

Full Length Research Paper

Effects of *Grewia tenax* (Guddaim) as a natural food on the hemoglobin level and growth among displaced children of Darfur State, Western Sudan

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Abstract

This study was conducted in Northern Darfur State at Asalam Camp, about 3 km north to El Fashir town, among permanently resident under five displaced children. The study aims to study the effect of *Grewia tenax* (Guddaim) on hemoglobin concentration and some RBCs Indices. It utilized a pre and post interventional community based design. 101 children age between 9-60 months were recruited, a pretested, structured questionnaire, anthropometric measurement and laboratory test for hemoglobin were the study tools. *Grewia tenax* as an additive food for six weeks had a significant effect on hemoglobin level and body thinness as measured by mid upper arm circumference (MUAC). Caretakers had excellent knowledge about Guddaim as a nutrient but its utilization was low. The study recommended a nutritional education program to improve the nutritional status and also to encourage gardening of *Grewia tenax* at small areas around the houses in the camp.

Keywords: Hemoglobin Level, Displaced Children, *Grewia tenax*, Darfur, Sudan.

INTRODUCTION

Deficiencies in iron, vitamin A and Zinc rank among the top ten leading causes of death through disease in developing countries (WHO, 2002). is the most common nutritional disorder in the world. Although the prevalence of iron deficiency anemia is higher in developing countries, this form of anemia is also common in the United States Particularly in toddlers, adolescent girls, and women of childbearing age. Factors underlying iron deficiency differ somewhat in various population groups and can be best considered in the context of normal iron metabolism (Kumar et al., 2010). Iron balance therefore maintained largely by regulating the absorption of dietary iron (Kumar et al., 2007). Iron is one of the most common elements in the earth's, yet iron deficiency is the most common cause of anemia affecting about 500 million people worldwide. This is because the body has a limited

ability to absorb iron and excess loss of iron as a result of hemorrhage is frequent (Hoffbrand, 2001).

Africa has been faced with the serious problem of not being able to feed its population or supply it with fuel wood (FAO, 2002). Frequent crop failure in arid and semi-arid areas often resulted in the poor nutrition of local people (Waterlow, 1998). For this reasons it imperative to find other resources for getting enough food for the growing population.

Africa has abundant wild plants and cultivate native species, with great agronomic and commercial potential as food crop, but many of these species, particularly the fruits and nuts had not been promoted or investigated and therefore remain under – utilized (Waterlow, 1998). During times of natural and man-made disasters, populations suffer severe food shortages can become heavily reliant on wild food plants for survival (Leborgne, et al., 2008).

The genus *Grewia* belongs to the family Teliaceae composed of about 150 Species forming an important economical complex, distributed in tropical and sub-

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tropical regions in Asia, Australia and Africa (FAO/WHO, 1988) Fruits and other parts of *Grewia tenax* contribute significantly to the food and energy needs of rural populations in multiple ways (Abdelmutti, 1991). The fruits have a number of uses and most valued for their high nutritive values most important, as the main source of food during famine (Mabry – Hernandez, 2009). Its leaves and twigs are palatable fodder for livestock.

The fruit known locally in the Sudan as “Gudaim” is a rich source of carbohydrates, protein, vitamins and minerals and constitutes important contributors to improving the nutritional contents of rural and urban people in Sudan (Abdelmutti, 1991).

Little research has been conducted to determine the relative importance of non-timber fruit trees and shrubs in the dry lands of Sudan. Few studies however, have been conducted looking especially at an inventory of the locally existing plants and products (Fadl and Gebauer, 2004a).

Objectives

The research aims at determining the effects of *Grewia tenax* (Guddeim) on hemoglobin level and other RBCs indices among displaced children, and to assess knowledge attitude and practice of caregivers of under five children towards nutrition of their children.

MATERIAL AND METHODS

Pre and post Interventional prospective Community based study was implemented in North Darfur State, Asalaam camp located 3 km North of El Fashir town, established in December 2005 in response of influx of displaced people due to civil war in the area. According to

The Sudanese Red Crescent (SRCS) reports the camp has 50,002 people. Over 70% of this population is estimated to be women and children.

