



Therapeutic Efficacy of Vitamin A in the Treatment of Idiopathic Microscopic Hematuria in Children

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Received 2020 December 01; Accepted 2021 January 15.

Abstract

Background: Hematuria is a symptom with a prevalence of 0.5% to 2% in those aged 5 - 12 years. Different factors can influence the severity of hematuria, including vitamin A (as a micronutrient).

Objectives: The current study aimed to evaluate the therapeutic effect of vitamin A on hematuria in children.

Methods: In this clinical trial study, 156 children aged 5 - 12 years with Idiopathic Microscopic Hematuria are studied. Participants were divided into two groups of treatment and control (each with 76 subjects). Those in the treatment group received vitamin A as a pearl of 25000 in 14 days, in addition to the routine treatment. The control group only received routine handling. The basic information of patients were recorded using an author-develop form by the supervisor and intern. Urine samples were collected on 14, 28, and 42 days. Data were analyzed using SPSS. Statistical significance was considered when P-value < 0.05.

Results: There was no significant difference between the two groups concerning gender (P = 0.202), age (P = 0.330), father's education (P = 0.152), mother's education (P = 0.392), father's occupation (P = 0.125), mother's occupation (P = 0.265), and numbers of children in the family (P = 0.209) variables. Hematuria status on days 14 (P = 0.014), 28 (P = 0.001), and 42 after treatment (P = 0.001) was statistically more positive in the vitamin A group. Hence, there was a significant difference between the two groups.

Conclusions: Vitamin A can reduce idiopathic microscopic hematuria. Hence, vitamin can be used as an alternative treatment to treat idiopathic hematuria in children.

Keywords: Vitamin A, Treatment, Idiopathic, Microscopic Hematuria, Children.

1. Background

Hematuria is the presence of 5 or more red blood cells (RBCs) per high-power field in 3 of 3 consecutive centrifuged specimens that obtained at least 1 week apart. School-age children account for 3 - 4% of all microscopic hematuria detected in a single urine sample, which falls to 1% or less for two or more positive samples (1-3). This condition may be gross or microscopic, microscopic hematuria is classified into asymptomatic and symptomatic, which can be with or without proteinuria. Asymptomatic isolated microscopic hematuria is the most common presentation of microscopic hematuria. In the present study, we evaluated microscopic idiopathic (4, 5).

Hematuria management contains focusing on weight gain to increase retroperitoneal fat, which in turn leads to decompression of the left renal vein due to a change in the position of the left kidney. However, other methods

and drugs may improve this condition (6, 7). From these drugs, we evaluate probably effect of vitamin A in children. Vitamin A is an important micronutrient factor that can influence different systems of the body. In addition, vitamin A, as an unsaturated nutritional organic compound, influences the growth, development, maintenance of the immune system and is an important hormone-like growth factor for epithelial and other cells. Globally, it is estimated that vitamin A deficiency (VAD) affects approximately one-third of children under the age of five (8, 9).

2. Objectives

Health care providers are faced with the challenge of better managing and treating hematuria in children as well as preventing its complications. In addition, vitamin A, as a micronutrient factor, can effectively control hema-

turia. Therefore, the current study aimed to investigate the effects of vitamin A in controlling hematuria as an alternative therapeutic compound.

3. Methods

3.1. Study Setting

This study was conducted in Amir-Kabir hospital in Arak city.

3.2. Study Population

In this clinical trial study, 156 children aged 5 - 12 years with Idiopathic Microscopic Hematuria are studied. Participants were divided into two groups of treatment and control (each with 76 subjects). The objectives of the study were explained to the parents. For children in the experiment group, parents were explained about the safety of the intervention. After obtaining informed written consent from eligible participants, patients were randomly allocated to two groups of treatment and control, each with 76 subjects. Those in the treatment group received vitamin A as a pearl of 25000 in 14 days, in addition to the routine treatment. The control group only received routine handling without knowledge of vitamin A recipients. Inclusion criteria were being aged 5 to 12 years and definitive diagnosis of microscopic idiopathic hematuria with no reason for hematuria. The exclusion criteria included suffering from renal anomalies, receiving other drugs, identified etiology of hematuria, and unwillingness to participate or continuing the study.

