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A comparative nutritional study of Moringa leaves and seeds on haemoglobin content in Guinea pig (*Cavia porcellus* Linn.)

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Abstract:- *The present project has been undertaken to evaluate the nutritional as well as medicinal properties of Moringa leaves and seeds on the Hb content in a mammal guinea pig. Moringa leaves and seeds were fed to the experimental animals @ 40 gms/ kgs body wt./day for different time duration i.e. 7, 15, 30, 45 and 60 days. A gradual increase in Hb content from the control value (7.00 gm/dl) was recorded in both cases which was proportional were 7.8 gm/dl, 9 gm/dl, 9.4 gm/dl, 9.6 gm/dl and 10 gm/dl after feeding with Moringa leaves respectively and 7.85 gm/dl, 9.1 gm/dl, 9.5 gm/dl, 9.75 gm/dl and 10.25 gm/dl after feeding with Moringa seeds respectively .the increase in Hb content was probably due to the presence of β-carotene, Fe, vit. B_2 vit. B_6 and folic acids, which are major factors for Fe mobilization and Hb formation, suggesting that Moringa is a very nice nutritional food.*

Key words*:- Moringa leaves, Moringa seeds, guinea pig, haemoglobin.*

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I. Introduction

Nutrition is the science that deals with all the various factors of which food is composed and the way in which proper nourishment is brought about. A healthy diet as such may prevent or alleviates many common health problems nutrition refers to the availability of energy and nutrients to the bodys cell in relation to the body requirements. Nutrition food in the maintenance of health.

It is widely accepted that fruits and vegetable are important components of a healthy diet and their consumption help to prevent a wide range of diseases. Epidemiological data have shown that persons with a high consumption of fruit and vegetables are at a lower risk of several type of cancers (riboli and norat, 2003) and of cardiovascular disease and stroke (Hu, 2003) than persons with a low consumption of fruit a vegetables.

*Moringa oleifera*lam is most widely cultivated species belonging to family Moringaceae and genus Moringa. This has a great medicinal and nutritional value. Many scientific journals and reports have appeared describing its nutritional and medicinal properties in last two decade. Moringa leaves have been used a combat malnutrition especially among infant and nursing mother. The leaves and seeds of Moringa are good source of vitamins, minerals, amino acid , macro and micro nutrients (Fuglier 2000, Tree of life,2005) . It shows anti-anemic activity (Olugbeni *et al*., 2010) ; Adedabo *et al*., (2009). All part of Moringa i.e leaves pods, seeds, barks, flowers and root have a great medicinal values. These show antidiabetic ,anticholesterolemic, anti-pyretic, antisickling and so many properties (Singh,2010).

The main objective of this study is to examine the nutritional significance of Moringa leaves and seeds comparatively on haemoglobin content in guinea pig.

II. Material and Methods:-

The present investigation was carried out on a mammal *Cavia porcellus* (Linn.) commonly known as guinea pig and was bred in the animal house of the Department of Zoology V.K.S.University, Ara. The animals selected for the present research work were approx. 4-5 month old and weighs 400-500 gm. They were kept in separate cages and maintained under natural photoperiod and labrotary conditions. The hygienic conditions of the animals were maintained by regular cleaning by using disinfectant.

For the experiment the animals were divided into three groups; control, Moringa leaves fed animals and Moringa seeds fed animals. The animals of all groups were fed thrice in a day's viz. at 9.00 A.M, 3.00 P.M and 9.00 P.M control group animals were fed with normal grass at the rate of 40 gm/kg body weight in all three sessions of feeding. While the animals of experimental groups were fed with Moringa leaves and seeds in the only morning session and exclusively grass on the rest of the session. The quantities of Moringa leaves and seeds and grass for the experiment animal at the time of each feeding were at the rate of 40 gm/kg body. All groups of animal were fed regularly with their respective diets for 7, 15, 30, 45 and 60 days and the blood

samples from the control and experimental animal were collected after completion of feeding scheduled between 10 A.M to 11 A.M to avoid the influence of circadian rhythms if any.

