

Characteristics and Demographic Features of Vitamin A Deficiency in Sudan during War, 2023-2024

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Abstract

Background: A deficiency is a public health issue for many children and adults. In wartime hardship, patients eat little meat, dark vegetables, and fruits, which can cause vitamin A deficiency and corneal dryness, erosion, ulceration, and perforation. The purpose of this study was to identify the characteristics and demographics of vitamin A insufficiency in Sudan during the 2023-2024 war. **Methodology:** This prospective descriptive study was carried out between June 15, 2024, and August 15, 2024, at Dr. Khalil's Ophthalmology Center in North Kordofan, Sudan. The study looked at 100 individuals who presented at the clinic complaining of deficient night vision (including full coverage during the notification period). **Results:** In this study, only six patients had corneal opacity, with 67% being males and 33% females. In terms of Bitto's spots, 12% are present, with males and females having 58% and 42%, respectively, and 46% having dry eyes. 52% were males and 48% were females in terms of retinal pigmentation. Only one female patient exhibited peripheral retinal pigmentation, which was due to retinitis pigmentosa; all patients had inadequate food intake; and no diarrhea was reported. **Conclusion:** In Sudan, the rise in vitamin deficiency can be attributed to the inadequate development of all health system programs. Additionally, the devastating war, which primarily affects young people, has forced most people to leave their homes and become either displaced or refugees. Consequently, 69% of the patients were 17 years old or younger. **Keywords:** Corneal opacity, night blindness, Bitto's spots, dry eye.

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INTRODUCTION

Vitamin A is a non-water-soluble vitamin that is essential for vision, particularly night vision. A deficiency in Vitamin A leads to night blindness, primarily due to a lack of carotenoids in vegetables and fruits. The destructive war that has been raging since 2023 has forced families to flee their homes, leaving them nutritionally deficient in the main minerals and vitamins essential for the body's functions. Vitamin A can also be found in animal products and is required for certain metabolic processes. The human body has the potential to convert provitamin to the active form of vitamin A, which is responsible for all physiological activities [1]. So vitamin A is a broad phrase that refers to a variety of fat-soluble compounds such as retinol, retinyl palmitate, and beta-carotene. It comes in a variety of forms and is crucial for vision, particularly night

vision, as well as cell division, epithelial function, and immunity. Animal sources (retinol and retinyl ester) and colored fruits and vegetables (beta-carotenoid) both provide Vitamin A [2]. A vitamin A shortage develops when individuals consume a diet low in animal sources, dark vegetables, and fruits. So, vitamin A supplements in young infants are critical nutrients that protect against mortality-related measles, diarrhea, and other infections while also improving the immune system [3].

Given the strong correlation between vitamin A deficiency and soil-transmitted helminthiasis, it is crucial to distribute vitamin A to all countries with suspected vitamin A deficiency. This is because approximately 75% of countries with moderate or severe vitamin A deficiency also have coendemic soil-transmitted helminthiasis, making it a critical public health issue to

address [4]. Furthermore, vitamin A deficiency can lead to severe complications such as corneal dryness, which can lead to corneal erosion, corneal ulceration, perforation, corneal opacity, and blindness. Therefore, policymakers should be encouraged to implement a standard policy to prevent this serious problem. Given that dietary deficits of provitamins seem to pose a significant concern, policymakers should take this into consideration. We should make a concerted effort to avoid vitamin A problems, as they are preventable. Ethiopian researchers discovered that poor night vision, bitot's spots, corneal dryness, and corneal scarring are indicators of vitamin A insufficiency. Giving vitamin A to youngsters can prevent all of these [5].

MATERIALS AND METHODS

The current prospective descriptive study was carried out at Dr. Khalil's Ophthalmology Center in North Kordofan State, Sudan, from June 15, 2024, to August 15, 2024. The study examined a group of 100 patients who presented at the clinic with complaints of impaired night vision, which included complete coverage during the specified period.

Ethical consent: All patients and child parents gave their agreement to participate in the study.

Ethical Approval

The Human Research Ethics Committee at MRCC approved this research proposal (Approval Number: HREC 0007/MRCC.3/24).

Statistical Analysis

We imported the data sets into a statistical package for social sciences (SPSS Inc., Chicago, IL, version 24) and extracted the findings. The chi-square test determined that P-values less than 0.05 were statistically significant.

RESULTS

This study investigated 100 people with night blindness aged 2 to 85 years, with a mean age of 23 years and a majority of 69% being under or 17 years old. In this study, only six patients had corneal opacity, with 67% being male and 33% being female. Bitto's spots are found in 12% of the population, with males accounting for 58% and females for 42% (see Images 1 and 2). Except for one female patient, all patients have no retinal pigmentation (RP), and all patients have a poor food intake, with the exception of one patient who has a healthy diet. All patients do not have diarrhea. 46% suffer from dry eye. 52% were men and 48% were women See Table 1 and Figure 1 below.

