Wheat Grass Juice Reduces Transfusion Requirement in Patients with Thalassemia Major: A Pilot Study

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Wheat grass juice is the juice extracted from the pulp of wheat grass and has been used as a general-purpose health tonic for several years. Several of our patients in the thalassemia unit began consuming wheat grass juice after anecdotal accounts of beneficial effects on transfusion requirements. These encouraging experiences prompted us to evaluate the effect of wheat grass juice on transfusion requirements in patients with transfusion dependent beta thalassemia. Families of patients raised the wheat grass at home in kitchen garden/pots. The patients consumed about 100 mL of wheat grass juice daily. Each patient acted as his own control. Observations recorded during the period of intake of wheat grass juice were compared with one-year period preceding it. Variables recorded were the interval between transfusions, pre-transfusion hemoglobin, amount of blood transfused and the body weight. A beneficial effect of wheat grass juice was defined as decrease in the requirement of packed red cells (measured as grams/Kg body weight/year) by 25% or more. 16 cases were analyzed. Blood transfusion requirement fell by >25% in 8 (50%) patients with a decrease of >40% documented in 3 of these. No perceptible adverse effects were recognized.

Key words: *Wheat grass juice, Thalassemia.*

The treatment of transfusion dependent *b*-thalassemia imposes a considerable burden on the family and institutional resources. In economically challenged nations, basic management (red cell transfusions, iron chelation) is a distant dream for the majority, who, consequently, endure a poor quality of life. In chronic illnesses, seeking remedy in alternate systems of medicine is a common practice. After learning of the potential benefits, some patients started consuming wheat grass juice, which has been promoted as a supplementary health food/tonic for many years. Atleast 3 of these children perceived an increase in the interval between transfusions with the desired level of hemoglobin being maintained for a longer period. The observations were significant and prompted us to scientifically evaluate the effects of wheat grass juice therapy in patients with transfusion dependent *b*-thalassemia.

Subjects and Methods

Randomly selected patients with transfusion dependent *b*-thalassemia, enrolled in the thalassemia unit of the Advanced Pediatrics Center were recruited for the study. Patients were enrolled irrespective of whether they were receiving chelation therapy with defiriperone/desferrioxamine or not. A

medical doctor exclusively on the roll of thalassemia center maintained records of the study subjects.

Exclusion criteria: (1) Splenectomy performed anytime during the study period, (2) Indiscipline in intake of wheat grass juice. This included interruption in intake exceeding 3-days/week or more than 7-days month, (3) Total duration of consumption of wheat grass juice of less than 1½ years.

Wheat Grass Juice: Family of the patients raised the wheat grass at home, in the kitchen garden or in earthen pots. The sprouts were harvested when they were 5-6" tall, grounded and the juice extracted by sieving. About 100 mL of freshly extracted wheat grass juice was consumed daily. No specific variety of wheat grass was used.

Transfusion protocol. All patients received packed red cells. The transfusions were administered at a frequency varying from 2-6 weeks, in an attempt to maintain the pre-transfusion hemoglobin above 9 g/dL. Appointment for the next transfusion depended on the current visit's pre-transfusion hemoglobin and the amount of blood transfused. Visits to the thalassemia center were at times modified depending on the availability of the blood of the required group, personal adjustments of appointment on the part of patient due to preoccupation with work (*e.g.,* examinations, social functions/festivals), patient indiscipline and problems related to transport between the unit and the home. Children less than 3-5 years were transfused packed cells by body weight (»15 mL/kg) and older children transfused 1-2 units depending upon requirements. All blood bags were weighed before transfusion and a fixed weight of 50 g deducted to exclude weight of the empty bag and the anti-coagulant. Blood bags had significant differences in weight depending on the built of the donor. If the transfusion was discontinued midway due to severe allergic reactions, appropriate reductions in amount of blood were made.

Record keeping: The study performa were designed to record date of visit, hemoglobin (pre transfusion), amount of blood transfused and the weight of the patient. Inquiry was made at each visit to ensure regularity of consumption of wheat grass juice.

Consent: The institutional ethics committee approved the study and informed consent was obtained from parents/patients as appropriate.

Data analysis

Each patient acted as his own control. The transfusion needs, immediately prior to the use of wheat grass juice therapy, were compared to the need during the period of wheat grass juice therapy. The observations, during consumption of wheat grass juice were prospective, whereas the transfusion requirements prior to intake of wheat grass juice, were obtained from the records maintained in the thalassemia unit. One year period in the immediate pre-wheat grass juice period was analyzed retrospectively. A period of 6 months soon after initiating wheat grass juice (henceforth referred to as neutral period) was omitted from the analysis. This was done as it was 'noted' that the 'response' to wheat grass juice generally took a few months. Patients had to be on wheat grass juice for at least one year, after the neutral period, for inclusion in the analysis.

The variables taken into account to estimate transfusion requirements included the pretransfusion hemoglobin, interval between transfusions and the amount of packed red cells transfused. Mean of the pre-transfusion hemoglobin, interval between visits and of the

body-weight was calculated for each child in the wheat grass juice period and the one-year period preceding it. Records of visits in the first six months of starting wheat grass juice therapy were excluded from analysis, as specified earlier. The criterion assigned for the success of wheat grass juice therapy was assigned as:

- Reduction in the amount of blood transfused in the wheat grass juice period (measured as g/Kg body weight/year) as compared to the pre-wheat grass juice period, by 25% or more, without any concomitant fall in the mean pre-transfusion hemoglobin.

