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## Effects of coarse grains on lipid profile of type II diabetic patients of Urban Area of Bhopal (M.P)

**Neetu Pal and Dr. Meenal Phadnis**

### Abstract

The benefits of coarse grains one or many had been researched in past to prove their beneficial effects on Type II 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 lipid profile of type II diabetic individuals. So, this topic is chosen for research after finding the need of this research for type II diabetic individuals as CVD is one of the complications of diabetes. After consumption of coarse grain on regular basis the result indicates average reduction in the final readings of S. Cholesterol (-18.86mg/dl), triglyceride (-18.64mg/dl) and LDL (-18.36mg/dl) of experimental group where as average increase of 2.58 mg/dl in final reading of HDL of experimental group

**Keywords:** Black gram, cracked wheat, corn meal, millets, pulses, oats, soy, Type II diabetic patients, S. cholesterol, triglyceride. LDL, HDL

### Introduction

The prevalence of diabetes is increasing in word and India tremendously. Soon making India diabetic hub. (Joshi SR *et al* 2007, Kumar A *et al* 2013) <sup>[14, 15]</sup>. Hence the need of widely applicable strategies to reduce diabetes and the complications associated with it. Cardiovascular disease itself is a life threatening lifelong disease but when it comes along as complication with type II diabetes it poses more threat to the life of the patient lifelong. So it is the requirement of the type II diabetic patient and the society to have some research in this area also. It was proven by late researches that coarse grain one or other have beneficial effects on lipid profile of type II diabetic patients, CVD patients and normal individuals.

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 reducing weight of type II diabetic patients. The benefits of coarse grain (cereals) in form of whole, cracked for atta with all physical constituents intact documented in many repeated and recent studies studies are

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 fibre has a range of health benefits:

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

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The possible components of coarse grains which makes them good for type II 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 fibre, including both insoluble and soluble fibre, plus resistant starch for colonic and cardiovascular health benefits.

Despite so many health benefits of coarse grains they are not abundantly consumed by the individuals. So it became 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 lipid profile and to minus the monotony of their diet.

### Cereal and Pulses-Cardiovascular Disorders (CVD)

Cardiovascular diseases or disturbed lipid profile is also a complication of type 2 diabetes

.Many researches have been done to prove the beneficial effects of whole grains and pulses on lipid profile and cardiovascular diseases. Several studies shown that subjects who ingest three or more portions of foods per day based on whole grain cereals have a 20-30% lower risk of CVD than subjects who consume predominantly refined cereals (Gil *et al* 2011) [16]. Regular consumption of whole grain cereal foods has been found to be consistently associated with a lower risk of developing cardiovascular disease in both cross sectional and longitudinal epidemiological studies (riccardi & rivellese 2000) [25]. Barley fibre increases the excretion of bile acids into the intestine. Since these bile acids are comprised of oxidized cholesterol. This lowers total serum (Nilsson *et al* 2006) [24]. Studies have confirmed that barley lowers cholesterol (Behall *et al* 2006) [6], low density lipoprotein (LDL) (Abu Mweiss *et al* 2010, Keenan *et al* 2007) [1, 22]. According to scientific research results it has been known to scientists for over 2 decades that beta-glucan (oats beta-glucan) has strong cholesterol and triglyceride lowering properties leading to reduced cardiovascular diseases (Daou *et al* 2012) [10]. Behall *et al* 1997 [7] reported that 2.1g of beta glucan per day reduced total cholesterol levels by 9.5% (Behall *et al* 1997) [7]. Beta glucans decreases the absorption and re-absorption of cholesterol, bile acids and their metabolites by increasing the viscosity of the gastrointestinal tract contents (Guo L *et al* 2014) [17]. The mechanism for beta-glucans to lower LDL is considered to be mediated by bile acids binding property of beta-glucans. Other soluble dietary fibres that are resistant to digestion by human enzymes such as pectins, guar gums, psyllium can also have similar effects (Anderson *et al* 1990, Andersom *et al* 1995) [2]. Whole grains are rich sources of fermentable carbohydrates including dietary fibre, resistant starch and oligosaccharides. The short chain fatty acid production in intestinal microflora has been related to lower serum cholesterol (Slavin 2004, Truswell 2002) [26, 5]. Truswell 2002 [5] concluded that enough evidence exists that wholegrain products may reduce the risk of CHD (Katz *et al* 2001) [21]. In a randomized controlled clinical trials, the consumption of wholegrain and legume powder reduced insulin demand, lipid peroxidation and plasma homocysteine concentrations in patients with coronary artery disease (Jang *et al* 2001) [19]. Phytosterols plant sterol and stanols are found in grains and legumes are known to reduce cholesterol (Yankan *et al* 2001) [27]. Phytic acid, lectins, phenolics, amylase inhibitors and saponins have also been shown to lower plasma cholesterol and triacylglycerols (slavin *et al* 1999) the favourable effect of whole grains may be due

to lowering of lipoprotein-mediated risk, notably a reduction in plasma total cholesterol and/LDL cholesterol and triglycerides (jarvi *et al* 1999, chandalia *et al* 2000) [20, 8]. Thus, there is a substantial body of literature showing that dietary fibres in particular soluble fibre decreases blood cholesterol concentration and may thereby modify the risk of coronary artery disease (Anderson *et al* 1999) [3], Health claims regarding the association between cholesterol lowering and soluble fibre from oat products/oats beta glucan(OBG) have been approved by the food standards agencies world wide (Health Canada, EFSA, Food standards Australia, MH Malaysia, Commission Regulation Eur-lex) The hypothesis of the research is that there will be no effect of coarse grains on lipid profile of type II diabetic patients of urban area of Bhopal M.P.

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

- A. Patient not adhering to the diet for the prescribed time.
- B. Patient moves out of the place.
- C. Patient feasts many times during the test period.
- D. Patient pulls out of the work in the middle.
- E. Patient does not keep the records properly.
- F. Non availability of coarse grains (jawar, bajara) throughout the year.

### 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 -30 so that statistics could be used to its best to verify the work, with 6-6 patients from each zone.

**Sample Size:** The sample thus selected was divided into two groups:-

- A-Control group
- B-Experimental group

**Eligibility criteria of sample:** The sample thus taken was supposed to be type II diabetic, resident of Bhopal, s urban area because the study was on type II diabetic patients of urban area of Bhopal, also their lipid profile was also considered as one of the factor for the study to be chosen as sample.

**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:** The sampling method used to select the sample was purposive 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. Everything was recorded at the prescribed time decided previously for the different attributes/variables. For this the sample of experimental was asked to consume 200-250gm of coarse grain (daliya, whole wheat atta, makki ka atta, oats, jawar, bajra, moong, urad, kidney beans, lentil, black gram, etc).The improvement was tested on different variables after a period of 3-4 months. First reading was taken the time the sample was selected for the study, then the follow up was made regularly every month and then after 3<sup>rd</sup> month final reading was taken.

**Tools Used**

Different sort of tools were used to collect the required data for the proposed research work. Those tools are listed below.