Table 1: Illustrates the distribution of clinical presentations and demographic features associated with vitamin A deficiency

Category	Variables	Males	Females	Total
Corneal opacity	No corneal opacity	49	45	94
	Corneal opacity	6	3	9
Bitto's spots	No Bitto's spots	46	42	88
	Bitto's spots	7	5	12
RP	No RP	53	46	99
	RP	0	1	1
Poor diet intake	Poor diet intake	52	47	99
	Good diet intake	1	0	1
diarrhea	No diarrhea	53	47	100
Dry eye	No Dry eye	29	25	54
	dry eye	24	22	46

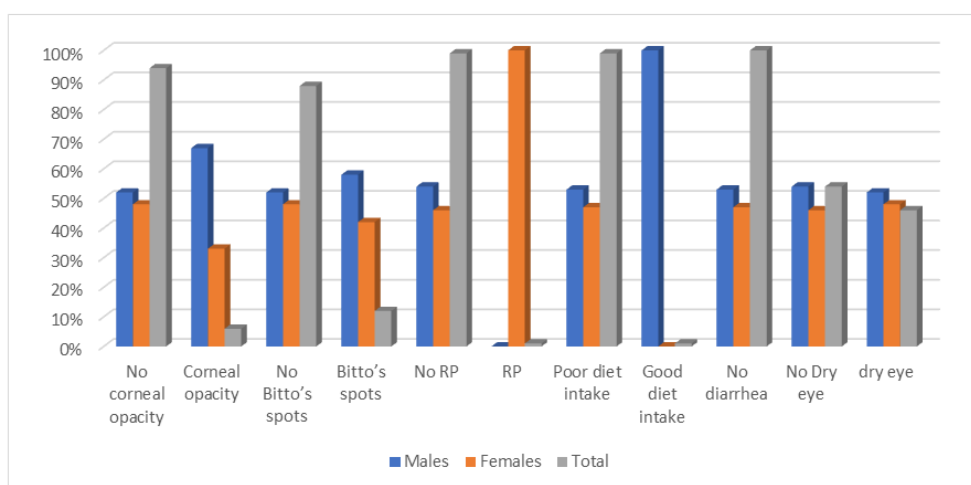


Figure 1: Shows the distribution of clinical presentation and demographic features of vitamin A deficiency according to the patient's sex

The study focuses on the distribution of clinical features and demographic data according to the age groups of the patients. So corneal opacity was discovered in 6 patients dispersed as follows, with age groups <9 years represented by 2/6 (33%), 10-13 years represented

by 1/6 (17%), and >36 years represented by 3/6 (50%). Bitto's spots affect 12% of patients, with 50% (6/12) in the age range 10-13 years, 25% (3/12) in the age group 10-16, and 17% (2/12) in the age group <9 years. Except for one patient aged 14-16 years.

Table 2: Shows distribution of clinical feature according to the age groups of the patient

Category	Variables	<9 years	10-13	14-16	17-35	>36	Total
Corneal opacity	No CO	20	21	18	20	15	94
	CO	2	1	0	0	3	6
Bitto's spots	No Bitto's spots	20	16	15	20	17	88
	Bitto's spots	2	6	3	0	1	12
RP	NO RP	22	22	17	20	18	99
	RP	0	0	1	0	0	1
Good dietary intake	Poor diet intake	22	21	18	20	18	99
	Good diet intake	0	1	0	0	0	1
Diarrhea	No diarrhea	22	22	18	20	18	100
Dry eye	No dry eye	10	12	12	14	6	54
	Dry eye	12	10	6	6	12	46

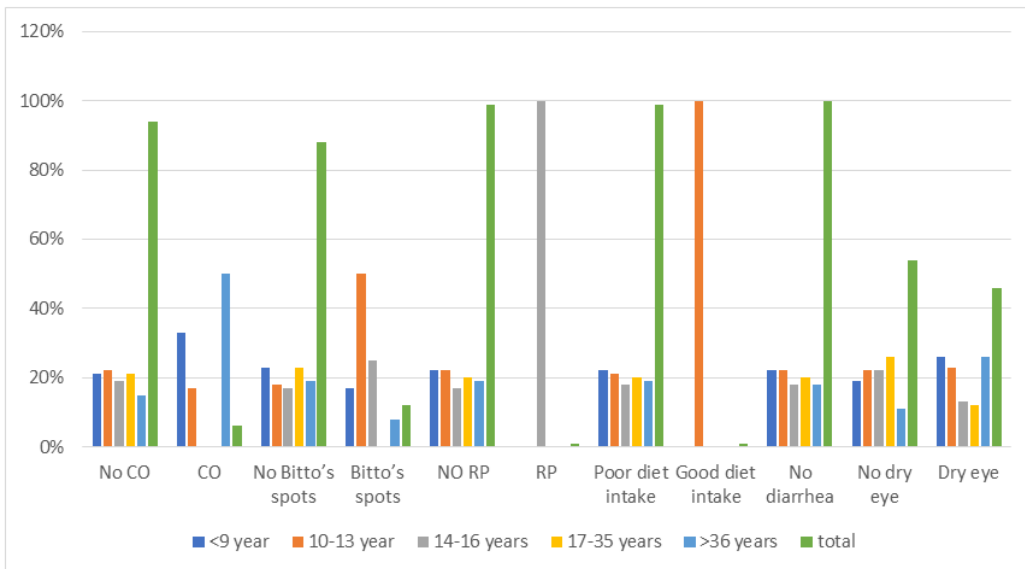


Figure 2: Shows distribution of clinical feature according to the age groups of the patients



