

High doses
Common cold

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VITAMIN C IN HIGH DOSES IN THE TREATMENT OF THE COMMON COLD

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Summary: In order to test vitamin C in the treatment of common cold, 45 patients (25 women and 20 men) received 6.0 g of vitamin C daily per os, when they showed the first symptoms of the disease. The treatment lasted five days regardless of the prospective results. The duration of the cold was significantly reduced when the treatment began within 24 hours of the first symptoms and in several patients it even did not develop fully. Patients felt quite well the day after the beginning of treatment. Results were not so good when there was a delay and the medication started on the second or third day of illness. At that time we observed that the cold often was complicated by secondary bacterial infections. Finally it seems important to report that after the end of the research we continue to use the same vitamin C dosage obtaining consistently the same results.

Introduction

The common cold is a virus disease, distributed all over the

world. It affects all races with no distinction as regards sex or age. Its average incubation period is three days.

Factors predisposing to the concentration of the common cold include chilling of the body by draughts or wearing wet clothes, fatigue, environmental pollution, etc. However, the importance of these factors has been diminished by the findings of recent studies (Andrewes², 1965; Debré and Celers³, 1970).

The virus infection brings about an inflammation of the upper respiratory tract. The symptoms reflect the involvement of the respiratory tract and the whole body. The patient experiences a feeling of congestion in the upper airways, with oedema of the nasal and pharyngeal mucosa. There is frequent rhinorrhoea and sneezing, together with a sensation of roughness in the throat which makes it difficult for the patient to swallow food.

Although very high temperatures are not observed, fever is almost always present and is accompanied by listlessness and headache of variable severity⁶.

Provided no bacterial complications ensue, the condition runs a course of 3 to 10 days. The change in the normal physiology of the mucosa opens the way for pathogenic bacterial attack. In many patients the common cold is almost always accompanied by bacterial complications.

Since there are various types of cold virus, no immunity to the disease is developed, and it may attack the same patient several times in one year.

In an analysis of the absence from work caused by the common cold, Pauling^{8,9} (1970, 1971) concluded that the disease results in an annual loss of 15 million dollars in the United States.

A variety of drugs are used in the treatment of this infection, and include analgesics, anti-histamines, decongestants, etc. All of them, however, treat only the symptoms and not the disease.

It would be of great value if a treatment could be found which hinders the establishment of the cold, or, in cases where it has already gained a hold, shortens its duration, reduces the severity of the symptoms, and prevents the occurrence of secondary infections. While a number of authors believe that vitamin C possesses these features, others cast doubts on this opinion.

Cowan, Diehl and Baker¹⁰ (1942), of the University of Minnesota, carried out a study involving roughly 400 students who took 200 mg vitamin C per day or a placebo for a period of 7 months. They observed no statistically significant difference in the frequency, duration or severity of colds between the group that received the vitamin and the placebo group.

Dr. Frederick J. Stare, Professor at the Department of Nutrition of the School of Public Health at Harvard University, states that "there is no conclusive evidence that ascorbic acid has any preventive effect or any therapeutic effect on the course of the common cold"¹².

Dr. Philip L. White, Secretary of the Council on Foods and Nutrition of the American Medical Association, doubts that vitamin C is capable of preventing the common cold or has any influence on its course.

Dr. Charles C. Edwards is equally sceptical, and considers it absurd that vitamin C should be used in the prevention or treatment of the common cold.

C. Andrewes² (1965), Honorary Consultant to the Cold Research Unit at Salisbury, England, does not make a single mention of vitamin C in his paper "The common cold: prospects for its control".

Referring to the relevant literature, Linus Pauling, a strong advocate of using vitamin C, explains these unfavourable results as the outcome of using small doses of ascorbic acid. According to Pauling, there are differences between the vitamin and placebo groups even in the study by Cowan⁴ (1942), and in his opinion these could be significantly increased by using larger doses of the vitamin.

Studies involving the use of larger doses, such as that of Sheila Charleston and Mary Clegg³ (1972), that of Anderson, Reid and Beaton¹ (1972), and the trial conducted by Ritzel¹¹ (1961), showed significant differences in the incidence and duration of the cold, which were considerably lower in the group that received vitamin C than in the placebo group.