The blood was collected from sub-clavien vein for determination of haemoglobin percentage from the experimental and control group of animals and kept in a dry clean vial containing a pinch of EDTA. The estimation of Hb content of blood of all the groups of animal were done by Shalis method.

The data represent the mean value of five animals with ± standard the mean value of five animals for test of significant between treated and control animal was analysed by using student "t" test at 5% level.

III. Results and Discussion:-

The evaluation of Haemoglobin (Hb) content in the blood was done after feeding with Moringa leaves and seeds for 60 days. The experimental animals when fed with Moringa leaves for different duration, the Hb content was found to show an increasing trend. The values obtained were 7.8 gm/dl, 9.0 gm/dl, 9.4 gm/dl, 9.6 gm/dl and 10.0 gm/dl respectively after being fed 7 days, 15 days, 30 days, 45 days and 60 days. The increase was ranging from 11.42% to 42.85% from the control value (7.00gm/dl). Statistically all the increase values were significant at 5% P-level (Table-1, Fig-1).

Where as, the Hb content in the experimental animals fed with Moringa seeds was observe also in linear enhancement proportional to the day duration. The value recorded were 7.85 gm/dl, 9.1 gm/dl, 9.5 gm/dl 9.75 gm/dl and 10.15 gm/dl respectively after 7 days, 15 days, 30 days, 45 days and 60 days of feeding with Moringa seeds. The percentage of increase ranged from 12.14% to 45% from the control value. All the increased values were found to be statistically significant at 5% P-level (Table-1, Fig-1).

Fig:-1 Haemoglobin (Hb) content in experimental animals fed with Moringa leaves and seeds for different durations.

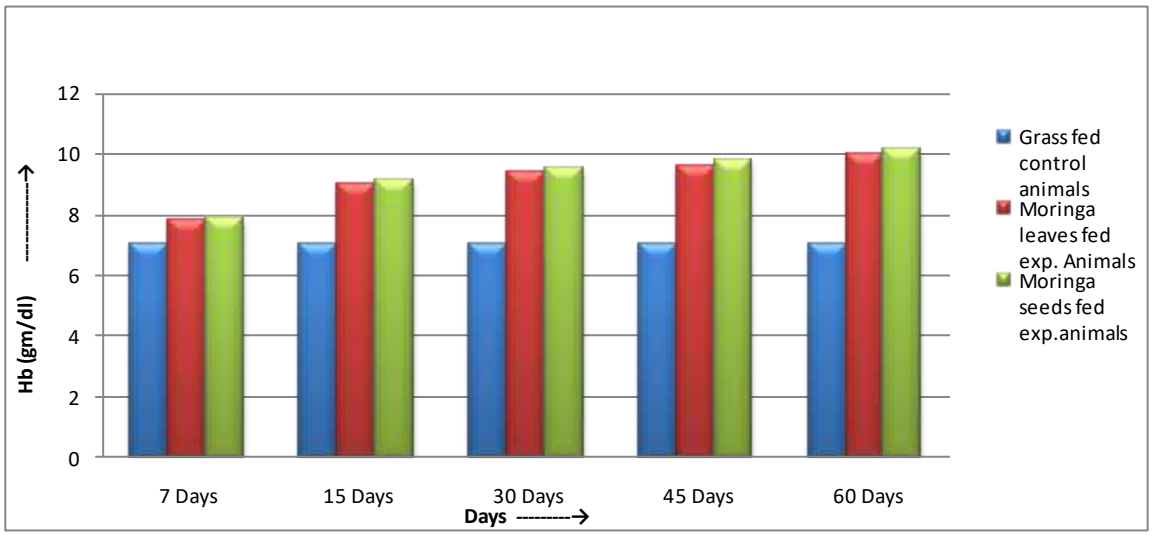

Table -1: Haemoglobin content (Hb) in experimental animals fed with Moringa leaves and seeds for differentduration.

