



The Outpatient Use of Ascorbic Acid in a Public Healthcare Organization in Riyadh Region

Original Research Article

ABSTRACT

Aim: The present study aimed to describe the outpatient use of ascorbic acid in a public healthcare organization in Riyadh Region.

Methodology: This is a retrospective study included reviewing the outpatient electronic prescriptions that contained ascorbic acid in a public healthcare organization in Riyadh Region.

Results: More than 51% of the patients who received ascorbic acid in the hospital during 2018 were females and the age of 57.14 % of them was less than 30 years. Most of the prescriptions were regular prescriptions (88.57%) and only 5.71% of the prescriptions were urgent prescriptions. More than 42% of the patients received ascorbic acid for 1 week and 37.14% of them received it for 1 month. Most of the prescriptions were prescribed by residents (85.71%) and most of these prescriptions were prescribed by emergency department (80.00%).

Conclusion: The prescribing of ascorbic acid was uncommon in the public hospital. More studies are needed to know the frequency and the pattern of using ascorbic acid in the public hospital and in other healthcare organizations in Riyadh Region.

Keywords: Ascorbic acid; outpatient; Vitamin C.

1. INTRODUCTION

Ascorbic Acid is a natural water-soluble vitamin (Vitamin C). Ascorbic acid is a potent reducing and antioxidant agent that functions in fighting bacterial infections, in detoxifying reactions, and in the formation of collagen in fibrous tissue, bones, teeth, skin, connective tissue, and capillaries [1]. Most animals and plants synthesize ascorbic acid for their own requirement. However, humans and apes cannot synthesize ascorbic acid due to lack of an enzyme gulonolactone oxidase [2].

Vitamin C is naturally found in fresh fruits and vegetables; for example, oranges, grapefruits, potatoes, lemons, limes, broccoli, spinach, tomatoes, and red peppers. Up to 90% of vitamin C is consumed in the form of fruits and vegetables. Lack of exposure to these foods has

been the most common cause of the vitamin C deficiency. Vitamin C deficiency, known as scurvy, is a disease mainly associated with socioeconomic status and access to food [3]. Symptoms of scurvy include easy bleeding, easy bruising, and joint and muscle pains [4].

Potential vitamin C deficiency and insufficiency is common. It is therefore possible, even in modern developed populations, that certain persons may require a higher intake of vitamin C [5]. Two large cohort studies focusing on vitamin C levels, conducted in the US and Canada, showed that the prevalence of low plasma vitamin C concentrations are as high as 22% to 33%, with 7% to 14% of affected individuals even exhibiting a potentially scorbutoxic deficiency [6,7]. Most people get enough vitamin C from a healthy diet. Vitamin C deficiency is more likely in people who smoke or are exposed to secondhand smoking,

have a limited diet that doesn't regularly include fruits and vegetables, or have certain gastrointestinal conditions or certain types of cancer, [8].

Ascorbic acid supplements are available in several dosage forms including oral capsule, oral liquid, oral gum, oral tablet, disintegrating tablet, chewable tablet, and extended release tablet [9]. Ascorbic acid is generally safe but could cause numerous adverse effects such as headache, nausea, heartburn, vomiting, and stomach cramps [10]. Moreover, it interacts with aspirin, Coenzyme Q10, docusate, duloxetine, Omega-3 polyunsaturated fatty acids, furosemide, metoprolol, and other medications [11]. This vitamin may also interfere with certain laboratory tests (including certain urine glucose tests), possibly causing false test results [12].

There is a lack of studies about the frequency and pattern of using ascorbic Acid. So, the present study aimed to describe the outpatient use of ascorbic acid in a public healthcare organization in Riyadh Region.

2. METHODOLOGY

This is a retrospective study included reviewing the outpatient electronic prescriptions that contained ascorbic acid in a public healthcare organization in Riyadh Region. The inclusion criteria include all of the outpatient prescriptions that contained ascorbic acid in 2018. Exclusion criteria include inpatient prescriptions as well as

the outpatient prescriptions that don't contain ascorbic acid.

