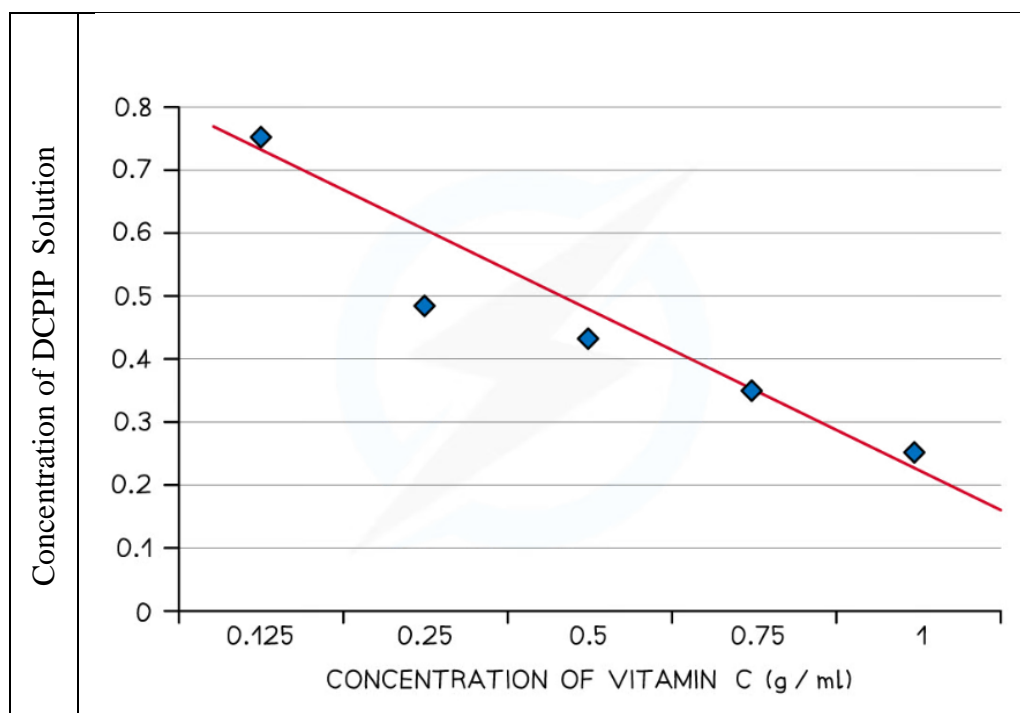
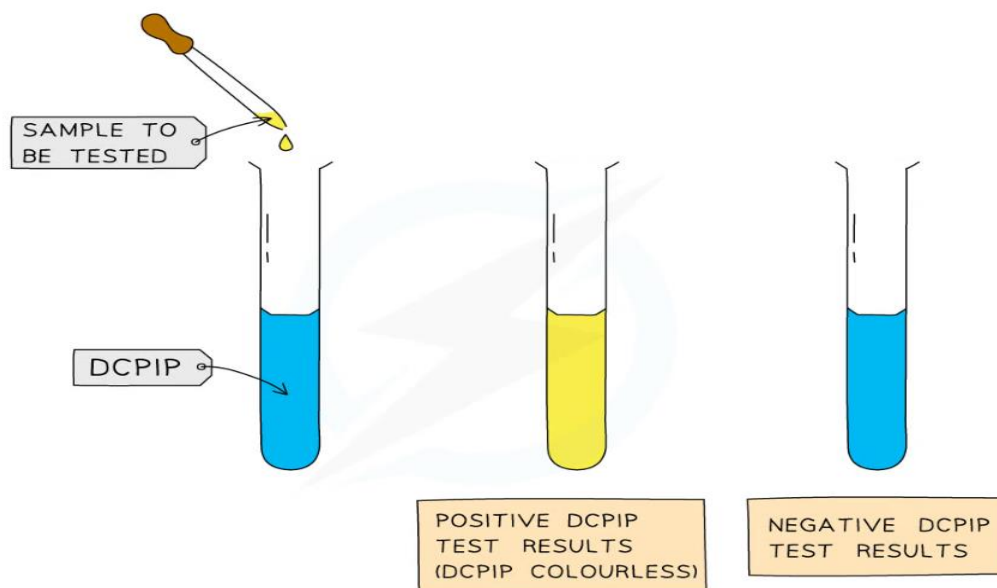
PROCEDURE