In a comparison between man and various species of animals, the biochemist Irwin Stone¹³ (1972), of Staten Island, states that for man a suitable dose of vitamin C would be between 1 and 4 grams per day.

In order to abort the cold, this author recommends taking 1.5 g of ascorbic acid on the onset of the first symptoms, and further doses at hourly intervals. If the medication is taken at a sufficiently early stage, by the third dose the cold has generally been aborted.

Dr. Edme Régnier¹⁰ (1968) recommends treating the cold with 600 mg of vitamin C on the appearance of the first symptoms, followed by doses of 600 mg every 3 hours (or 200 mg every

hour), the dose being increased to 750 mg on retiring to bed. In the author's personal experience, the sneezing which marked the onset of a new cold would appear two or three times per year, and was followed, on the 2nd or 3rd day, by the unpleasant and apparently inevitable signs and symptoms of secondary bacterial infection.

The author's activities would be restricted for two or even as much as four weeks by the clinical symptoms of the bacterial complications. As an experiment, on the appearance of the first cold symptoms he then decided to take 6 g vitamin C divided into 3 doses, and in 24 hours the cold had cleared up. Since that experiment, 11 years ago, whenever he has felt the symptoms of a cold he has succeeded in aborting the condition in one day.

Since vitamin C in large doses is completely harmless and the substance has no side-effects, there are no contraindications to its use⁷.

The purpose of this clinical study is to obtain data on the effect of large doses of vitamin C in the treatment of the common cold with regard to its duration, the severity of its symptoms and the occurrence of secondary infections.

Observations and method

The total patient material comprised 136 persons of both sexes and various ages. Two were excluded because they were found to be suffering from infectious mononucleosis, and one because of infection with toxoplasmosis. The 133 patients included in the

analysis comprised 78 females and 55 males aged between 14 and 89.

The group included students of medicine at the Federal University of Pernambuco, physicians, the investigators, patients of private clinics and Social Security (IPNS) members (Gouveia de Barros Clinic), so that the trial was conducted on persons from the most varied economic, social and cultural groups. The following symptoms were most frequently complained of: sore painful throat, hoarseness, sneezing, nasal obstruction, lachrimation, headache, muscular and bone pain, weakness, chills, sweating and general malaise. A double-blind trial was conducted in which the preparations, numbered 1 and 8, were given to alternate patients as they presented themselves. The preparations, in the form of 1 g effervescent tablets, were prescribed in accordance with the following plan for all patients: 2 tablets dissolved in water (2 g) three times per day for five consecutive days, or in other words 6 g per day or a total of 30 g. When 42 patients had received substance No. 1 and 41 had received No. 8, there was no longer any point in continuing the double-blind trial, since in view of the clinical progress of the patients there was not the slightest doubt that substance No. 1 was the vitamin C and No. 8 was the placebo. From then until the end of the trial our 133 patients therefore took only preparation No. 1.

We divided our patients into four groups, namely:

Group I: 45 patients (25 females and 20 males) mean age 33 - treatment begun early, in the first 24 hours after the onset of cold symptoms.

Group II: 30 patients (17 females and 13 males) mean age 33 - treatment begun between 24 and 48 hours after the onset of cold symptoms.

Group III: 17 patients (11 females and 6 males) mean age 37 - treatment begun late, 48, 72 or more hours after the onset of symptoms.

Placebo group: 41 patients (25 females and 16 males) mean age 36.

Results

The results obtained in the various groups are summarized in Tables 1, 2, 3 and 4, thus allowing the course of colds treated with vitamin C to be compared with that of colds treated with other drugs.

Statistical analysis of the results

The first remark on this study concerns the criterion used to establish the duration of the cold. This is too subjective and undoubtedly subject to large variations, particularly since there is no exact definition of what exactly marks the beginning or end of the "cold".

However, with the acceptance of the adopted criterion it is possible to test vitamin C with regard to a possible superiority over other drugs commonly used in the treatment of colds.

The statistical method employed is Student's "t" test, which analyses the difference between the two means.

The results obtained were as follows:

I. For Table 1 - treatment with 6 g per day of vitamin C for five (5) consecutive days; treatment begun early, in the first 24 hours after the onset of symptoms.

Tab. 1. Patients treated with 6 g vitamin C per day for 5 consecutive days. Treatment begun early, in the first 24 hours after the onset of symptoms. Comparison of the duration of colds treated with vitamin C and those treated with other drugs (aspirin, phenacetin, antihistamines, etc.) No. of cases: 45.