The collected data included the demographic data of patients, the type of the prescriptions, the number of ascorbic acid prescriptions that were prescribed during different months of the study, the duration of ascorbic acid use, the level of prescribers who prescribed ascorbic acid, and the departments that prescribed ascorbic acid.

After that approval of the study by the Institutional Review Board committee, the data were collected in Excel spreadsheet and were represented as percentages and frequencies.

3. RESULTS and DISCUSSION

Only 35 patients received ascorbic acid in the hospital during 2018. More than 51% of the patients were females and the age of 57.14 % of them was less than 30 years. Table 1 shows the personal data of the patients.

Table 2 shows the type of the prescriptions that contained ascorbic acid. Most of the prescriptions were regular prescriptions (88.57%) and only 5.71% of the prescriptions were urgent prescriptions.

Table 3 shows the number of ascorbic acid prescriptions that were prescribed during different months of the study. Most of the prescriptions were prescribed in July (20.00%), January (11.43%), March (11.43%), and October (11.43%).

Table 1. The personal data of the patients

Variable	Category	Number	Percentage
Gender	Female	18	51.43
	Male	17	48.57
Age	10-19	10	28.57
	20-29	10	28.57
	30-39	7	20.00
	40-49	4	11.43
	50-59	2	5.71
	60-69	1	2.86
	More than 69	1	2.86
Nationality	Saudi	28	80.00
	Non- Saudi	7	20.00

Table 2. The type of the prescriptions that contained ascorbic acid

Prescriptions type	Number	Percentage
Regular	31	88.57

Emergency	1	2.86
Urgent	2	5.71
V.I.P	1	2.86

Table 3. The number of ascorbic acid prescriptions that were prescribed during different months

Month	Number	Percentage
January	4	11.43
February	3	8.57
March	4	11.43
April	3	8.57
May	1	2.86
June	1	2.86
July	7	20.00
August	2	5.71
September	2	5.71
October	4	11.43
November	3	8.57
December	1	2.86

Table 4 shows the duration of ascorbic acid use. More than 42% of the patients received ascorbic acid for 1 week and 37.14% of them received it for 1 month.

Table 4. The duration of ascorbic acid use

Duration	Number	Percentage
3 Days	3	8.57
4 Days	1	2.86
1 Week	15	42.85
10 Days	1	2.86
11 Days	1	2.86
15 Days	1	2.86
1 Month	13	37.14

Table 5 shows the level of prescribers who prescribed ascorbic acid. Most of the prescriptions were prescribed by residents (85.71%) and 8.57% of the prescriptions were written by consultants.

Table 5. The level of prescribers

Prescribers level	Number	Percentage
Specialist	2	5.71
Resident	30	85.71
Consultant	3	8.57

Table 6 shows the departments that prescribed ascorbic acid. Most of the prescriptions were prescribed by emergency department (80.00%) and 8.57% of the prescriptions were written by orthopedic department.

Table 6. The departments that prescribed ascorbic acid

Department	Number	Percentage
------------	--------	------------

Internal Medicine	2	5.71
Emergency	28	80.00
Neurology	1	2.86
Orthopedic	3	8.57
Nephrology	1	2.86

The prescribing of ascorbic acid was uncommon in the public hospital. This could be due to the availability of ascorbic acid in other healthcare centers and in community pharmacies. In contrary to that, Thomas et al stated that ascorbic acid and zinc gluconate are commonly available over-the-counter supplements that patients take for the treatment of viral infections [13]. Kalokerinos et al Informed that ascorbic acid is commonly used for managing numerous diseases and also as an adjunctive treatment in several infectious diseases [14]. Naidu reported that the ascorbic acid is widely used for the prevention or relief of common cold [2].

The age of 57.14 % of the patients was less than 30 years and the age of 28.57% of them was less than 20 years. This is rational because patients most frequently use vitamin C for treating and preventing the common cold [15] and young age is a risk factor for common cold. Infants and young children are at greatest risk of colds [16]. Centers for Disease Control and Prevention reported that one of the main risk factors for developing common cold is the age and that infants and young children have more colds per year than adults [17].

