



STUDY OF ANTIHYPERTENSIVE ACTIVITIES OF WHEAT GRASS (*TRITIMUM AESTIVUM LINN*) IN ALBINO RATS

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ABSTRACT

Context: Hypertension is the most common cardiovascular disease affecting 50% of individuals above the age of 50 years. Whole grain like wheat (*Triticum aestivum Linn.*) may have cardioprotective effect.

Aims: This study was carried out to find out the anti-hypertensive potential of *Triticum aestivum Linn.* by observing its effect on fructose fed hypertensive rats.

Settings and Design: This was a longitudinal study done on thirty healthy albino rats

Methods and Material: Thirty albino rats were grouped into five groups of six rats in each, and housed in separate cages group-wise. The parameters like Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP) and Heart Rate (HR) were recorded on the 16th day of drug administration.

Statistical analysis used: ANOVA test and post hoc Dunnett test using SPSS version 16, unpaired t test

Results: Significant reduction in blood pressure and heart rate was seen.

Conclusions: We found significant favourable effect of *Triticum aestivum Linn* on hypertension, however multiple clinical studies are recommended.

KEYWORDS : Triticum Aestivum Linn, Hypertension

INTRODUCTION:

Cardiovascular disease (CVD) is the principal cause of death worldwide. According to World Health Organization (WHO) cardiovascular diseases contribute to 20% of mortality and is estimated to have caused over 15 million deaths comprising more than one third of all deaths in the year 2001.(1) Hypertension is the most common cardiovascular disease affecting 50% of individuals above the age of 50 years. According to survey the prevalence of hypertension is 972 million worldwide and it keeps on increasing so rapidly that in 2025 this number may exceed 1.56 billion with one in three adults worldwide having raised blood pressure.(2) The Joint National Committee (7th JNC2003) on Hypertension advocates non pharmacological therapy to be an important component of treatment of all patients with hypertension and prehypertension. In some Stage-1 hypertensives lifestyle changes (like dietary restrictions on sodium and alcohol, healthy eating plan, weight reduction in obese and increasing aerobic activity) are sufficient enough to bring down the elevated blood pressure without the need of drug therapy on a daily basis. In others, though lifestyle modification is insufficient and pharmacological treatment becomes necessary, these lifestyle changes need to be continued lifelong, since they facilitate the effects of drugs.(3)

Whole grain like wheat (*Triticum aestivum Linn.*) finds a place in the recommended DASH diet and is an important component of human diet, particularly in developing countries. Epidemiological studies reveal that consumption of whole grain and its products are protective against chronic diseases such as cardiovascular diseases, diabetes and cancer. Wheat when harvested as young green shoots germinated over a period of 6-10 days is generally called 'wheat grass' and it is known as 'functional food' during which vitamins, minerals and phenolic compounds such as flavonoids are synthesized in wheat sprouts reaching maximum antioxidant potential.(4) Herbal products are highly acceptable and used 70 to 80% of the world population for their primary health care, especially in developing countries, due to their easy access, lesser side effects and low cost. It is also known to possess antioxidant as proven in several studies. (5,6) This property might protect the heart and preventing the most important cardiovascular complication and cause of death due to hypertension i.e. myocardial

infarction. This study will definitely help and add knowledge in scientific exploration of antihypertensive & cardioprotective potential of this promising herb in animal models. This study was carried out to find out the anti-hypertensive potential of *Triticum aestivum Linn.* by observing its effect on fructose fed hypertensive rats.

SUBJECTS AND METHODS:

This was a longitudinal study done on thirty healthy albino rats weighing between 100-200gms. Prior to the dietary manipulation, all rats were fed standard rat chow, containing 60% vegetable starch, 11% fat and 29% protein, water ad libitum and maintained on 12 hours light/dark cycle. Simultaneously rats were acclimatized to the procedure of blood pressure measurement daily for one week.

DRUGS & CHEMICALS:

The drugs selected for the study were obtained in pure powder form from the following sources.

- 1- Fructose – Analytical Grade
- 2- *Triticum aestivum* powder –Girmes wheat grass, Pune
- 3- Carvedilol – Alkem Company, Mumbai, Maharashtra, 400013

Hypertension was induced in albino rats by administration of High Fructose Diet, as per the method described by Hwang et al(1987).(7) Plan of the study was as follows. Thirty albino rats were grouped into five groups of six rats in each, and housed in separate cages group-wise. The parameters like Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Pressure (MAP) and Heart Rate (HR) were recorded on the 16th day of drug administration. The mean of three observations for each parameter were taken as the final recorded value of each rat of all groups.