The Study population were children of both sexes permanently resident in the camp. Their age is between 9 - 60 months, less than 110 cm in height. An informed consent for participation was taken from the caregivers

Children with chronic diseases e.g. chronic cough or protein energy malnutrition were excluded.

Total number of children satisfying the inclusion criteria was 101 in the pre test and only 59 in the posttest due to refusal of many caregivers to give blood.

The intervention

Children caregivers were interviewed using a pre-tested questionnaire to assess their KAP toward Guddaim. Laboratory examination was done for Hb%, using Sysmex. Mid arm circumference (MUAC) is an anthropometric measurement used in this study.

Grewia tenax was distributed in form of Juices free of sugar. Juices concentration ($\frac{1}{4}$ *Grewia tenax*, $\frac{3}{4}$ water). Study population (101) used to come every day to take *Grewia* juices under direct observation of the researcher, 180 ml per day was offered for each child daily for 6 weeks. Haemoglobin concentration and (MUAC) were checked again.

RESULTS

Socio-demographic characteristics of the study population

The majority of our sample was from Zagawa tribe. Under five years showed equal distribution in different age groups, less percentage for those less than one year (12.5%). Both sexes were equally represented in the sample.

There was a high illiteracy rate among caretakers of under-five displaced children (59.5%) and a small percentage (6.5%) were health workers and teachers Table (1). All of them (100%) were aware about Guddaim fruits. About (74.5%) of caretakers believes that Guddaim increases the hemoglobin Figure (1) and about (64.7%) of them use Guddaim for the treatment of anemia.

Anthropometric results: (MUAC)

Table (2) showed the nutritional status of recruited displaced children based on anthropometric measurement (MUAC). Only hundred of those children suffer moderate to severe malnutrition.

Interventional result

Guiddaim supplementation improve nutritional status significantly (P. value = .000). as measured by MUAC as well an increase in HGB, HCT, and MCV, levels (Figures 2, 3, and 4). The T test shows that the intervention had a highly significant effect on HGB, HCT, and MCV (P. value = 000)

DISCUSSION

Anemia is a condition in which the body does not have enough healthy red blood cells. Iron is an important building block for red blood cells. When the body does not have enough iron, it will make fewer red blood cells or red blood cells that are too small. This is called iron deficiency anemia (Mabry – Hernandez, 2009).

The study showed that all caregivers had excellent knowledge about Guddaim function. However, a gap of its utilization (64.7%), it is costly and unaffordable by

Table 1. Demographic data of caregivers in Asalam Camp N =184.

Educational level	Frequency	%
Illiterate	110	59.8
Khalwa	6	3.3
Primary Level	49	26.6
Secondary Level	18	9.8
University	1	.5
Total	184	100.00
Occupation	Frequency	%
Farmer	13	7.1
Labor	24	13.0
Housewife	135	73.4
Health worker	10	5.4
Teacher	2	1.1
Total	184	100