The presented study showed that most of ascorbic acid prescriptions were prescribed by residents (85.71%) and this is rational because ascorbic acid is generally safe. Furthermore, the present study showed that most of the prescriptions were prescribed by emergency department (80.00%) because numerous of the patients who visited emergency department have viral illness such as common cold.

4. CONCLUSION

The prescribing of ascorbic acid was uncommon in the public hospital. More studies are needed to know the frequency and the pattern of using ascorbic acid in the hospital. Further studies are needed to explore the use of ascorbic acid in other healthcare organizations in Riyadh Region.

DISCLAIMER

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT AND ETHICAL APPROVAL

As per university standard guideline, participant consent and ethical approval have been collected and preserved by the authors

ACKNOWLEDGEMENT

"This Publication was supported by the Deanship of Scientific Research at Prince Sattam bin Abdulaziz University"

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. National Center for Biotechnology Information. PubChem Compound Summary for CID 54670067, Ascorbic acid. Accessed December 2 2021. Available: <https://pubchem.ncbi.nlm.nih.gov/compound/Ascorbic-acid>.
2. Naidu KA. Vitamin C in human health and disease is still a mystery? An overview. *Nutr J.* 2003;2:7.
3. Maxfield L, Crane JS. Vitamin C Deficiency. [Updated 2021 Jul 18]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021. Available: <https://www.ncbi.nlm.nih.gov/books/NBK493187/>
4. Patient.info. Vitamin C Deficiency. Accessed December 2 2021. Available: <https://patient.info/healthy-living/vitamin-c-deficiency-leaflet>.
5. Hagel AF, Albrecht H, Dauth W, Hagel W, Vitali F, Ganzleben I, et al. Plasma concentrations of ascorbic acid in a cross section of the German population. *J. Int. Med. Res.* 2018;46(1):168-74.
6. Schleicher, RL, Carroll, MD, Ford, ES Serum vitamin C and the prevalence of vitamin C deficiency in the United States: 2003–2004 National Health and Nutrition Examination Survey (NHANES). *Am J Clin Nutr.* 2009;90:1252–1263.
7. Cahill, L, Corey, PN, El-Sohehy, A. Vitamin C deficiency in a population of young Canadian adults. *Am J Epidemiol.* 2009;170:464–471.
8. MayoClinic. Vitamin C. Accessed December 2 2021. Available: <https://www.mayoclinic.org/drugs-supplements-vitamin-c/art-20363932>.
9. Drugs.com. Ascorbic acid. Accessed December 2 2021. Available: <https://www.drugs.com/mtm/ascorbic-acid.html>.
10. Rxlist. Ascorbic Acid. Accessed December 2 2021. Available: <https://www.rxlist.com/ascorbic-acid-drug.htm>.
11. Drugs.com. Ascorbic acid Interactions. Accessed December 2 2021. Available: <https://www.drugs.com/drug-interactions/ascorbic-acid.html>.
12. Webmd. Vitamin C-Juice C 500 Tablet - Uses, Side Effects, and More. Accessed December 2 2021. Available: <https://www.webmd.com/drugs/2/drug-58273/vitamin-c-juice-c-500-oral/details>.
13. Thomas S, Patel D, Bittel B, Wolski K, Wang Q, Kumar A, et al. Effect of High-Dose Zinc and Ascorbic Acid Supplementation vs Usual Care on Symptom Length and Reduction Among Ambulatory Patients With SARS-CoV-2 Infection: The COVID A to Z Randomized Clinical Trial. *JAMA Netw Open.* 2021;4(2):e210369.
14. Kalokerinos A, Dettman I, Meakin M. Endotoxin and vitamin C part 1—Sepsis, endotoxin and vitamin C. *JACNEM.* 2005;24(1):17-21.
15. Webmd. Vitamin C (Ascorbic Acid). Accessed December 2 2021. Available: <https://www.webmd.com/vitamins/a/i/ingredientmono-1001/vitamin-c-ascorbic-acid>.
16. MayoClinic. Common cold. Accessed December 2 2021. Available: <https://www.mayoclinic.org/diseases-conditions/common-cold/symptoms-causes/syc-20351605>.
17. CDC. Colds. Accessed December 2 2021. Available: <https://www.cdc.gov/antibiotic-use/colds.html>.