Name	Age yrs	Sex	Vitamin C		Other drugs	
			Duration of cold in days after initiation of treatment	Duration of previous colds in days after initiation of treatment	Duration of cold in days after initiation of treatment	Duration of previous colds in days after initiation of treatment
S.S.F.	19	M	2	4 to 5		
M.L.P.A.	51	F	1	5		
M.J.D.S.	28	F	2	10; frequent bacterial complications		
A.G.S.	49	F	1	4		
M.L.P.S.	46	F	8; developed bacterial complications	8; frequent bacterial complications		
G.F.S.	49	M	1	10; frequent bacterial complications		
J.A.A.	15	M	1	5 to 6		
H.H.A.	89	F	2	10 to 12; frequent bacterial complications		
M.C.L.	15	F	4	4 to 5		
S.H.A.	14	F	4	8 to 10; frequent bacterial complications		
S.A.M.	14	F	2	5		
A.J.M.L.	23	M	1	4		
L.E.A.	18	M	2	5		
J.A.A.	14	M	1	5 to 6		
M.C.P.A.	20*	F	4	4		
J.S.A.M.	40*	F	1	4 to 5		
L.G.	34	M	10; developed bacterial complications	10 to 12; frequent bacterial complications		
J.P.A.S.	52	F	1	3		
S.M.C.P.	27	M	1	4		
S.A.	34	F	2	4		
L.A.F.	17	M	1	6		
J.W.B.C.	15	M	2	7 to 10; frequent bacterial complications		

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A.P.	38	M	1	5		
M.S.C.L.	35	F	20; developed bacterial complications	15 to 20; frequent bacterial complications		
T.S.	37	F	2	5		
A.F.	22	M	2	6 to 10; frequent bacterial complications		
I.C.L.	15	F	15; developed bacterial complications	15; frequent bacterial complications		
J.C.L.	14	M	2	2		
F.S.	25	M	1	10 to 15; frequent bacterial complications		
C.L.	63*	F	8; developed bacterial complications	8 to 10; frequent bacterial complications		
F.S.	18	F	2	5 to 6		
S.R.	24	M	1	4 to 5		
P.S.	29	M	2	5		
M.G.S.	22	F	1	3 to 4		
J.C.V.	44	M	2	4		
F.P.S.	43	M	3	3		
N.Q.	39	F	2	8 to 15; frequent bacterial complications		
C.A.F.	51	F	1	5		
C.L.	47	F	1	5		
C.R.	43	F	4	4		
F.D.F.	46	M	2	5		
C.P.	57	M	3	6		
H.H.A.	24	F	1	4 to 5		
R.S.	18	F	30; developed bacterial complications	20 to 30; frequent bacterial complications		
B.C.	28	F	2	8 to 15; frequent bacterial complications		

*Passed a number of diarrhoeic stools during treatment with vitamin C.

Mean duration of the cold after start of treatment was 3.6 days in the group treated with vitamin C. It was 6.9 days in the group treated with other drugs.

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From this comparison we obtain:
 $t = 3.54$, D.F. = 88 and $p < 0.01$.

Taking $P < 0.05$ as the level of significance, we find that the shortening of the duration of the cold with vitamin C in relation to other drugs is statistically significant.

If. For Table 2 - treatment with 6 g per day of vitamin C for 3 consecutive days; treatment initiated between 24 and 48 hours after the onset of symptoms.

In the group treated with vitamin C the mean duration of cold after start of treatment was 5.3 days. It was 7.5 days in the group treated with other drugs.

Tab. 2. Patients treated with 6 g per day of vitamin C for 5 consecutive days. Treatment initiated between 24 and 48 hours after the onset of symptoms. Comparison of the duration of colds treated with vitamin C and colds treated with other drugs (aspirin, phenacetin, antihistamine, etc.) No. of cases: 30.