- Ascorbic acid is a good reducing agent and therefore it is easily oxidised
 - Methods for the detection of vitamin C involve titrating it against a solution of an oxidising agent called DCPIP
 - DCPIP is a blue dye that turns colourless in the presence of vitamin C
 - Note that titration is a method of chemical analysis that involves determining the quantity of a substance present by gradually adding another substance
1. Make up a series. e.g. three, of known vitamin C concentrations
This can be done by serial dilution
 2. Use a measuring cylinder to measure out 1 cm³ of DCPIP solution into a test tube
 3. Add one of the vitamin C solutions, drop by drop, to the DCPIP solution using a graduated pipette or burette
 4. Shake the tube for a set period of time using a stop watch
It is important to keep the shaking time the same for each concentration; this is a control variable
 5. When the solution turns colourless record the volume, in number of drops, of vitamin C solution added
 6. Repeat steps 2-5 for the same concentration twice more and calculate an average
 7. Repeat steps 2-6 for each of the known concentrations

8. Results can be plotted as a line of best fit showing the volume of vitamin C needed to decolourise DCPIP against the concentration of vitamin C

Result:

9. The volume of vitamin C solution required to decolourise DCPIP should decrease as the concentration of the vitamin C solution increases
10. Through this experiment it was known that Vitamin C is high in Orange juice.



ROLE OF VITAMIN C IN THE PREVENTION OF COVID-19 PANDEMIC

- The COVID-19 (SARS-CoV-2) virus was originally discovered in Wuhan, China. It was initially reported to the WHO on December 31, 2019 and is now spreading across the globe at an alarming rate.
- It is caused by infection with Severe Acute Respiratory Syndrome Corona-virus 2 (SARC-CoV-2).
- Reported to **WHO**, As on **23 December 2022 (at 4.54 pm)**:

| Number of COVID-19 | Confirmed Cases | Deaths |
|---------------------------|------------------------|------------------|
| Globally => | 65,19,18,402 | 66,56,601 |
| In India => | 4,46,76,678 | 5,30,690 |

- As of today, COVID-19 has infected millions of individuals globally, causing an asymptomatic illness, inadequate therapy and lengthy incubation periods.
- Vitamin C has many health benefits. It helps in strengthening our immune system and lower blood pressure. Daily intake of vitamin C is 75 mg for women & 90 mg for men.
- One study found that taking a vitamin C supplement relaxed the blood vessels that carry blood away from the heart, which helped lower blood pressure levels.
- Additionally, Vitamin C supplementation reduces systolic blood pressure by 3.8 mm Hg and diastolic blood pressure by 1.5 mm Hg, on average.
- Vitamin C has been used as an anti-oxidant in various diseases including viral illnesses like corona virus disease (COVID-19). For the prevention and treatment of viral respiratory tract infections
- Recommendations for vitamin C by adults have been set by various national agencies
- 40 milligrams per day India National Institute of Nutrition, Hyderabad
- 45 milligrams per day or 300 milligrams per week, The WHO
- Many studies assessed vitamin C deficiency and Pneumonia and found that patients with a low vitamin C intake required hospitalization much longer than those who had adequate amounts.

Conclusion:

Pertaining to old Proverb '**Health is Wealth**', health is not an option but a necessity to live a happy life. As the basic laws of good health are directly related to the food we eat, the amount of physical exercise we do, our cleanliness, sleep time. So taking good fresh homemade food, seasonal fruits and healthy lifestyle are necessary for happy living.

EAT HEALTHY STAY ACTIVE BE POSITIVE LIVE HAPPILY

PHOTOS:

