

# Effects of Coarse Grains on HbA1c Level of Type 2 Diabetic Patients in Urban Area of Bhopal (M.P)

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**Abstract:-** The benefits of coarse grains one or many had been researched in past to prove their beneficial effects on type 2 diabetes, weight, CVD, B.P. But no research had been done on collective effect of all coarse grains (black gram, cracked wheat, corn meal, millets, pulses, oats, soy) on HbA1c level of type 2 diabetic individuals. So, this topic is chosen for research after finding the need of this research for type 2 diabetic individuals. The hypothesis is that there will be no effect of coarse grain consumption on HbA1c level of type 2 diabetic patients. The result indicates average reduction of 1.13 in HbA1c level of the type 2 diabetic patients of experimental group. This proves positive effect of coarse grains on HbA1c level of type 2 diabetic individuals.

**Keywords:-** Black Gram, Cracked Wheat, Corn Meal, Millets, Pulses, Oats, Soy, Type 2 Diabetic Patients, HbA1c.

## I. INTRODUCTION

The prevalence of diabetes is increasing in word and India tremendously. Soon making India diabetic hub<sup>8</sup>. Hence the need of widely applicable strategies to reduce diabetes and the complications associated with it. Diabetes is fundamentally a condition of disordered metabolism<sup>23</sup> in which the amount of glucose (sugar) in the blood is too high because the body can't use it properly. In past researches it was proven that if glucose levels of type 2 diabetic patients can be managed by consumption of certain food. If the glucose levels are managed diabetes can also be managed. So if the diet of type 2 diabetic patient is planned properly according to the individual requirements glucose level of the patient could be managed. It will require dietary modifications as well as life style changes. In this respect coarse grains play a vital role as Indian diet mostly composed of coarse grains in one or other form.

In this research coarse grains were considered as all dried grains (pulses and cereal) consumed either in powdered form or broken but with its all physical components intact as whole grain atta, cracked wheat etc. The whole of grain consist of so many vital nutrients which help in managing diabetes and its complications in many ways. The benefits of coarse grain (cereals) in form of whole, cracked for atta with all physical constituents intact were documented in many repeated and recent studies.

1. Reduction in stroke risk by 30-36% ,
2. Reduced type 2 diabetes risk by 21-30%
3. Reduced heart disease risk by 25-28%
4. Better weight maintenance or weight loss to some extent
5. Healthier blood pressure levels

Benefits of pulses with its husk intact in whole form like kidney beans or split form like black gram.

Dietary fiber has a range of health benefits:

1. Lower risk of heart disease
2. Manage and reduce risk of type 2 diabetes
3. Improved weight control
4. Improved digestive health
5. lower risk of digestive disorders (grains & legumes nutrition council 2016).

The possible components of coarse grains which makes them good for type 2 diabetic patients is that they are rich in energy-giving carbohydrates, with a low glycemic index rating for blood glucose control, a good source of B-group vitamins (especially folate), iron, zinc, calcium and magnesium. Abundance in fiber, including both insoluble and soluble fiber, plus resistant starch for colonic health benefits.

Despite so many health benefits of coarse grains they are not abundantly consumed by the individuals. So it become necessary to do the research to make people aware of benefits of coarse grains, to give them variety in their diet, to make their daily diet plan interesting and help them manage their HbA1c level, minus the monotonicity of their diet.

### A. Cereals and Pulses-Glucose

- High intake of whole grain cereals their products such as whole wheat bread is associated with a 20%-30% reduction in the risk of type 2 diabetes<sup>5</sup>. Many prospective studies have also shown a general inverse relationship between the consumption of fiber rich foods and the risk of type 2 diabetes. It is also noteworthy that in all of these studies the intake of cereal fiber in particular was inversely associated with the incidence of diabetes<sup>18</sup> where as some clinical trials have shown an improvement in insulin sensitivity, while other studies have reported no effect on either glucose or insulin metabolism<sup>4</sup>. The other study found that by suppressing free fatty acids levels in the blood, whole

barley regulates blood sugar better than other grains and for upto 10 hr after consumption<sup>14</sup>. The protective effects of whole grains may depend on the presence or interaction of several biologically active constituents including dietary fiber, vitamin E, magnesium, folate and other nutrients and non-nutrients<sup>21</sup>. Dietary fiber has been shown to decrease glucose, insulin and serum lipid concentrations in both diabetic and nondiabetic person<sup>1,6</sup>. Magnesium a rich constituent of the grains germ is associated with low insulin concentration<sup>10,11</sup> and a low incidence of type 2 diabetes<sup>12,20,22</sup>. Association was found between whole grain intake and fasting insulin concentration was attenuated after adjustment for dietary fiber and magnesium. This suggests that the apparent insulin-sensitizing effect of whole grains might be partially mediated by the effect of these nutrients<sup>13</sup>. Fibre intake is not only inversely associated with fasting insulin<sup>9</sup>, but insoluble and cereal fiber intakes significantly reduce the risk of type 2 diabetes<sup>12,20,22</sup>. The improved insulin sensitivity with higher fiber diets may occur because the gel forming properties of soluble fibers delays the rate of carbohydrate absorption<sup>2</sup>. In one study it was found that insoluble cereal fiber rather than soluble fiber was the predominant fiber having a favorable effect on fasting insulin and magnesium is another component in whole grains that may improve insulin sensitivity. Intracellular magnesium has also been linked to insulin sensitivity in metabolic studies<sup>15,19</sup> and clinical studies have shown that supplementation with magnesium improves insulin sensitivity<sup>16,17</sup>. Many researches were done in past concluding and proving the beneficial effects of fiber and magnesium, Low GI of cereals and pulsed in reducing the risk of type 2 diabetes by lowering fasting glucose and glucose levels in diabetic and non-diabetic individuals. Legumes may also reduce the risk of diabetes through the second-meal effect. The second meal effect is the ability of legumes to lower both postprandial glycemia after the meal at which they are consumed and also at a subsequent meal later in the day or even on the following day<sup>3</sup>.