Name	Age yrs	Sex	Vitamin C	Other drugs
			Duration of cold in days after start of treatment	Duration of previous colds in days after start of treatment
A.L.J.	51	M	3	5
J.A.S.	18	F	4	5
O.S.G.R.	17	M	8; developed complications	8 to 10; frequent bacterial complications
E.G.S.	27	M	1	4 to 5
A.A.F.	27	F	2	8 to 12; frequent bacterial complications
N.E.S.	18	F	3	10 to 15; frequent bacterial complications

V.G.M.**	39	M	2	10 to 15; frequent bacterial complications
C.S.	51	F	4	3 to 4
L.A.	49	F	3	3
J.A.	16	M	15; developed bacterial complications	10 to 15; frequent bacterial complications
M.D.P.S.	40	F	3	20; frequent bacterial complications
J.N.S.	41	M	1	2 to 3
O.G.L.	50	F	3	3
I.J.G.L.	21	M	5	5 to 6
J.M.A.	16	M	3	6 to 7
J.C.L.L.	38	M	2	8 to 10; frequent bacterial complications
A.P.S.	15	M	2	7
J.F.*	50	M	1	8; frequent bacterial complications
C.S.	51	F	8; developed bacterial complications	8 to 12; frequent bacterial complications
M.J.	28	F	4	4
E.M.L.	41	F	4	10; frequent bacterial complications
A.P.C.	26	F	1	4 to 5
L.A.A.	48	F	2	4 to 5
M.D.D.	32	F	20; developed bacterial complications	15 to 20; frequent bacterial complications
F.	27	M	3	3 to 4
E.B.S.	33	F	4	3 to 4
R.S.C.**	43	M	15; developed bacterial complications	8 to 10; frequent bacterial complications
M.C.L.	24	F	1	5 to 6
I.C.L.	17	F	2	4 to 5
N.G.F.	29	F	30; developed bacterial complications	20 to 30; frequent bacterial complications

**Epigastric pain during treatment with vitamin C.
 *Passed a number of diarrhoeic stools during treatment with vitamin C.

From this comparison we obtain:
 $t = 1.45$, D.F. = 58 and $P > 0.1$.

The difference is not statistically significant.

III. For Table 3 - treatment with 6 g per day of vitamin C for 5 consecutive days; treatment commenced later than 48 hours after onset of symptoms.

Mean duration of the cold after start of treatment was 9.0 days in the group treated with vitamin C. It was 7.8 days in the group treated with other drugs.

From this comparison we obtain:

$t = 0.62$, D.F. = 32 and $P > 0.5$.

The difference is not statistically significant.

Tab. 3. Patients treated with 6 g per day of vitamin C for 5 consecutive days. Treatment begun late, i.e. 48, 72 or more hours after the onset of symptoms. Comparison of the duration of the cold treated with vitamin C and colds treated with other drugs (aspirin, phenacetin, antihistamines, etc.) No. of cases: 17.

Name	Age yrs	Sex	Vitamin C		Other drugs	
			Duration of cold in days after start of treatment	Duration of previous colds in days after start of treatment	Duration of cold in days after start of treatment	Duration of previous colds in days after start of treatment
A.	17	F	3	5		
A.P.**	27	M	5	5 to 6		
M.V.S.	51	F	10; developed bacterial complications	7 to 10; frequent bacterial complications		
G.M.	68	F	15; developed bacterial complications	10 to 20; frequent bacterial complications		
O.	36	F	7	5 to 7		
E.S.C.	48	F	6	5 to 6		
F.S.	53	F	6	3 to 4		

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C.	50	M	12; developed bacterial complications	10 to 15; frequent bacterial complications
L.C.*	38	M	7	4 to 5
M.S.	39	M	10; developed bacterial complications	5 to 6
S.S.	16	F	15; developed bacterial complications	15; frequent bacterial complications
P.L.	33	F	6	6
A.F.	43	M	30; developed bacterial complications	15 to 20; frequent bacterial complications
S.C.	29	F	5	4 to 6
O.	44	M	3	3 to 5
C.T.S.	21	F	3	3 to 4
B.A.	19	F	10; developed bacterial complications	10; frequent bacterial complications

**Epigastric pain during treatment with vitamin C.

*Passed a number of diarrhoeic stools during treatment with vitamin C.

Tab. 4. Group which received placebo. Comparison with the use of other drugs in previous colds. No. of cases: 41.