**Questionnaire:**

**Lipid Profile:** S. Cholesterol

Total Triglyceride

LDL

HDL

**Result**

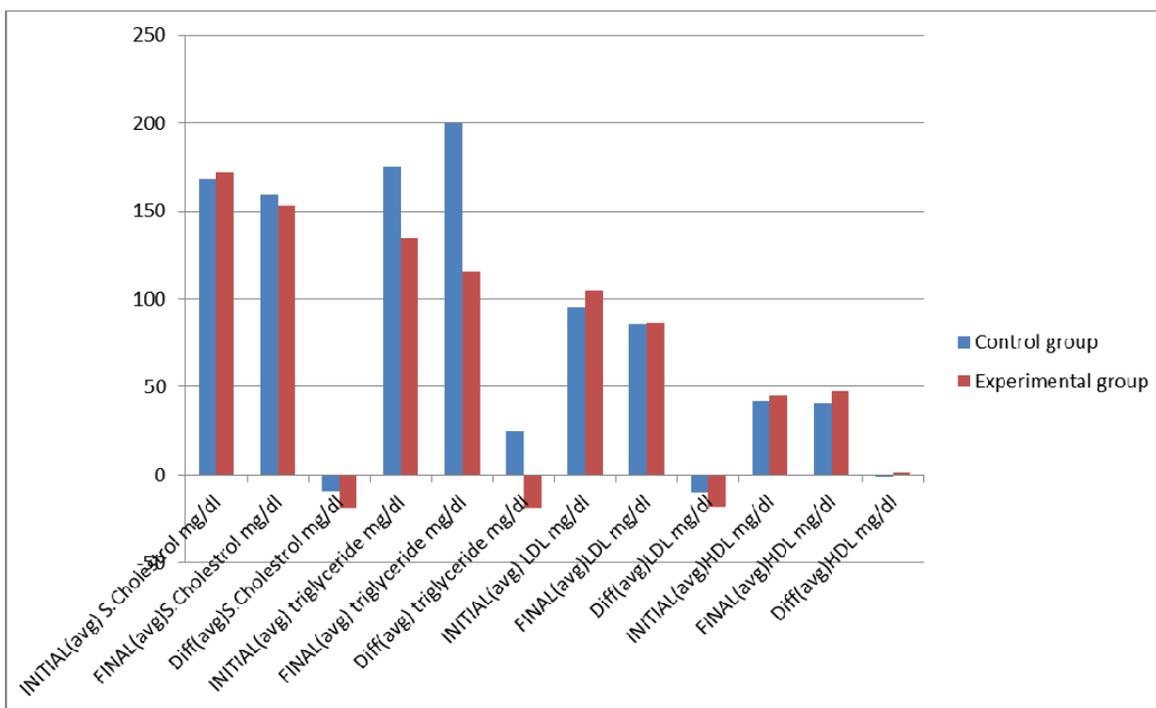
S.Cholestrol mg/dl		
	CONTROL GROUP	EXPERIMENTAL GROUP
INITIAL(avg)	168.38	171.86
FINAL(avg)	159.39	153
Diff(avg)	-8.99	-18.86

Triglyceride mg/dl		
	CONTROL GROUP	EXPERIMENTAL GROUP
INITIAL(avg)	174.93	134.47
FINAL(avg)	200	115.82
Diff(avg)	25.29	-18.64

LDL (Low density lipoprotein) mg/dl		
	CONTROL GROUP	EXPERIMENTAL GROUP
INITIAL(avg)	95.2	104.92
FINAL(avg)	85.36	86.55
Diff(avg)	-9.84	-18.36

HDL( High density lipoprotein)mg/dl		
	CONTROL GROUP	EXPERIMENTAL GROUP
INITIAL(avg)	41.47	46.06
FINAL(avg)	40.62	47.64
Diff(avg)	-0.86	2.58

In the research it was found that the average S. Cholesterol of control group after the time period of three months 159.39 mg/dl to initial of 168.38 and that of experimental group was 153 mg/dl to initial of 171.86 mg/dl, average triglyceride of control group after the time period of three months 200 mg/dl to initial of 174.93 mg/dl and that of experimental group was 115.82 mg/dl to initial of 134.47 mg/dl, average LDL of control group after the time period of three months 85.36 mg/dl to initial of 95.20 mg/dl and that of experimental group was 86.55 mg/dl to initial of 104.92 mg/dl. average HDL of control group after the time period of three months 40.62 mg/dl to initial of 41.47 and that of experimental group was 47.64 mg/dl to initial of 46.06 mg/dl. So significant improvement is seen in the lipid profile of type II diabetic patients of experimental group.



The average S. Cholesterol reduction of experimental group is -18.86mg/dl were as average S. Cholesterol reduction of -8.99 mg/dl was found in control group.

The average triglyceride reduction of experimental group is -18.64mg/dl were as average triglyceride increase of +25.29 mg/dl was found in control group

The average LDL reduction of experimental group is -18.36mg/dl were as average LDL reduction of -9.84 mg/dl was found in control group

The average HDL increase of experimental group is +2.58mg/dl were as average HDL reduction of -0.85 mg/dl was found in control group

**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.

### Conclusion

In the research it was found that the daily consumption of coarse grain as regular diet helps in managing lipid profile of type II diabetic patients by helping him to decrease S. Cholesterol, triglyceride and LDL levels and increase HDL level.

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.

The interpretation made in the study is that the regular consumption of coarse grain by the type II diabetic patients reduces S. cholesterol, triglyceride and LDL cholesterol levels and increases HDL cholesterol levels without any subsequent side effects.

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