3.3. Ethical Considerations

With performed necessary proceedings, including monitoring and follow-up of continuing hematuria, for all children with microscopic idiopathic hematuria, only we started vitamin A as an alternative therapeutic option in the interventional group. As the recommended vitamin A used in the present study causes no side effects, the current study contains no ethical issue. However, the present study is confirmed by the Ethics Committee of the Arak University of Medical Sciences (code: 93-165-29) and is registered at Iran clinical trial center (code: IRCT 2014091013366N3). Besides, the authors did their best to observe all ethical issues, including plagiarism, data fabrication, and double publication.

3.4. Measurement

The profile of each patient was individually recorded using author-developed forms. Call number of project managers was accessible for patients, in order to remove

and prevention of any ambiguity in the study process. After coding all forms, information collected by the supervisor and intern, patients were divided into two groups of treatment and control. Then, urine samples were collected on 14, 28, and 42 days after treatment.

3.5. Statistical Analysis

Data were analyzed by χ^2 test for qualitative variables and t-test for quantitative variables using SPSS. Statistical significance was considered when P-value < 0.05.

4. Results

The mean age of participants was 7.41 ± 2.16 (control group: 7.52 ± 2.42 ; treatment group: 7.31 ± 1.90). There was no significant difference between the two groups concerning the age of participants ($P = 0.202$). Also, 48% of participants were male, and 52% were female. In both groups, the number of males was equal to females ($P = 0.330$). In addition, other demographic information including father's education ($P = 0.152$), mother's education ($P = 0.392$), father's occupation ($P = 0.125$), mother's occupation ($P = 0.265$), and numbers of children in the family ($P = 0.209$) were equal in both groups (Table 1). Hematuria status of children was observed before and after vitamin A consumption. Fourteen days after treatment, hematuria was positive in 90.8% ($n = 69$) of the treatment group and 100% ($n = 76$) of the control group ($P = 0.014$). Also, 28 days after treatment, hematuria was positive in 59.2% of subjects in the treatment group and 94.7% of subjects in the control group ($P = 0.001$). Forty-two days after treatment, hematuria was positive 40.8% and 75% of subjects in treatment and control groups (Table 2), respectively. Hence, there was a significant difference between the two groups ($P = 0.001$).

5. Discussion

Hematuria is a urological disorder that depends on the nutritional status. Vitamin A is an important micronutrient that can improve several health conditions. In the present study, we evaluated hematuria status in two groups of children, with and without vitamin A consumption, to assess the therapeutic effects of vitamin A on hematuria. Few studies have investigated the effect of vitamin A hematuria. Hence, in the following, the most related studies are discussed. Yesilkaya et al., investigated 88 patients who were treated for 6 months and monitored them monthly by complete urinalysis, found no significant difference between the two groups. However, in the present study, hematuria was lower in the treatment group compared to the control group (10). Solak et al. present a case

Table 1. Demographic and Epidemiologic Information of Children in Treatment and Control Groups

Variables	Groups		Total	P Value
	Treatment	Control		
Age				0.202
Mean	7.31	7.52	7.41	
SD	1.90	2.42	2.16	
Gender				0.330
Male	33(43.4)	40(52.6)	73(48)	
Female	43(56.6)	36(47.4)	79(52)	
Fathers' education				0.152
Diploma and lower	45(59.2)	37(48.7)	82(54.0)	
Associate degree	2(2.6)	6(7.9)	8(5.2)	
Bachelor	20(26.3)	28(36.8)	48(31.6)	
Master degree and higher	9(11.9)	5(6.6)	14(9.2)	
Mothers' education				0.392
Diploma and lower	42(55.3)	41(53.9)	83	
Associate degree	2(2.6)	2(2.6)	4	
Bachelor	24(31.6)	18(23.7)	42	
Master degree and higher	8(10.5)	15(19.8)	23	
Fathers' occupation				0.125
Employee	24(31.6)	36(47.4)	60	
Employer	1(1.3)	2(2.6)	3	
Self-employer	45(59.2)	36(47.4)	81	
Medical doctor or engineer	6(7.9)	2(2.6)	8	
Mothers' occupation				0.265
Employee	31(40.8)	31(40.8)	62	
Housewife	44(57.9)	39(51.3)	83	
Employer	1(1.3)	6(7.9)	7	
Number of children in family				0.209
0	31(40.8)	34(44.7)	65	
1	32(42.1)	20(26.3)	52	
2	10(13.2)	17(22.4)	27	
3	3(3.9)	4(5.3)	7	
4 and higher	0(0)	1(1.3)	1	

