

## Plasma Ascorbic Acid Levels in Children with Measles

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### SUMMARY

Osinusi K, Ette SI and Akinwolere OAO. Plasma Ascorbic Acid Levels in Children with Measles. *Nigerian Journal of Paediatrics* 1988, 15:15 Plasma concentration of ascorbic acid was determined in sixty-six children with haemorrhagic measles and a group of matched controls. The mean ascorbic acid level of  $0.33 \text{ mg/dl} \pm 0.16$  among the children with measles was significantly lower than a mean of  $1.00 \text{ mg/dl} \pm 0.19$  among the controls ( $P < 0.001$ ). Although there was no direct relationship between the level of ascorbic acid and severity of measles infection, the level of ascorbic acid increased as the condition improved in the patients who were followed up. It is postulated that very low level of ascorbic acid in these children was due to the effect of measles infection, thus giving rise to some scurvy-like features. It is possible increased as the condition improved in the patients who are followed up. It is postulated that very low level of ascorbic acid in these children was due to the effect of measles infection, thus giving rise to some scurvy-like features. It is possible that ascorbic acid given in therapeutic doses to children with measles may hasten recovery and improve the poor prognosis of this disease in developing countries. There is a need for a controlled study to evaluate the effect of ascorbic acid in the treatment of measles.

### Introduction

MEASLES is a serious problem among the under-five children in the tropics.<sup>1</sup> Although the clinical course of measles in developing countries follows the general pattern described elsewhere,

the clinical manifestation are usually more severe than those reported in Europe and North America. The haemorrhagic nature of the measles rash, the red velvety appearance of the mucous membrane with tendency to bleed easily and the severe desquamation that follows the rash in some Nigerian children have been described<sup>2-3</sup>

The pathogenesis of these features is not clearly understood, but the similarity between the described features and some of the clinical manifestation of scurvy suggests that ascorbic acid

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deficiency might play a role in the production of the features characteristic of haemorrhagic measles.

The objective of the present study was to compare the ascorbic acid levels in children with haemorrhagic measles and to study the trend of ascorbic acid levels as the conditions of the children improved, in an attempt to define the relationship between measles and ascorbic acid levels.

**Materials and Methods**

The subjects comprised two groups of children; the first group consisted of 66 children (35 males and 31 females) aged 7 to 42 months with haemorrhagic measles, who also had ulceration of the gum and buccal mucosa.

Only children from low socio-economic class as determined by parents' occupation were recruited into the study. Most of the fathers were artisans and junior workers in government and private establishments while most of the mothers were petty traders. Although none of the children had

signs of protein-energy malnutrition, 55 (83.3%) were below the 50th percentile on the local weight chart,<sup>4</sup> while the remaining 11 (16.7%) were just above the 50th percentile.

The second group comprised 27 children (14 males and 13 females) in the same age range, from the same socio-economic background who did not have measles. they were part of a community-based longitudinal study; they had no complaints but required venepuncture as part of the study protocol for which informed consent had been obtained. Of this group, 19 (70.4%) were below the 50th percentile on the local weight chart while the remaining<sup>8</sup> (29.65 were above the 50th percentile).

Ten millilitres of blood obtained by venepuncture was placed in a heparinized tube. The plasma obtained by centrifugation was used for assay of ascorbic acid according to the technique of Denson and Bowers Seventeen of the children with measles were followed up and ascorbic acid levels were again assayed in them after six weeks; seven of them had a third level of ascorbic acid determined

**TABLE I**

**Plasma Ascorbic levels in Children with Measles (subjects) and in controls**

	Male			Female			No of cases	All Mean (mg/100ml)	SD
	No of Cases	Mean (mg/100ml)	SD	No of cases	Mean (mg/100ml)	SD			
Subjects	35	0.37	0.15	31	0.35	0.17	66	0.33	0.1
Controls	14	0.92	0.14	13	0.93	0.14	27	1.001	0.19
t		12.22			11.84			16.17	
p		< 0.001			< 0.001			< 0.001	

SD = Standard Deviation.

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six weeks after the second. Students t-test was used to compare mean values.

### Results

Table I compares the means plasma ascorbic acid levels in patients with measles (subject) and in controls. The mean ascorbic acid level of 0.33 mg/dl in the subjects was significantly lower than that of the control group (1.001mg/dl, p 0.001). In both the

study and control groups there was no significant difference in the ascorbic acid levels between the males and the females. The mean ascorbic acid level of  $0.34 \pm 0.17$ mg/dl in the 55 children with measles whose weights fell below the 50th percentile on the local weight chart was not significantly different from one of  $0.32 \pm 0.16$ mg/dl in the 11 measles patients whose weights were above the 50<sup>th</sup> percentile (p < 0.05).

**TABLE II**  
**Plasma Ascorbic Acid levels in Patients with Measles at Presentation and during Convalescence**

Patients	Ascorbic Acid Level at Presentation	2nd Level 6 weeks later	3rd Level 6 weeks after 2nd Level
BB	0.4	0.50	-
TH	0.43	0.44	-
MM	0.53	0.60	-
AT	0.24	0.31	-
KO	0.24	0.30	-
CC	0.28	0.34	-
AM	0.31	0.38	-
AI	0.33	0.44	-
AM	0.32	0.40	0.49
ST	0.48	0.50	0.56
YL	0.51	0.55	0.59
OD	0.49	0.52	0.56
SL	0.61	0.58	0.66
AR	0.22	0.28	0.36
AS	0.29	0.36	0.40

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There was no direct relationship between the level of ascorbic acid and the severity of the measles infection but the level of ascorbic acid increased as the condition improved in the patients who had second and third ascorbic acid levels determined. Talbe II shows the trend of ascorbic acid in the subject who had ascorbic acid levels determined during convalescence.

### **Discussion**

Although it is well known that ascorbic acid is essential for good health, its role in the prevention and treatment of common cold and other viral infection remains controversial. While some workers have reported objective benefits and improvement<sup>6,7</sup>, some have reported no effect<sup>8,9</sup> and others have reported negative effects<sup>10-13</sup>.

The mean ascorbic acid level in the control group who had the same nutritional status as the study group was similar to the level reported from healthy controls from a previous study<sup>14</sup>, but higher than the level in children with measles. This and the fact that the ascorbic acid level in the study group increased progressively during convalescence indicate that the ascorbic acid level in the study children was lowered by measles infection and it improved as the infection subsided.

Ascorbic acid is important in the hydroxylation of lysine and proline, a necessary intermediate step in biogenesis of collagen, a primary component of connective tissue. Derangement of the above process might be important in the pathogenesis of haemorrhagic measles. It has been suggested that supplemental ascorbic acid increase resistance to disease by strengthening the intercellular substance, hence encouraging normal tissue to resist invasion by infection<sup>15</sup>. Pauling<sup>15</sup> predicated that people who take optimum quantity of ascorbic acid at each age would have only one quarter as much illness and chance of dying as those who do not take extra ascorbic acid.

It might be suggested therefore, that ascorbic acid given in pharmacological doses to children

with severe measles might reduce the severe and prolonged morbidity and high mortality associated with this condition in developing countries.

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Accepted 15 September 1987.