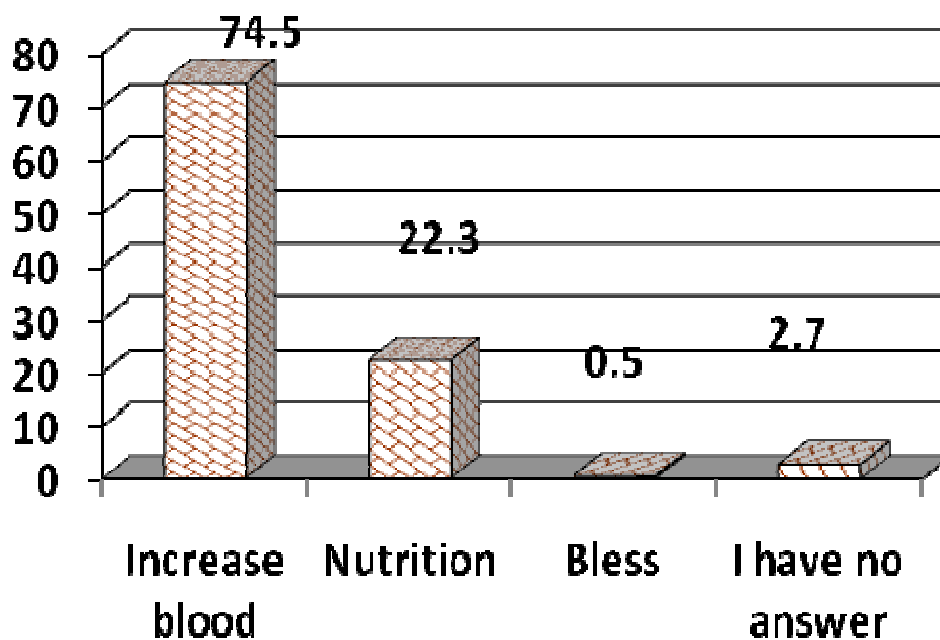


Figure 1. Knowledge of caretakers about Guddaim function Anthropometric results

Table 2. Malnutrition among children in Asalam Camp N =184.

MUAC	Frequency	%
Normal	129	70.1
Thin	55	29.9
Total	184	100
Malnutrition classification	Frequency	%
Severe	29	52.7
Moderate	26	47.3
Total	55	100

PRE AND POST INTERVENTIONAL RESULTS

Figure (2) MUAC (Before and After) n=184

Chi -Square

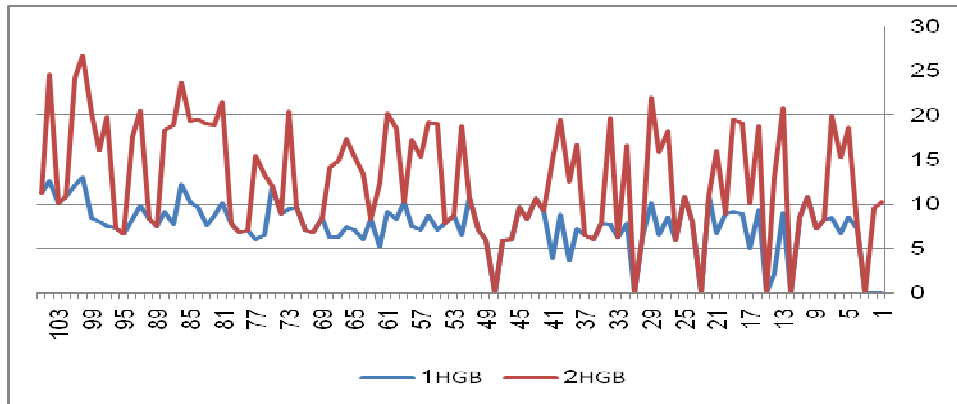


Figure 2. Hemoglobin Level concentration pre and post intervention N =184. T test p =.000)