report study, on the correlation between the level of serum uric acid and vitamin A consumption. They concluded that vitamin A could increase the level of serum uric acid (11). Bass et al. observed clinical manifestations of VAD in infants. They discussed two cases and found severe anemia, hydrocephalus, hematuria, and xerophthalmia as complications of VAD (12).

Ming Yang et al. evaluated the therapeutic effects of

vitamin A in measles and found no significant decline in mortality in both groups (13). Richard et al., in a study about the effects of periodic vitamin A supplementation on mortality and morbidity of human immunodeficiency virus-infected children, evaluated the efficacy of vitamin A supplementation. They found that vitamin A supplementation was associated with a decreased mortality rate in HIV-infected children (14). Victor et al. considered VAD as

Table 2. Hematuria Status of Children after Treatment with Vitamin A in Three Periods

	Periods of Treatment with Vitamin A					
	14 Days After Treatment		28 Days After Treatment		42 Days After Treatment	
	Treatment	Control	Treatment	Control	Treatment	Control
Hematuria						
Positive	69 (90.8)	76 (100)	45 (59.2)	72 (94.7)	31 (40.8)	57 (75)
Negative	7 (9.2)	0 (0)	31 (40.8)	4 (5.3)	45 (59.2)	19 (25)
P value	0.014		0.001		0.001	

an effective factor in children's survival. A study by Sarah et al. (15) on 141 severely anemic children, which used vitamin A (100000 or 200000 IU depending on the age) as the intervention found that vitamin A could significantly decrease erythropoietin concentration and inflammation. In addition, they found that vitamin A could mobilize iron from stores and stimulated the production of new erythrocytes (16). Seal et al., in a study, evaluated VAD in the long term and concluded that poor nutrition and public health programs contribute to vitamin deficiency (17). The current study has limitations, including parental noncompliance, that after explaining to them about the importance of this issue, they were convinced. However, because of few clinical studies about the therapeutic effect of vitamin A in hematuria and unclear mechanism, further studies are needed to provide valid evidence. In addition, the authors recommend further studies with a larger sample size and higher doses of vitamin A and in longer durations on hematuria.

5.1. Conclusions

This study demonstrated that vitamin A could reduce the hematuria status of children. So it can be used for treating children with idiopathic microscopic hematuria.

Acknowledgments

This study is performed in partial fulfillment of the requirements for Dr. Saeide Abbasi, in the School of Medicine, Arak University of Medical Sciences, Arak, Iran.

Footnotes

Authors' Contribution: Parsa Yousefichaijan planned and carried out the study. Fatemeh Dorreh, Hassan Taher Ahmadi, and Ali Arjmand performed the clinical testing of the patients participating in the study. Masoud Rezagholizamenjany and Saeide Abbasi helped to draft the manuscript. Mohamad Rafiei performed the statistical analysis. In addition, all authors approved the final manuscript.

Clinical Trial Registration Code: IRCT 2014091013366N3

Conflict of Interests: The authors declared no competing interests.

Ethical Approval: With performed needed proceedings, including monitoring and follow-up of continuing hematuria, for all children with microscopic idiopathic hematuria, only we started vitamin A as an alternative treatment method in the interventional group. Based on that, there are not any side effects of vitamin A in a given dose, so there are not any ethical problems. In addition, ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors, and the ethical committee of Arak University of Medical Sciences approved the study protocol by the ethical number of 93-165-29.

Funding/Support: The authors did not receive any funding report/ support details.

Informed Consent: Informed written consent was obtained from all participants.

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