Group	Diet	Drug	Dose	Duration
Control	Standard Diet	Distilled Water	0.5 ml	For 15 Days Orally
2	High Fructose Diet	Distilled Water	0.5 ml	
3	High Fructose Diet	Triticum aestivum Extract	200mg/kg	

4	High Fructose Diet	Triticum aestivum Extract	250mg/kg	
5	High Fructose Diet	Carvedilol	5mg/kg	

BLOOD PRESSURE MEASUREMENT:

On 16th day fructose diet was withdrawn. Rats were removed from the cages and taken to the laboratory at 09.00hr, they were allowed free access to normal chow diet & water, kept calm and quiet (noise free) area before the blood pressure measurement. The body weight of all the rats was measured. The blood pressure of each rat was measured at 13.00hr. The tail cuff method without external pre heating was used using NIBP system by standard method.

Statistical Analysis--The comparison were done using ANOVA test and post hoc Dunnett test using SPSS version 16, unpaired t test and p<0.05 was considered as statistically significant.

Table No - 2: Effect of *Triticum aestivum* Linn. on Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial Blood pressure (MAP) of fructose induced hypertensive rats 15 days after continuous administration (Dose in mg/Kg)

Parameters (mmHg)	Group 1 Control (Distilled Water)	Group 2 (Fructose solution 10%)	Group 3 (<i>Triticum aestivum</i> 200mg/kg +Fructose solution 10%)	Group 4 (<i>Triticum aestivum</i> 250mg/kg +Fructose solution 10%)	Group 5 (Carvedilol 5mg/Kg +Fructose solution 10%)
SBP ± SE	118.16 ±0.723	132.33 ±1.52	125.83 ±0.456	***119.50 ±0.67	***104.34 ±2.16
DBP ± SE	96.00 ±0.81	111.167 ±3.07	*103.167 ±1.74	***98.833 ±1.13	***84.167 ±1.35
MAP ± SE	103.5 ±0.61	***118.16 ±1.7	*110.67 ±1.2	***105.83 ±0.60	***91.00 ±1.06
HR± SE	372.16 ±7.67	***467 ±5.91	*418.34 ±4.94	***404.00 ±4.67	***333.00 ±5.38

* P<0.05,** P<0.01,*** P<0.001

DISCUSSION:

This study was carried out to find out the anti-hypertensive potential of *Triticum aestivum* Linn. by observing its effect on fructose fed hypertensive rats. Wheat grass refers to the young grass of wheat (*Triticum aestivum*) germinated for a period of 6 to 10 days. It contains vitamin C and E, β carotene, ferulic acid, vanilic acid and phenols, especially flavonoids. Wheat grass juice is found to have healing properties in various degenerative diseases and is known to benefit blood cells, bones, glands, kidney and other parts of the body. (8,9,10) Since little or no work has been done on the antihyperlipidemic, antihypertensive effects of wheat grass, the present study was designed to analyse its role on Isoproterenol induced myocardial insufficiency and hyper tension.

A significant rise in systolic, diastolic and mean arterial pressure along with an increased heart rate was noticed, when on fructose diet. The mechanism of hypertensive effect is postulated to be due to hyperinsulinemia and insulin resistance leading to a rise in blood pressure. There was significant rise in all blood pressure parameters of rats maintained on high fructose diet as compared to control rats on normal chow diet. *Triticum aestivum* was found to exhibit significant antihypertensive effect in the form of systolic blood pressure, diastolic blood pressure, mean arterial pressure and the heart rate. With the increase of the dose of the test drug, antihypertensive effect was significantly increased. With the increasing duration of treatment, the effect was increased & comparable to that of standard drug, Carvedilol. (9,10)

To conclude, we have evaluated the therapeutic potential of wheat grass in hypertension. We found significant favourable effect on reducing hypertension. However multiple clinical studies involving human volunteers are recommended to evaluate their favorable effect.

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RESULTS:

The effect of *Triticum aestivum* on Fructose Induced Hypertension in rats is evident in table 1. Effect of *Triticum aestivum* Linn. on blood pressure and heart rate of fructose induced hypertensive rats 15 days is shown in table 2. Significant reduction in blood pressure and heart rate is shown in the table.

Table No 1: Body weight and Pattern of hypertension induced by Fructose (10%) diet in albino rats

Group	Diet Consumed	Body Weight (gms)	SBP			DBP		MAP	HR (Beats/min)
			mmHg						
1	Normal chow diet	200.16 6.5	118.1 2.2	96.0 2.52	103.15 2.25	372.42 13.05			
2	Fructose (10%) diet	2042.4	*132.64 0.57	*109.1 0.71	*116.66 0.515	*467.44 4.24			

*P <0.05

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