There are certain limitations of the study which could cause hindrance to the study. Those limitations are as given

- Patient not adhering to the diet for the prescribed time.
- Non-availability of patient.
- Patient fasting recorded.
- Patient drop-out reported.
- Improper data maintenance.
- Non availability of coarse grains (jawar, bajara) throughout the year.

## II. METHODOLOGY

For the purpose urban area of Bhopal(M.P) is taken as sample area. Then the area was divided into five zones i.e north, east, south, west and center. As the research work is experimental so the sample size taken was 30. So that statistics could be used to its best to verify the work, with 6 patients from each zone. Sample Size:- The sample thus selected was counselled for lifestyle changes (diet, exercise and sleep)

- **Eligibility criteria of sample:-** The sample thus taken was supposed to be type 2 diabetic, resident of Bhopal's urban area because the study was on type 2 diabetic patients of urban area of Bhopal.
- **Locations where the data were collected:-** The required data was collected from Krishana diabetic clinic and research center near matamandir, Bhopal M.P (India)
- **Sampling technique:-** Non random sampling (purposive) method was used to select the sample. As specific type of sample was required for the research work.
- **Period:-** The sample was observed for the time period of 3-4 months for the required data. HbA1c is done after 3 months as it provides the average glucose level for the period of three months
- **Tools Used -** Biochemical tests was used to collect the required data for HbsA1c level

## III. RESULT

HbA1c level		
	Control Group	Experimental Group
Initial (avg)	8.2	8.72
Final (avg)	8.02	7.72
Diff (avg)	-0.18	-1.13
Percentage	-2.19%	-12.95%

Fig 1

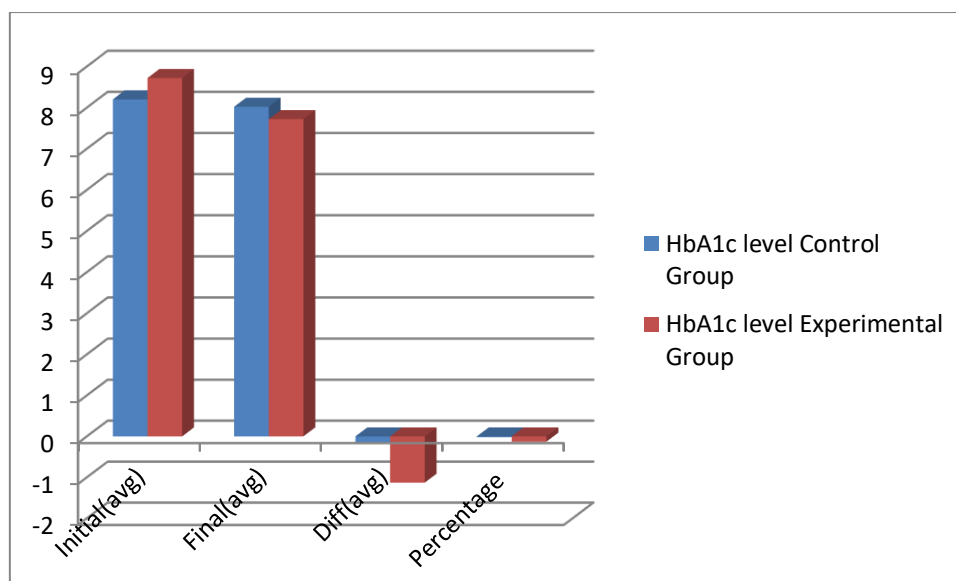


Fig 2

In the result it was found that regular consumption of coarse grains lead to average HbA1c decrease of 1.13 reported in experimental group. Whereas in control group decrease of 0.188 was noticed in type 2 diabetic patients.

➤ **OTHER EFFECTS OF STUDY:-** There was no harmful effect of the study on the sample where as it had some beneficial effects as relieve in constipation, less time taken in morning, long satiety .

#### IV. CONCLUSION

The research concludes that the consumption of coarse grains on regular base has significant positive effect on reduction of HbA1c level in type 2 diabetic patients.

**Generalization of result:-** The result could be generalized for the whole Bhopal or M.Ps or on Indias urban area as the sample taken represents whole Bhopal in best possible way.

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