Name	Age yrs	Sex	Placebo		Other drugs	
			Duration of cold in days from start of using placebo	Duration of previous colds in days from start of treatment	Duration of cold in days from start of treatment	Duration of previous colds in days from start of treatment
G.R.A.	25	M	More than 5.	5		
L.A.O.	38	F	More than 5	5 to 8		
D.O.S.	35	F	Cleared up on 3rd day	3 to 4		
D.S.S.	29	M	More than 5. Bacterial complications	5		
J.R.F.	77	F	More than 5. Bacterial complications	10; frequent bacterial complications		
A.G.S.	23	M	Cleared up on 2nd day	2 to 3		
M.C.A.J.	65	F	Cleared up on 5th day	4 to 5		

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S.F.S.	37	F	More than 5. Bacterial complications	8; frequent bacterial complications
L.M.C.	21	F	More than 5. Bacterial complications	4 to 5
M.J.S.W.	22	M	More than 5. Bacterial complications	3
C.C.S.	42	M	More than 5. Bacterial complications	10 to 12; frequent bacterial complications
J.A.A.	17	F	Cleared up on 3rd day More than 5.	3 to 4
M.X.S.	40	F	More than 5. Bacterial complications	4 to 5
M.L.B.	23	F	More than 5. Bacterial complications	10 to 15; frequent bacterial complications
I.G.F.	49	F	More than 5	5
M.C.L.	45	F	More than 5. Bacterial complications	8 to 12; frequent bacterial complications
S.J.F.	19	M	Cleared up on 5th day	4 to 5
A.S.	24	M	More than 5	7
M.L.A.S.	17	F	More than 5	8 to 10; frequent bacterial complications
M.F.B.	56	F	More than 5	4 to 5
V.G.C.	50	F	Cleared up on 3rd day	4
S.B.	21	F	Cleared up on 5th day	5
S.	58	M	More than 5	5
J.S.F.	60	M	Cleared up on 5th day	4
R.L.	50	F	More than 5. Bacterial complications	10 to 12; frequent bacterial complications
S.M.S.	26	F	More than 5. Bacterial complications	8 to 10; frequent bacterial complications
S.T.	55	M	More than 5. Bacterial complications	4 to 5
J.R.W.	38	M	More than 5. Bacterial complications	6
N.E.	42	F	More than 5	7
C.M.	18	F	Cleared up on 5th day	5
P.A.N.	19	F	More than 5. Bacterial complications	15 to 20; frequent bacterial complications
J.R.B.	16	F	More than 5	3

E.S.O.	51	M	Cleared up on 4th day	3 to 4
M.C.L.	17	F	More than 5	5
E.H.S.M.	39	F	More than 5	10 to 15; frequent bacterial complications
M.C.	36	M	Cleared up on 3rd day	3 to 4
A.P.	34	F	More than 5	4 to 5
J.B.P.	22	M	More than 5	5
M.G.M.	61	M	More than 5. Bacterial complications	20; frequent bacterial complications

It is difficult to specify the duration of the cold in this placebo group, since roughly 50% of the patients changed over to other drugs from the 5th day onwards.

Conclusions

The basic conclusion to be drawn is that if the cold is to be of shorter duration than when other drugs are used, vitamin C must be administered in the first 24 hours after the onset of symptoms.

Rabies virus	Guinea pigs	Immuno-potentiator
	- Male	
	- Female	

PROPHYLACTIC EFFECT OF VITAMIN C ON THE INCIDENCE OF RABIES
IN GUINEA PIGS INOCULATED WITH FIXED RABIES VIRUS

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Summary: The author has found that large doses of vitamin C exert a prophylactic effect on the incidence of rabies in guinea pigs inoculated with fixed rabies virus. The incidence of rabies was reduced by about 50 per cent.

The results of the preliminary dose-response experiments indicate that in female guinea pigs much lower doses of vitamin C are effective than in male guinea pigs. In males the dose of 100 mg per kg of weight twice a day through 6 to 7 days was effective. In females, the optimal dose appears to be 50 mg per kg, 100 mg were slightly less effective. 25 mg per kg were still effective, but less than 50 and 100 mg.

A study of the influence of vitamin C on the efficiency of immunization with rabies vaccine (prepared from brains of sheep infected with fixed rabies virus) have shown that under experimental conditions vitamin C diminishes the efficiency of immunization to some extent.

A preliminary study of the influence of rabies vaccine on the prophylactic effect of vitamin C has indicated that under experimental conditions animal brain containing vaccines annul the effect of vitamin C.

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