Results

The study was performed in the period between February 2000 and May 2003. Out of 38 patients enrolled in the study, only 16 (42%) fulfilled the criteria for final analysis. Indiscipline in intake and an insufficient duration of intake of wheat grass juice necessitated exclusion from analysis in 14 and 6 cases, respectively. Two cases had a splenectomy mid-way through the study. The mean age was 13.3 years (range: 4-27). Amongst the 16 evaluable patients, there was a solitary girl. Salient observations are detailed in *Table I*. Eight (50%) patients responded as per the defined criterion. None of the patients reported any perceptible adverse effects.

Discussion

Consumption of wheat grass juice was found to have beneficial effect on the transfusion requirements in 50% of patients in this pilot study.

The criteria employed for determining the benefit of wheat grass juice was taken arbitrarily as a decrease in blood transfusion requirement by 25 % or more. We felt that this cut-off was appropriate for judging the response. Most patients, who had a response by the designated criterion, also had an increase, albeit small, in the mean pre-transfusion hemoglobin whilst consuming wheat grass juice. This was true in all responders, except in three. In one case, No. 4, pre-transfusion hemoglobin remained the same, whilst a modest decline of 0.2 and 0.3 g% were observed in cases No. 5 and 15, respectively. The decrease in hemoglobin in these two patients was miniscule, in comparison to the decrease in amount of transfusion as well as the increase in interval between transfusions. The mean interval between transfusion visits increased in all responders, the maximum increment being of 122%. This reflects the postponement of the scheduled transfusion visit due to satisfactory hemoglobin value in between the transfusions. In three patients, reduction in the amount of blood transfused, exceeded 40 % of the pre-wheat grass juice period. Poor compliance in 14 of 38 patients (37%) could be attributed to lack of sufficient motivation. The process of growing, harvesting and extracting juice was too laborious, especially in summer months for most parents of defaulters. Other factors that influenced their decision to discontinue were high expectations coupled with the lack of discernible benefit in the early months after entry into the study. Strict scientific evaluation will undoubtedly, recognize a bias towards 'responders' when a significant proportion of cases were rendered 'inevaluable' for failing to adhere to the criteria in the study protocol. It is difficult to refute this viewpoint especially when 'therapy indiscipline' was observed in those who perceived no discernible benefit.

The authors do not wish to speculate on the mechanism of beneficial action of wheat grass juice in transfusion dependent thallassemics. Chlorophyll makes up >70% of the solid

TABLE I– *Patient Details in Wheat Grass Juice Study on Thalassemia Children.*

No.	Age (yr)	Sex	Mean pre-transfusion Hb (g %) Pre-WGJ period	Mean pre-transfusion Hb (g %) WGJ period	Mean interval between visits (days) Pre-WGJ period	Mean interval between visits (days) WGJ period	% difference in the mean interval between visits in the pre-WGJ & WGJ period	Blood transfused Pre-WGJ period (g/Kg body wt/yr)	Blood transfused WGJ period g/Kg body wt/yr)	% difference in the amount of blood trans-of blood trans-fused in the pre-WGJ & WGJ period	Duration of WGJ intake after the neutral period (months)
1	15	M	9.2	10.1	17.5	23.8	36	241	240	0.4	15
2	12	M	8.2	9.2	20.2	21.3	5.4	245	188	23	15
3	21	M	9.9	11.4	19	42.2	122	156	91	42	38
4	15	M	9.7	9.7	20.6	23.7	15	279	188	33	19
5	18	F	10.6	10.4	20.2	31	54	219	149	32	18
6	15	M	9.7	10.3	24.3	23.7	–2.5	281	242	14	14
7	7	M	10.2	10	25	32	28	284	219	23	24
8	6	M	10.2	10.4	22.9	24.4	7	276	242	12	13
9	23	M	9.3	10.3	22	28.3	29	166	120	28	23
10	19	M	9.4	9.8	21.6	23.5	9	254	179	30	18
11	6	M	9.3	9.7	24.5	28.8	18	256	184	28	22
12	9	M	9.4	9.6	20.4	20.7	1.5	281	231	18	16
13	11	M	8.9	9.8	25.9	41	58	166	94	43	18
14	4.5	M	8.7	9.6	23.7	24.4	3	306	291	5	19
15	27	M	11.4	11.1	22.8	39.8	75	204	121	41	20
16	4	M	8.9	9.7	27.5	31.2	14	267	221	17	16

Yr: year, Hb: hemoglobin, g: grams, WGJ: wheat grass juice, wt: weight, neutral period: 6 months after initiating wheat grass juice therapy.

Key Message

- Wheat grass juice had benefecial effect on transfusion requirements in 50% patients of ß-thalassemia major.

content of wheat grass juice. Both chlorophyll and hemoglobin share a similar atom structure. The only difference in the two molecules is that of the metallic atom element. Hemoglobin consists of iron, while in chlorophyll the metallic atom is magnesium. The believers of alternative system of medicine claim that as chlorophyll and hemoglobin are alike in atom structure, intake of wheat grass juice enhances hemoglobin production. This sounds too simplistic and needs to be proven. Wheat grass juice has iron and what consequences will this have on the iron overload needs to be evaluated. To add to the quandary, wheat grass juice has been documented to be effective for an unrelated condition-ulcerative colitis, in a randomized double-blind placebo-controlled trial from Israel(1).

We conclude that wheat grass juice has the potential to lower transfusion requirements in thalassemics. The observations of our pilot study may prompt investigators to conduct similar studies worldwide. The ensuing years should throw light on the mechanism of action of wheat grass juice, adverse effects, particularly in relation to iron status and the appropriate doses. Wheat grass juice extract is available commercially, as tablets and capsules, in a few countries. These preparations should eliminate the inherent variations in obtaining wheat grass juice. Efforts are underway to initiate another study to evaluate the efficacy of dried extract of wheat grass. The findings may help in circumventing the cumbersome procedure of extracting fresh wheat grass juice.

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