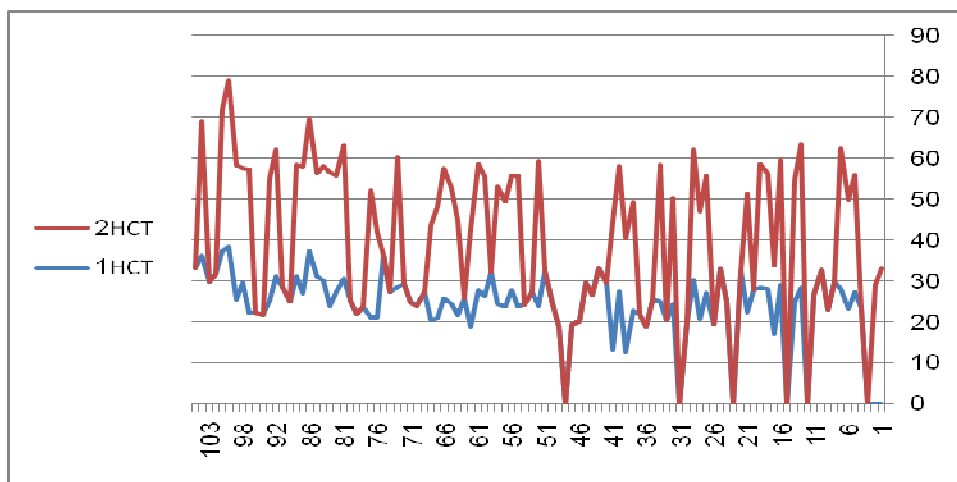


Figure 3. HCT level before and after intervention n =184 p=.000

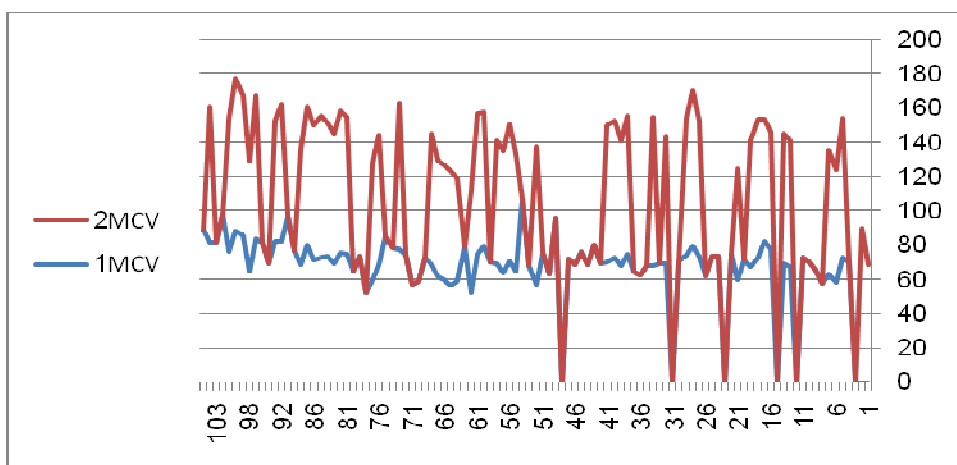


Figure 4. MCV level pre and post n=184. P =0.00

many people. More than half of caregivers use Guddaim with sugar.

Phase one of the study showed that the majority of the

study population had iron deficiency anemia and they did not receive iron supplement. Dietary iron supplements were essential in this condition. Increase demands not

met by normal dietary intake occur around the world during pregnancy and infancy. Demand of iron is increased in the growth phase of early childhood and during pregnancy (Kumar, et al., 2007).

The intervention had statistically significant effect on MUAC. This indicates improvement of child thinness and weight. This agrees with the result of (El-Siddig et al., 2003).

The intervention had significant effect on (HGB, HCT, MCH, MCV MCHC), this agreed with (Vogt, 1995) and (Abdelmutti, 1991) who mentioned that the fruit is considered as a simple safeguard against iron – deficiency. Grecian tenax fruit was reported to contain large amounts of iron⁽¹³⁾ and as such is used for treatment of anemia and malaria. Because of its high iron contents, fruits of *G. tenax* are often used in special diets for pregnant women and anemic children (Gebauer, 2005).

In the Sudan *Grewia tenax* fruits are used as fresh or dry food and the fruit juice is used as refreshing beverage to increase hemoglobin level for curing anemia and malaria as well as it is used as a thin porridge (Nasha) by lactating mothers to improve lactation and health. Pulp is used in making jams and Giddied slices (Gamardein) and the remnants of the processed fruit are used as animal and bovine chicks feed EL Amin, 1995)

It has been well documented that during times of natural and man-made disasters, populations suffering from severe food shortages can become heavily reliant on wild food plants for survival (Leborgne, et al., 2008).

CONCLUSION

In conclusion *Grewia tenax* (Guddaim) had significantly increased Haemoglobin concentration among study population as well as its significant effect on anthropometric measurement. Caregivers had excellent knowledge and attitude toward Guddaim as a nutrient but its use is limited for logistic reasons. The study recommend introduction of nutrition education programme to raise awareness of the benefits of Guddaim

and implanted in the farms. Further studies are recommended to investigate the Guddaim potentials.

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