Image 1: Bitto's spots in 8 years old child

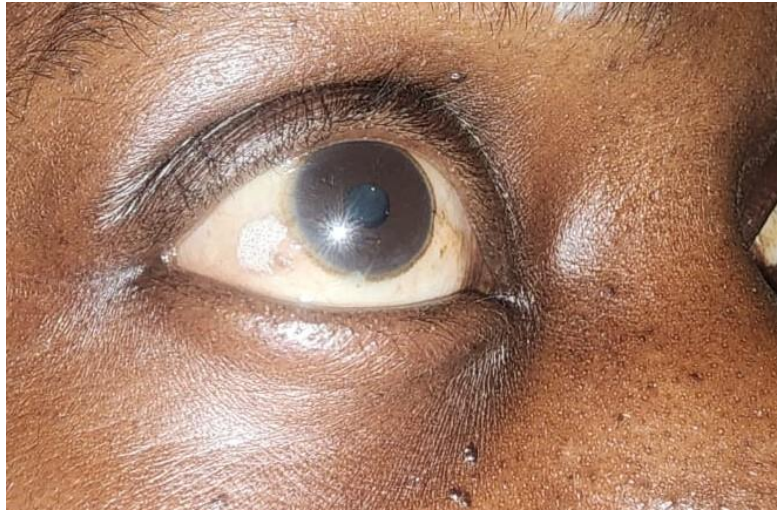


Image 2: Bitto's spots in 60 years old female

DISCUSSION

Considering the Sudan conflict, which has caused widespread destruction and distress in all areas of life, nutritional shortage is seen as a significant catastrophe. Consequently, many individuals have been forced to leave their homes and become either displaced or refugees. The most impacted population consists of children and the elderly. Therefore, the present study aims to investigate the effects of vitamin A insufficiency on demographic features and patient eyes, as it is a significant issue with consequences that can result in blindness. Therefore, it is crucial to consider nutritional insufficiency or imbalance when suspecting a vitamin A deficit. Additionally, any individuals who report difficulties in opening their eyes should be suspected of having vitamin A deficiency. It is noteworthy that the majority of children suffering from vitamin A insufficiency do not exhibit the dry eye symptom. Consequently, the number of children displaying ocular indications is relatively low in comparison to those with vitamin A deficiency. Thus, there exist several additional youngsters within the society that suffer from vitamin A deficiency while having normal eyesight. Therefore, it is crucial to undertake a search throughout the community to identify all children who have vitamin A insufficiency yet possess normal eyesight [7]. Therefore, the present study reveals that only 46% of children suffer from vitamin A insufficiency and night blindness with dry eye, while the remaining children have normal eyesight and vision. Furthermore, it is possible to avoid blindness caused by vitamin A deficiency, particularly in low-income countries. Regarding Bitto's spot, it is regarded as a diagnostic indicator of vitamin A deficiency and can be effectively treated with vitamin A supplementation. Bitto's spots are keratin deposits on the conjunctiva. In this study, it was established that Bitto's spots were present in 12% of the patients. Regarding their dietary consumption, almost all of my patients obtain inadequate vitamin A-rich foods due to poverty. Consequently, their diet consists mostly of fruits, vegetables, and animal items such as meat and milk. In high-income and well-

resourced countries, it is necessary to reassess the dietary intake and suspicion of vitamin A deficiency in potentially affected children. In individuals exhibiting one or more signs and symptoms, vitamin A insufficiency continues to be considered as one of the differential diagnoses. Early diagnosis is crucial for the right involvement of a multidisciplinary team in order to optimize care and reduce morbidity and mortality [11]. In the community-based study conducted in Ethiopia on a randomly selected sample of 411 children, it was observed that 0.7% of the children had bitot's spots, while 0.2% had corneal opacity. Therefore, all 100 patients in this study had impaired night vision, with 12% having bitot's spots and 6% having corneal opacity [5]. Thus, vitamin A insufficiency poses a substantial public health issue in several low-income nations [12]. The growth of vitamin deficiency in our country can be attributed to the inadequate progress of health system initiatives, which has been exacerbated by the devastating conflict. The impact of this issue is particularly severe on youngsters, including 69% of the patients who are 17 years old or younger.

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