S.N	DAYS	MORINGA LEAVES FED ANIMALS			MORINGA SEEDS FED ANIMALS		
		Values ± S.E	PV	' t'	Values ± S.E	PV	' t'
1	GRASS FED CONTROL	7.00 ± 0.069	----	----	7.00 ± 0.069	----	----
2	7 Days	7.8 ± 0.197	11.42	07.29	7.85 ± 0.05	12.14	10.85
3	15 Days	9.0 ± 0.063	28.57	21.32	9.10 ± 0.116	30.00	22.48
4	30 Days	9.4 ± 0.156	34.28	26.40	9.50 ± 0.032	35.71	28.73
5	45 Days	9.6 ± 0.312	37.14	28.60	9.75 ± 0.372	39.28	25.46
6	60 Days	10.0 ± 0.417	42.85	32.12	10.15 ± 0.352	45.00	32.74

't' = 2.13 (5% P-Level), PV = Percentage variation from control , n = 6

On comparison, the Hb content in the Moringa seds fed experimental animals was marginal more than the Moringa leaves fed experimental animals in every sampling day.

In the present investigation, the scholar has tried evaluate the nutritional as well as medicinal properties of Moringa leaves and seeds on the Hb content. Haemoglobin which is commonly known as respiratory pigment is a chromoprotien, synthesized in the red cells in bone marrow. The synthesis begins in proerythroblasts and continues even into the reticulocyte stage of red cells. As such, when the reticulocyte leaves the bone marrow and passes in to the blood stream, Hb still continues to be synthesized till the erythrocyte become mantined.

According to Guyton (2007) erythrocytes have the ability to concentrate Hb in the cell fluid upto approximetely34 gm per 100 milliliter of the cells. For the synthesis of Hb, iron is one of essential elements besides the globins. The requirement of iron is generally made from the food. Dietary iron is absorbed through the mucosal cells especially of the small intestine as Ferrous (Fe^{+++}) from. Through, in diet the iron is mostly present in Ferric (Fe^{++})state. As such, for the absorption of Iron, Ferric is to be converted into ferrous form. For this, vitamin C, B-complex and amino acids are of optimum help.

In the present project, it has been found that, the experimental animal when fed with Moringa leaves and seeds for 60 days, a continuous rise in the Hb content occur in proportion to the days of feeding. Moringa contains a good amount of Fe, Cu, Ca, B_2, β-carotene, cynocobalamin and vitamin C, which are the main ingredient for the synthesis of Hb and RBC both and may be the factors for increase in Hb content in the present study.

It has been found that patients suffering with bronchial asthama when given dried seeds of *M. oleifera* @3 gm weeks , approx. 3% increase in Hb content was recorded (Agrawal and Mehta, 2008). Abser *et al*., (1977) also reported an increase in HB% in rat when fed with M. oleifera leaves. Chumark (2005) also reported 29% increase in Hb content of rabbit when fed with water extract of Moringa leaves. Arise in Hb% along water extract of Moringa leaves. A rose in Hb% along with other haemotological parameters have been observed by Farjana *et al*.,(2016)in rats, when fed with Moringa leaves for 7 days . They were of the opinion that because Moringa contains good amount of β-carotene which help in producing vitamin A probably help to increase Hb level.

Comparatively, higher increase in Hb content of experimental animals fed with Moringa seeds than Moringa leaves because of Moringa seeds contain more β-carotene (2000µg>0.05µg), more Fe (0.07 mg>0.05 mg) and slightly more cynocobalamin. β-carotene and cynocobalamin are responsible for formation and maturation of RBC. As such, it may be probably one of the reasons for a higher increase in the Hb content, in the seeds fed animals than the leaves fed animals.

Allen *et al*., (2002) have also found that vitamin B_2 was needed for Fe^{++} mobilization, which is essential for Hb synthesis. While, Johnson (2006)was of the view that, if cynocobalamin is deficient in an animal will results in a condition known as a pernicious anaemia. Which is caused by lack of Hb content.

Thus, present finding is in conformity with the view of physiologists and investigators referred above.

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